

LED MAXISEMPIONE 160W - TEST REPORT



La certificazione fotometrica dei nostri apparecchi viene sempre effettuata da un istituto esterno. Efficienza luminosa e "lm Output" sono quindi il risultato di tale istituto.

The photometric certification of our appliances is always carried out by an external institute. Luminous efficiency and "lm Output" are therefore the result of this institute.

A richiesta - On demand

0-10V

DYNA
control

Pag. 8

WIRELESS

Pag. 9

Gamma di apparecchi a LED per illuminazione di aree urbane. Ideale per l'illuminazione di strade, parcheggi, aree residenziali.

Installazione: attacco palo in alluminio pressofuso idoneo per pali di diametro min. 55mm - max. 65mm, orientabile da ± 0 a $\pm 20^\circ$.

Corpo e telaio: in alluminio pressofuso UNI 5076 verniciato con polvere termoindurente poliesteri.

Imbocco a palo: in alluminio pressofuso UNI 5076, verniciato con polvere termoindurente poliesteri, con goniometro graduato per un corretto puntamento del fascio luminoso.

Verniciatura: di tipo poliesteri eseguita a polvere, resistente agli agenti atmosferici e alla corrosione e garantita per 1.200 ore in nebbia salina (ISO 9227). Colore Grigio RAL9007

Schermo: vetro temperato di spessore 4mm resistente agli shock termici e agli urti.

Sorgente: LED **SAMSUNG** SEOUL

Temperatura di colore: 4000K; altre temperature di colore a richiesta (2200K - 2700K - 3000K - 5000K - Consegna 60 giorni).

Protezione alle sovratensioni inclusa:

Modo differenziale 6kV (L-N)

Modo comune 8kV (L-GND, N-GND, L&N-GND)

A richiesta: versione con protezione maggiorata (10kV) contro gli impulsi aggiungendo il cod. RO0640/N.

Driver: incorporato

Fattore di potenza $\geq 0,98$.

Norme di riferimento: IEC 61000-4-5; EN60598-1; EN60598-2-1; EN62471; EN62031; EN60598-2-3; EN61547

Range of LED luminaires to light up urban areas. Suitable for roads, car parks and residential areas lighting.

Installation: pole attachment in die cast aluminium suitable for poles with a diameter of min. 55mm - max. 65mm, that can be pivoted ± 0 to $\pm 20^\circ$.

Housing and frame: made by UNI 5076 die-cast aluminium, coated with polyester thermoset powder.

Pole entrance: made by UNI 5076 die-cast aluminium, coated with polyester thermoset powder, with graduated goniometer to allow the correct orientation of light beam.

Coating: coated with powdered polyester, resistant to atmospheric agents, corrosion and guaranteed for 1.200 hours in saline mist (ISO 9227). Grey RAL 9007 color.

Shield: tempered glass with 4mm thickness resistant to thermal shocks and collisions.

Light source: LED **SAMSUNG** SEOUL

Color temperature: 4000K; other color temperatures available on demand (2200K - 2700K - 3000K - 5000K. Delivery time: 60 days)

Protection against overvoltages included:

Differential mode 6kV (L-N)

Standard mode 8kV (L - GND, N-GND, L&N-GND).

On demand: this version with greater protection (10kV) with code RO0640/N.

Driver: included

Power factor $\geq 0,98$

Standard reference: IEC 61000-4-5; EN60598-1; EN60598-2-1; EN62471; EN62031; EN60598-2-3; EN61547

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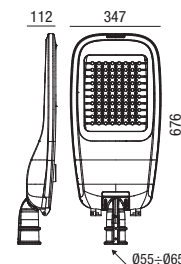
Articolo: LED Maxisempione - CELL - 160W HE

Codice: 36250S (4000K) - 36250/3KS (3000K)

IP66	IK09	CRI >70	+50 C -40	850°	17	N	RoHS compliance	TECEE	LOW FLICKER	RG0
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Caratteristiche meccaniche - Mechanical features

Corpo - Body:	Alluminio stampato - Moulded aluminium
Cornice - Frame:	Alluminio stampato - Moulded aluminium
Colore - Colour:	Grigio RAL 9007 - Grey RAL 9007
Lenti - Lenses:	PMMA stampato - Moulded PMMA
Schermo - Shield:	Vetro temperato - Tempered glass
Viteria - Screws:	INOX AISI 304
Dissipazione - Dissipation:	Statica - Static
Peso - Weight:	7,00 Kg



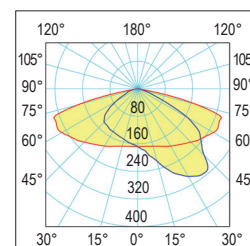
Caratteristiche elettriche - Electrical features

Alimentazione - Power supply:	220-240V ac - 50/60Hz
Potenza - Power:	160W
Fattore di potenza - Power factor:	> 0,98
Corrente di spunto - Inrush current:	50A - 200µS
Efficienza - Efficiency:	92%
Filtro antidisturbo - Noise filter:	EN 55015
Alimentatore - Driver:	PHILIPS XTANIUM - Incluso - Included - DIM 0-10V
Aspettativa di vita - Life expectation:	100.000h (L90/B10)
Indice Mac Adam - Mac Adam index:	3
Rischio fotobiologico - Photobiological risk:	RG0
Protezione sovratensioni - Surge protection:	8KV - Differential mode 6KV - Common mode



Caratteristiche illuminotecniche - Photometric features

Tipo di LED - LED type:	LED LUMILEDS LUXEON 3030 HE PLUS
Flusso luminoso - Luminous flux:	23.200 Lm
Lm/W:	145
CCT:	4.000 K (on demand 3.000 K)
Ottica secondaria - Secondary optic:	ST (Street light)







ST/CDL
Stradale - Street optic

Accessori - Accessories

Cod. R00640/N - Surge protector (non incluso)
DYNA SYSTEM
DALI
WIRELESS
NEMA SOCKET

Conforme alle seguenti norme - Complying with the following standards

Sicurezza - Safety:	Generale - General:	EN 60598-1	   
	Particolari - Particular:	EN 60598-2-1	
	Moduli LED - LED modules:	EN 62031+A1	
Sicurezza fotobiologica - Photobiological safety		EN 62471 (Risk exempt)	
Esposizione umana ai campi elettromagnetici - Human exposure to electromagnetic fields:		EN 62493	
Immunità EMC - EMC immunity:		EN 61547	
Compatibilità elettromagnetica - Electromagnetic compatibility:		EN 61000-3-3	
Limiti di emissioni armoniche - Limits of harmonic emissions:		EN 61000-3-2	

LED Minisempione - LED Sempione - LED Maxisempione - LED Megasempione

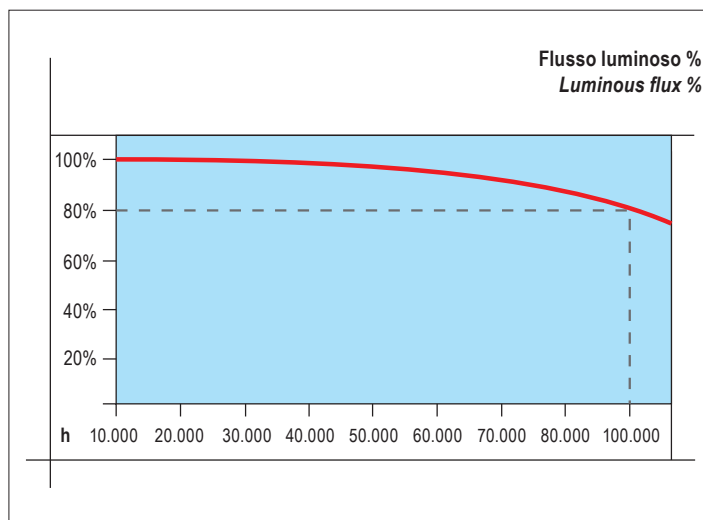
Aspettativa di vita del LED

Al contrario delle lampade tradizionali, non tendono a spegnersi improvvisamente esaurita la loro vita utile, ma diminuiscono lentamente il loro flusso iniziale fino ad esaurirsi. Il LED non si rompe (se non per difettosità), ma si determina un decadimento continuo. Il calo del flusso del LED, definito come vita utile, è rappresentato dalla sigla L80 (vedi grafico), che significa flusso al 80%. Il valore "B", seguito da un valore compreso tra 10 e 50, indica la qualità del componente utilizzato, definendo la percentuale di LED che allo scadere delle 100.000 ore non mantiene le caratteristiche dichiarate.

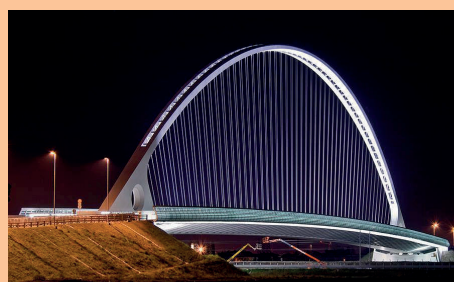
LED service life expectancy

Unlike traditional lamps, they do not tend to go out suddenly at the end of their useful life, but slowly decrease in flux until they expire. The LED does not break (unless it is defective), but declines gradually in performance. The drop in LED flux, defined as the useful life, is represented by the acronym L80 (see graph), which means flux at 80%. Value "B" followed by a value between 10 and 50 indicates the quality of the component being used, defining the percentage of LED that does not maintain the declared characteristics when the 100,000 hours have elapsed.

LED: mantenimento del flusso luminoso - TM21 (compreso fine del ciclo di vita) LED: maintenance of the lighting flux - TM21 (including end of life cycle)						
	n° LED	W	L80B10 @ta: +25°C	L80B10 @ta: +45°C	L90B10 @ta: +25°C	L90B10 @ta: +45°C
LED Minisempione	128	50	> 100.000 h	> 100.000 h	70.000 h	50.000 h
	128	75	> 100.000 h	> 100.000 h	70.000 h	50.000 h
LED Sempione	192	95	> 100.000 h	> 100.000 h	70.000 h	50.000 h
	192	120	> 100.000 h	> 100.000 h	70.000 h	50.000 h
LED Maxisempione	320	160	> 100.000 h	> 100.000 h	70.000 h	50.000 h
	80	210	> 100.000 h	> 100.000 h	70.000 h	50.000 h
LED Megasempione	144	250	> 100.000 h	> 100.000 h	70.000 h	50.000 h
	144	300	> 100.000 h	> 100.000 h	70.000 h	50.000 h

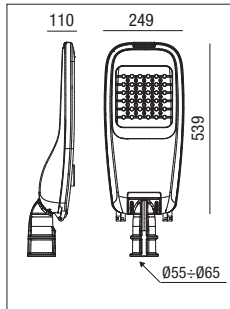


Test **LM79 - LM82 - TM21**
certificato da laboratorio
accreditato
LM79 - LM82 - TM21 Test
certified by an external laboratory

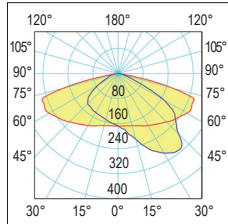


I modelli della serie LED Sempione sono conformi alle prove di vibrazione, secondo la **Norma EN 60598-1** certificata da Ente esterno: **illuminazione stradale - Vibrazione degli apparecchi di illuminazione**
The models of the LED Sempione series comply with vibration tests, according to the EN 60598-1 standard certified by the external body: Street lighting - Vibration of lighting fixtures

LED Minisempione

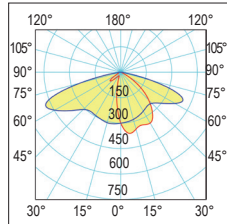


Optica di serie Standard optic

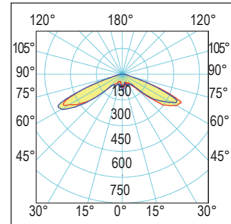


ST/CDL
Stradale - Street optic

Optiche a richiesta Optics on demand



Optica stradale consigliata per strade con pista ciclabile
Road optics recommended for roads with cycle tracks



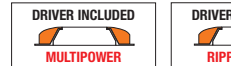
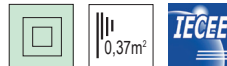
Optica stradale consigliata per illuminazione parchi
Road optics recommended for lighting in parks



220-240 Vac 110 Vac a richiesta on demand

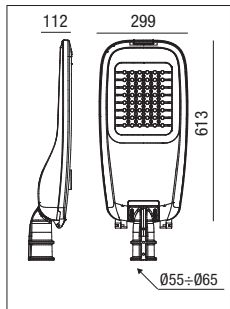
50/60 Hz IP66 IK09

CRI >70 +45°C -30°C

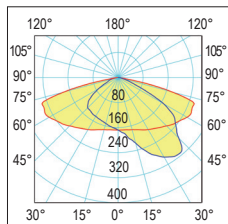


colour	W	Led SMD	Optic	K	nominal lm tc = 25°C	lm output	lm/W	pcs	Kg	CELL	Euro
0-10V	G	20 N° 128 led 3030	ST	4000	3.450	3.000	150	1	5,00	36000/20S	205,00
0-10V	G	30 N° 128 led 3030	ST	4000	5.200	4.500	150	1	5,00	36000/30S	210,00
0-10V	G	40 N° 128 led 3030	ST	4000	6.900	6.000	150	1	5,00	36000/40S	215,00
0-10V	G	50 N° 128 led 3030	ST	4000	8.250	7.500	150	1	5,00	36000S	220,00
0-10V	G	60 N° 128 led 3030	ST	4000	10.350	9.000	150	1	5,00	36001/60S	255,00
0-10V	G	75 N° 128 led 3030	ST	4000	12.400	11.250	150	1	5,00	36001S	260,00
0-10V	G	50 N° 128 led 3030	ST	3000	7.840	7.250	145	1	5,00	36000/3KS	220,00
0-10V	G	75 N° 128 led 3030	ST	3000	11.780	10.900	145	1	5,00	36001/3KS	260,00

LED Sempione

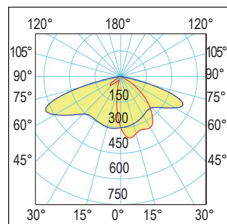


Optica di serie Standard optic

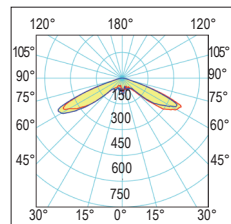


ST/CDL
Stradale - Street optic

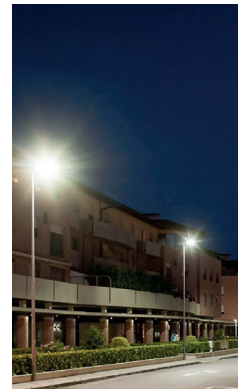
Optiche a richiesta Optics on demand



Optica stradale consigliata per strade con pista ciclabile
Road optics recommended for roads with cycle tracks



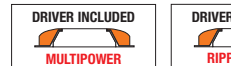
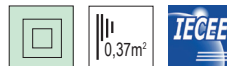
Optica stradale consigliata per illuminazione parchi
Road optics recommended for lighting in parks



220-240 Vac 110 Vac a richiesta on demand

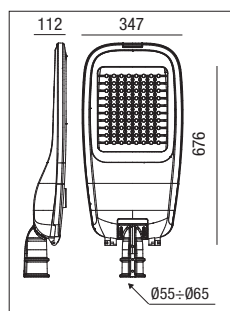
50/60 Hz IP66 IK09

CRI >70 +45°C -30°C

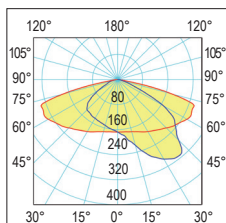


colour	W	Led SMD	Optic	K	nominal lm tc = 25°C	lm output	lm/W	pcs	Kg	CELL	Euro
0-10V	G	95 N° 192 led 3030	ST	4000	15.650	14.250	150	1	6,00	36100S	310,00
0-10V	G	120 N° 48 led 5050	ST	4000	18.500	16.800	140	1	6,00	36200	320,00
0-10V	G	95 N° 192 led 3030	ST	3000	14.870	13.800	145	1	6,00	36100/3KS	310,00
0-10V	G	120 N° 48 led 5050	ST	3000	17.800	16.200	135	1	6,00	36200/3K	320,00

LED Maxisempione

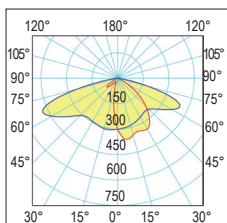


Ottica di serie Standard optic

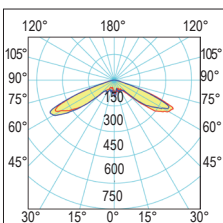


ST/CDL
Stradale - Street optic

Ottiche a richiesta Optics on demand



Ottica stradale consigliata per strade con pista ciclabile
Road optics recommended for roads with cycle tracks



Ottica stradale consigliata per illuminazione parchi
Road optics recommended for lighting in parks

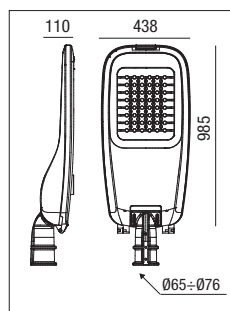


220-240 Vac | 110 Vac a richiesta on demand | 50/60 Hz | IP66 | IK09 | CRI >70 | +45°C / -30°C | 850° | DRIVER INCLUDED MULTIPOWER | DRIVER INCLUDED RIPPLE FREE | LOW FLICKER | RG0 | RoHS compliance

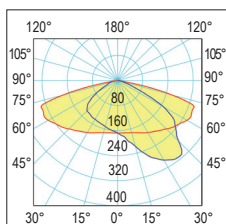
	colour	W	Led SMD	Optic	K	nominal lm _{tc} = 25°C	lm output	lm/W	pcs	Kg	CELL	Euro
0-10V	G	160	N° 320 led 3030	ST	4000	26.400	24.000	150	1	7,00	36250S	400,00
	G	210	N° 80 led 5050	ST	4000	30.000	27.300	130	1	7,00	36251	440,00
0-10V	G	160	N° 320 led 3030	ST	3000	25.000	23.200	145	1	7,00	36250/3KS	400,00
	G	210	N° 80 led 5050	ST	3000	28.900	26.250	125	1	7,00	36251/3K	440,00

LED Megasempione

NEW

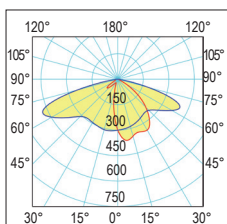


Ottica di serie Standard optic

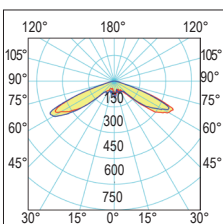


ST/CDL
Stradale - Street optic

Ottiche a richiesta Optics on demand



Ottica stradale consigliata per strade con pista ciclabile
Road optics recommended for roads with cycle tracks



Ottica stradale consigliata per illuminazione parchi
Road optics recommended for lighting in parks

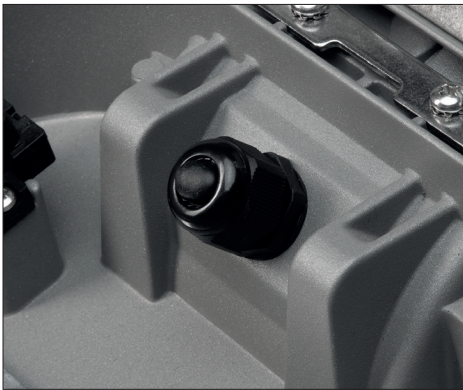


220-240 Vac | 110 Vac a richiesta on demand | 50/60 Hz | IP66 | IK09 | CRI >70 | +45°C / -30°C | DRIVER INCLUDED MULTIPOWER | DRIVER INCLUDED RIPPLE FREE | LOW FLICKER | RG0 | RoHS compliance

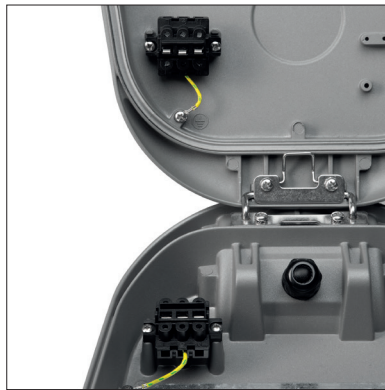
	colour	W	Led SMD	Optic	K	nominal lm _{tc} = 25°C	lm output	lm/W	pcs	Kg	CELL	Euro
	G	250	N° 144 LED 5050	ST	4000	39.000	30.500	122	1	15,30	36601	800,00
	G	300	N° 144 LED 5050	ST	4000	47.250	36.850	119	1	15,50	36600	900,00
	G	250	N° 144 LED 5050	ST	3000	39.000	30.500	122	1	15,30	36601/3K	800,00
	G	300	N° 144 LED 5050	ST	3000	47.250	36.850	119	1	15,50	36600/3K	900,00

LED Minisempione - LED Sempione - LED Maxisempione - LED Megasempione

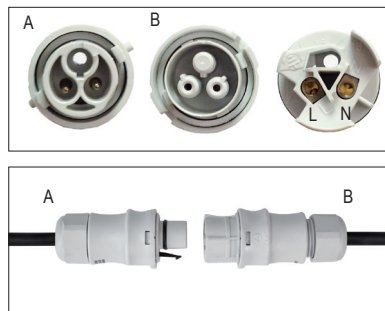
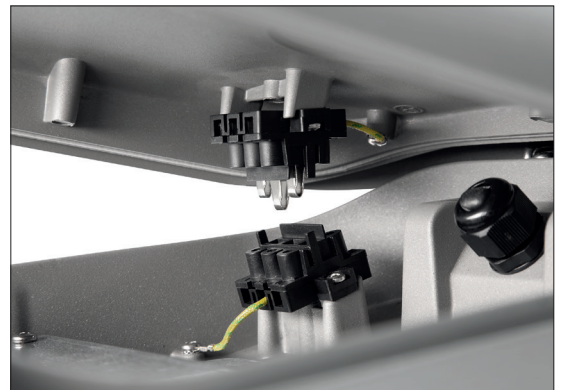
Dettagli Details



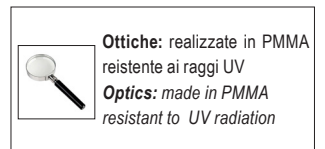
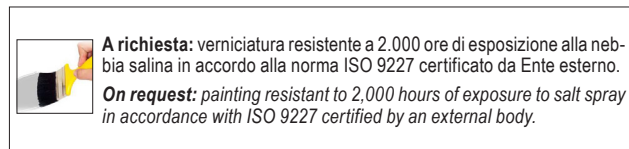
Completo di dispositivo anticondensa.
Pressacavo con valvola di compensazione e riciclo dell'aria
Complete with anti-condensate device.
Cable gland with valve for compensation and circulation of air.



Completo di sezionatore di linea in doppio isolamento che interrompe l'alimentazione elettrica all'apertura della copertura.
Complete with line disconnecter in double insulation that interrupts the power supply when the cover is opened.



Completo di connettore IP68 per una rapida installazione -
Complete with IP68 connector
for quick installation



Nel LED Driver è incluso il dispositivo di controllo della temperatura all'interno dell'apparecchio con ripristino automatico. Protezione contro gli impulsi conforme alla Norma EN 61547.
*The LED driver includes the temperature control device inside the device with automatic reset.
Impulse protection in accordance with EN 61547.*

Accessorio non incluso Not included accessory



Code: RO0640/N
Euro: 16,00
Dispositivo di protezione conforme alla Norma EN 61547 contro i fenomeni impulsivi atto a proteggere il modulo LED e il relativo alimentatore: classe II (a richiesta protezione fino a 10kV)
Protection device in compliance with the EN 61547 standard to counteract the impulsive phenomena designed to protect the LED module and the relative power supply: class II (protection up to 10kV available on request)



Gestione del punto luce per un ulteriore risparmio di energia (richiedere preventivo) - Management of the lighting point for further energy savings (Request a quotation)

Regolazione 1±10V 1±10V control	Mezzanotte virtuale Virtual midnight	Nema Socket	Telegestione sistema Wi-Fi (da concordare) Wi-Fi system remote management (to be agreed)
Possibilità di regolazione 10% - 100% con sistema 1±10V <i>Possibility of adjustment 10% - 100% with 1-10V system</i>	Sistema con riduzione automatica del flusso <i>System with automatic flux reduction</i>	Predisposizione sul corpo dell'apparecchio. Ideale per la gestione autonoma locale tramite sensori o da remoto dell'illuminazione <i>For installation on the body of the appliance. Ideal for autonomous management of the lighting, either locally with sensors or remotely</i>	Sistema di controllo, gestione consumi e diagnosi dell'impianto con tecnologia Wi-Fi <i>Control system, consumption management and diagnosis of the system with Wi-Fi technology</i>

DYNA control - Mezzanotte virtuale - Virtual midnight

DYNA CONTROL è un sistema automatico di controllo del flusso luminoso delle lampade. Il sistema entra in funzione alla prima accensione calcolando per 3 giorni i tempi di accensione, il quarto giorno il sistema in modo autonomo calcola la mezzanotte virtuale eseguendo una regolazione del flusso regolando la lampada come indicato sullo schema di Fig. 1; per i primi tre giorni quindi il sistema manterrà le lampade accese al 100%, nel tempo di accensione dell'impianto, il quarto giorno entrerà in funzione il sistema DYNA CONTROL gestendo in modo autonomo il flusso luminoso garantendo così un notevole risparmio energetico.

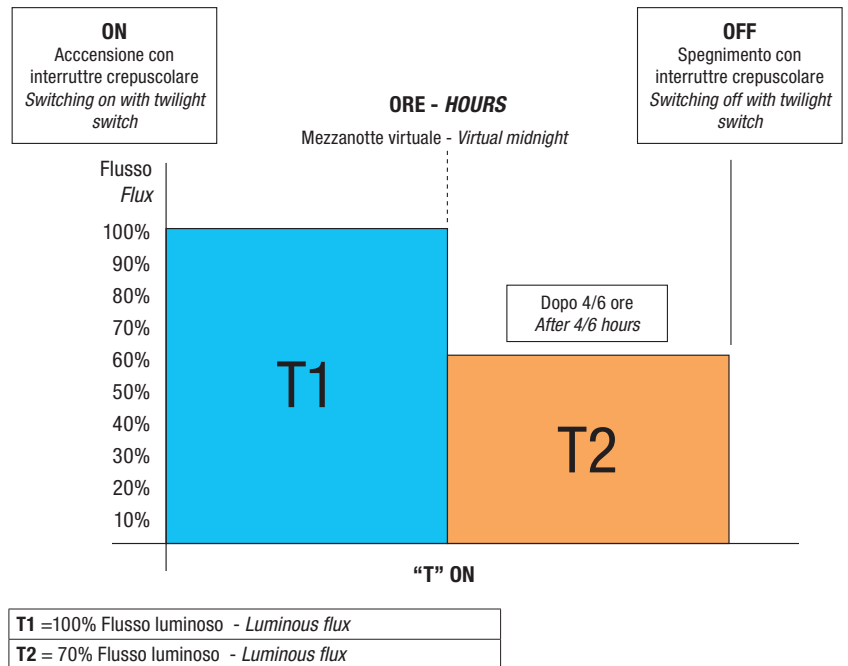
Accensioni inferiori ad 1 ora (es. manutenzione) verranno ignorate ed il sistema non entra in funzione, per accensioni da 1 a 4 ore (es. anomalia impianto) o superiori alle 23 ore (es. impianto sempre acceso), il sistema resetta il timer quindi ricomincerà a contare per i primi 3 giorni e successivamente riprenderà il funzionamento automatico.

DYNA CONTROL is an automatic system to control lamp brightness. The system starts working when first switched-on calculating switch-on times for 3 days, on the fourth day the system autonomously calculates the virtual midnight, adjusting the brightness of the lamp as indicated in fig.1. Therefore, for the first three days the system will keep the lamps on at 100%, during system switch-on, on the fourth day, the DYNA CONTROL system will start operating autonomously, controlling the lamp's brightness, thus ensuring significant energy savings.

Switch-on of less than 1 hour (ex. for maintenance) will be ignored and the system will not operate. For switch-on times from 1 to 4 hours (ex. system anomaly) or over 23 hours (ex. system always on), the system resets the timer and will restart counting for the first 3 days and then resume to automatic operation.

Fig. 1

Esempio applicativo 2 steps - Application example 2 steps



Minimo tempo di accensione per funzionamento automatico 4 ore (3 giorni).
 Accensioni di 1 ora ignorate.
 Accensioni da 1 a 4 ore oppure superiori alle 23 ore resettano il sistema.
*The minimum ignition time for automatic operation is 4 hours (three days).
 Ignitions 1 hour ignored.
 Switching from 1 to 4 hours or higher with 23 hours reset the system.*

CLO - Constant Light Output

Tutte le fonti di luce (anche i LED) hanno una riduzione della produzione di luce nel corso del tempo. Per garantire il minimo richiesto di livelli di luce in un impianto, la maggior parte dei progetti di illuminazione sono calcolate in base al livello di luce alla fine della vita utile della lampada (di norma il punto L70: 70% dei Lumen iniziali). Ciò significa che il sistema consuma più potenza del necessario, sprecando in media 15% di energia durante la sua vita (Fig. A).

L'emissione luminosa funzionalità costante (CLO) compensa questa perdita di luce, in modo che i LED siano in grado di fornire sempre il livello di luce necessaria.

L'alimentatore può essere programmato per erogare corrente costante ad un livello ridotto per un nuovo apparecchio, ed aumentare gradualmente compensando il decadimento del flusso luminoso, Ciò influisce positivamente sulla vita della sorgente luminosa, sul risparmio energetico, prolungando la durata del sistema.

La regolazione della potenza erogata viene fatta in base al contatore delle ore di esercizio. Ad intervalli di tempo di 4.000 ore, il sistema incrementa la corrente del corrispondente valore di decadimento del flusso luminoso indicato dai costruttori della sorgente luminosa. In questo modo il flusso luminoso dell'apparecchio rimane costante per tutta la sua vita.

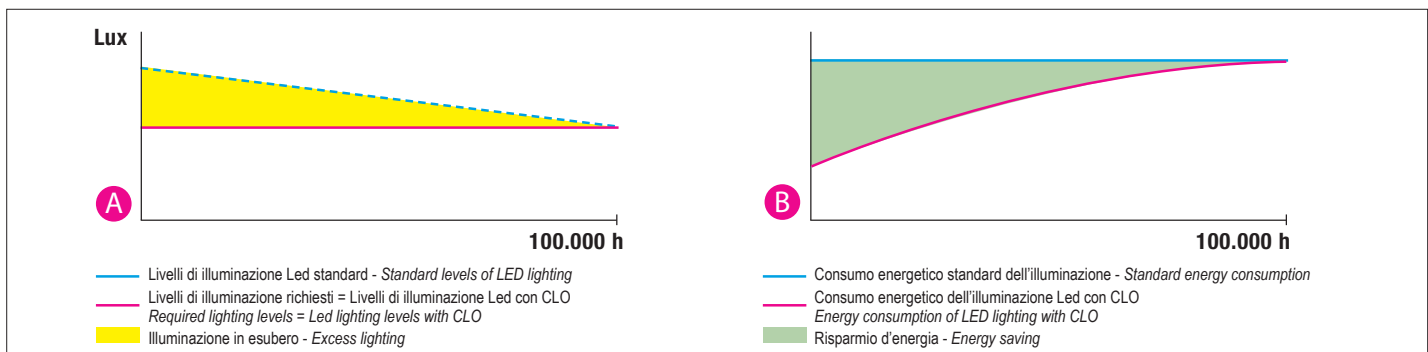
All light sources (including LEDs) produce less light over time. In order to guarantee the minimum required levels of light of a system, most lighting projects are planned taking into account the level of light at the end of the useful life of the lamp (normally point L70: 70% of initial lumen output). This means that the system consumes more power than necessary, wasting on average 15% of energy throughout its life (Fig. A).

The constant lumen output (CLO) compensates for this loss of light to ensure that the LEDs supply the required level of light at all times.

The power supply unit can be programmed to supply direct current at a reduced level for a new appliance, and to gradually increase this to compensate for the decline in luminous flux. This positively increases the lifespan of the light source and of the system, while ensuring energy savings.

The supply of power is adapted according to the operating hours counter.

After every 4,000 hours, the system increases the current in proportion to the decrease in the luminous flux indicated by the manufacturers of the light source. In this way, the luminous flux of the appliance remains constant during its entire life-span.



Smart City

**Sistema di comunicazione Wireless e cablo di Relco
Servizi su misura**

**Possibilità di co-implementazione di diverse tecnologie
Programmazione e controllo da remoto mediante gateway in loco
Monitoraggio in tempo reale dello stato del sistema e raccolta dati
Idoneità al relamping per il risparmio energetico
Ideale per applicazioni commerciali, industriali ed ambienti esterni**

ZD-Light è un sistema estremamente efficiente, che combina soluzioni tecnologiche di prima qualità per il telecontrollo di luci e di oggetti IoT. Grazie ad un'interfaccia utente intuitiva (pagina web o APP) il nostro sistema può monitorare, controllare e gestire le installazioni luminose, dalla singola lampada al network nel suo insieme.

Basato sulla tecnologia mesh mqtt, ZD-Light permette di coprire vaste aree mentre il protocollo standard ZigBee 3.0 lo rende estremamente versatile in termini di compatibilità con una pluralità di dispositivi. Il sistema è pensato per fornire soluzioni ad hoc sulla base delle necessità del singolo Cliente. ZD-Light copre una vasta gamma di applicazioni, che spaziano dalle aree commerciali agli edifici, dai capannoni industriali ai giardini pubblici, a città, strade e tunnel.

Impiegando diversi componenti è possibile gestire la luce a 360°, effettuare misurazioni di specifici parametri ambientali come l'inquinamento atmosferico, monitorare lo stato delle lampade (temperatura di funzionamento, consumi, eventuali difetti meccanici che potrebbero provocare danni ecc.) ed implementando sensori di movimento, creare heat map finalizzate alla definizione delle maggiori aree di concentrazione delle persone. La programmazione dinamica della luce permette la gestione automatica del flusso luminoso della lampada in specifici intervalli di tempo. La funzione CLO consente di mantenere costante il flusso luminoso per tutta la durata di vita del prodotto, bilanciando elettronicamente la riduzione dell'efficienza tipica dei LED. Tutte le informazioni raccolte possono essere archiviate a gestire in loco o da remoto via Cloud.

Messa in opera e installazione del sistema non incluse nel prezzo.

**Relco Wireless and wired communication system
Customised services**

**Possibility of co-implementing different technologies
Remote programming and control via on-site gateways
Real-time monitoring of the system status and data collection
Feasibility of relamping for energy saving
Ideal for commercial, industrial and outdoor applications**

ZD-Light is an extremely efficient system that combines first-class technological solutions for the remote control of lights and IoT objects. Thanks to an intuitive user interface (web page or APP) our system can monitor, control and manage light installations, from a single lamp to a network as a whole. Based on MQTT mesh technology, ZD-Light allows large areas to be covered, whereas the standard ZigBee 3.0 protocol makes it extremely versatile in terms of compatibility with a variety of devices. The system is designed to provide ad hoc solutions based on the requirements of the individual Customer. ZD-Light covers a wide range of applications, which range from commercial areas to buildings, from industrial warehouses to public gardens, to cities, roads and tunnels.

The light can be fully controlled by using different components, while measuring specific environmental parameters, such as atmospheric pollution, and monitoring the status of the lamps (operating temperature, consumption, any mechanical defects that could cause damage, etc.) and implementing movement sensors, creating heat maps aimed at defining the main areas of concentration of people. The dynamic programming of the light allows the luminous flux of the lamp to be automatically controlled in specific time intervals. The CLO function allows the luminous flux to be kept constant throughout the life cycle of the product, balancing the efficiency reduction typical of LEDs electronically. All collected information can be stored to be managed on site or remotely via Cloud.

Installation and start-up of the system not included in the price



Telegestione sistema Wi-Fi (da concordare)

Sistema di controllo, gestione consumi e diagnosi dell'impianto con tecnologia Wi-Fi

Wi-Fi system remote management (to be agreed)

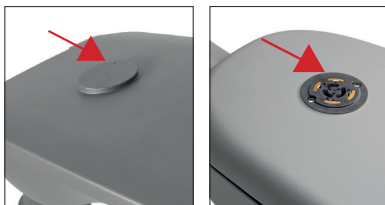
Control system, consumption management and diagnosis of the system with Wi-Fi technology



Nema Socket

Gli apparecchi della serie LED Sempione sono predisposti di presa Nema socket che fornisce un collegamento elettrico e meccanico tra il sensore e l'apparecchio. La presa è realizzata in policarbonato ed è completa di guarnizione per garantire il grado IP dell'apparecchio; inoltre, grazie alla sua struttura smontabile, è possibile installarla direttamente sul corpo dell'apparecchio (evitando l'accesso alle parti interne) senza l'uso di attrezzi; questo faciliterà conseguentemente anche la manutenzione da fare in futuro. La presa Nema Socket è predisposta di 5/7 poli: 3 poli per il collegamento elettrico, i 2/4 poli rimanenti per il segnale 1-10V o DALI; si integra perfettamente con tutti i sistemi "smart" che consentono di monitorare l'illuminazione da remoto. L'ideale utilizzo della presa Nema Socket è negli impianti di illuminazione stradale (pubbliche o private), piste pedonali e ciclabili, viali interni a scuole, ospedali, siti industriali e arredo urbano in generale in cui è importante un controllo "smart" dell'illuminazione.

The Sempione LED series appliances are fitted with a Nema socket that provides an electrical and mechanical connection between the sensor and the appliance. The socket is made of polycarbonate and is complete with a gasket to guarantee the IP rating of the appliance; furthermore, thanks to its removable structure, it is possible to install it directly on the body of the appliance (avoiding access to internal parts) without using any tool; this will also facilitate future maintenance. The Nema Socket is designed for 5-7 poles: 3 poles for the electrical connection, and the 2-4 remaining poles for the 1-10V or DALI signal; it integrates perfectly with all the "smart" systems that allow remote light monitoring. The ideal use of the Nema Socket is in street lighting systems (public or private), pedestrian and bicycle lanes, lanes in school grounds, hospitals, industrial sites and urban furniture in general where "smart" lighting control is important.



Predisposizione sul corpo dell'apparecchio. Ideale per la gestione autonoma locale tramite sensori o da remoto dell'illuminazione

For installation on the body of the appliance. Ideal for autonomous management of the lighting, either locally with sensors or remotely

Vantaggi

- Facile da installare, non necessita dell'uso di attrezzi
- Rotazione completa (355°)
- Robusti contatti con blocco di chiusura ad avvitamento per garantire un'interconnessione di potenza.
- La presa viene fornita pre-terminata con conduttori per una facile integrazione in impianti nuovi o esistenti.
- Compatibile con fotocelle DIMM (standard ANSI) per la connessione tra fotocella e apparecchio di illuminazione.
- Può essere fornita con due o quattro contatti di dimmeraggio a supporto dei protocolli di dimmerazione a uno o due canali.

Advantages

- Easy to install, it does not require tools to be used
- Complete rotation (355°)
- Strong contacts with screw closure to guarantee power interconnection.
- The socket is supplied pre-terminated with conductors to be easily integrated into new or existing systems.
- Compatible with DIMM photocells (ANSI standard) for connection between the photocell and lighting appliance.
- It can be supplied with two or four dimming contacts which support one or two channel dimming protocols.



EC DECLARATION OF CONFORMITY

The company RELCO S.r.l declares under his liability that the product:

LED MAXISEMPIONE (cod. 36250S; 35250/3KS)

to which this declaration refers, is compliant to the following standards:

EN60598-1: 2015;
EN60598-1: 2015/AC: 2015;
EN60598-1: 2015/AC: 2016;
EN60598-1: 2015/AC: 2017-05;
EN60598-2-3: 2003 + A1: 2011;
EN62031: 2008 +A1: 2013;
EN62471: 2008;
EN55015: 2013 + A1;
EN61000-3-2: 2014;
EN61000-3-3: 2013;
EN61547: 2009;
EN62493: 2015 ;
EN50581: 2012.

So, it meets the requirements of the applicable directives:

2014/35/EU: Low Voltage directive

2014/30/EU: Electromagnetic compatibility directive

Furthermore, the product is compliant to the European directives:

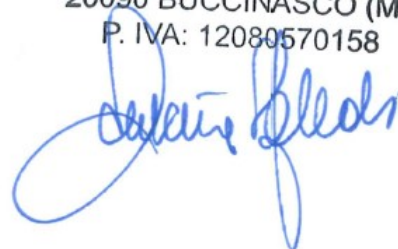
2011/65/EU;

2009/125/EC and subsequent regulations: **1194/2012/EU, 1428/2015/EU.**

Latest two digits of the year of the CE certification: 19

Buccinasco 02/07/2020

RELCO S.r.l.
Via Delle Azalee, 6/A
20090 BUCCINASCO (MI)
P. IVA: 12080570158



DECLARATION OF CONFORMITY TO THE DIRECTIVE 2011/65/EU (RoHS II) AND COMMISSION DELEGATED DIRECTIVE (EU) 2015/863 of 31 March 2015 (RoHS3) amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances

The company Relco S.r.l. declares under his liability that the product manufactured and or marketed does not contain (except within the threshold values specified in this Directive) the following chemicals:

- Cadmium(Cd)
- Mercury
- Lead(Pb)
- Hexavalent chromium (Cr6+)
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ethers (PBDE)
- Bis(2-Ethylhexyl) phthalate (DEHP)
- Benzyl butyl phthalate (BBP)
- Dibutyl phthalate (DBP)
- Diisobutyl phthalate (DIBP)

Furthermore the products are compliant to the standard: EN50581: 2012.

Buccinasco 07/02/2019

RELCO S.r.l.
Via Delle Azalee, 6/A
20090 BUCCINASCO (MI)
P. IVA: 12080570158



Declaration of WEEE Conformity

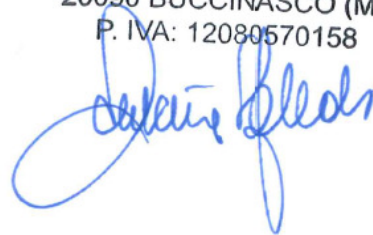
Supplier registration number: R.A.E.E. IT08020000000670

The European Community WEEE directive deals with the disposal of Waste Electrical and Electronic Equipment at the end of its useful life. The aims of the directive are to minimize the amount of material entering this waste stream and to provide funding for treatment facilities in order to maximize recovery and recycling.

Relco's obligation as a supplier is to ensure the correct disposal of Electrical and Electronic Equipment (EEE) we produce when it reaches the end of its useful life and becomes waste.

Our customers to arrange for the return of Relco S.r.l. manufactured WEEE have to contact the company Ecolight Servizi S.r.l. Via Monte Rosa, 96 20149 Milano Italy (www.ecolightservizi.it).

RELCO S.r.l.
Via Delle Azalee, 6/A
20090 BUCCINASCO (MI)
P. IVA: 12080570158



Licence for use of the here shown ENEC conformity mark :



Based on:

Agreement on the use of a commonly agreed Mark on Conformity for equipment complying with European Standards as of 12 November 1991 (in short ENEC Agreement), as revised latest by ENEC group April 16. 1997.

Nemko hereby grants the following manufacturer as licensee the right to affix this ENEC mark on the product(s) specified below.

Product	LED Streetlight
Applicant	Relco Srl Via delle Azalee 6/A 20090 Buccinasco (MI) Italy
Manufacturer	Relco Srl Via delle Azalee 6/A 20090 Buccinasco (MI) Italy
Factory	Relco Srl Via delle Azalee 6/A 20090 Buccinasco (MI) Italy <input type="checkbox"/> See next page(s)
Ratings	220 or 180 W, 220-240 V~, 50/60 Hz
Trade mark	



Relco (Components & Lighting)

Model / Type Ref.	LED MAXISEMPIONE series
Principal characteristics	Cl.II, IP66, IK09, 4000 K, ta 40 °C, distance from lighted objects 1 m. See test report for product code involved. <input type="checkbox"/> See next page(s)

A sample of the product was tested and found to be in conformity with	LITE	EN 60598-1:2015;A1 EN 60598-2-3:2003;A1
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The conditions for this licence are that the ENEC-marked products conform with the applicable Standard(s) as stated in the Test Report with Order No: 377848

and that Articles 8 and 9 of the ENEC Agreement are fulfilled by the manufacturer. The mark signifies the compliance of the completed products with these conditions. Further information is given in the attached Annex, which forms an obligatory part of this licence document. This licence has been issued under the presumption and conditional on the fact that the licensee holds all necessary legal rights with regard to the product presented for testing and certification.

Additional model(s) See next page(s)

Date of issue 03-03-2020

Jiyea Gim
Certification Department**Nemko AS**Philip Pedersens vei 11, 1366 Lysaker, Norway
TEL +47 22 96 03 30 EMAIL info@nemko.com
ENTERPRISE NUMBER NO974404532

Licence for use of the here shown ENEC conformity mark :



Product	LED Streetlight
Pos. No	1
Model / Type Ref.	LED MINISEMPIONE series
Trade mark (if different from page 1)	
Rating	75 or 50 or 60 or 40 or 30 or 20 W, 220-240 V~, 50/60 Hz
Principal characteristics	Cl.II, IP66, IK09, 4000 K, ta 45 °C, distance from lighted objects 1 m. See test report for product code involved.

Product	LED Streetlight
Pos. No	2
Model / Type Ref.	LED SEMPIONE series
Trade mark (if different from page 1)	
Rating	120 or 95 W, 220-240 V~, 50/60 Hz
Principal characteristics	Cl.II, IP66, IK09, 4000 K, ta 45 °C, distance from lighted objects 1 m. See test report for product code involved.

Date of issue 03-03-2020

Jiyea Gim
Certification Department**Nemko AS**Philip Pedersens vei 11, 1366 Lysaker, Norway
TEL +47 22 96 03 30 EMAIL info@nemko.com
ENTERPRISE NUMBER NO974404532

CB TEST CERTIFICATE CERTIFICAT D'ESSAI OCProduct
Produit

LED Streetlight

Name and address of the applicant
Nom et adresse du demandeurRelco Srl
Via delle Azalee 6/A
20090 Buccinasco (MI)
ItalyName and address of the manufacturer
Nom et adresse du fabricantRelco Srl
Via delle Azalee 6/A
20090 Buccinasco (MI)
ItalyName and address of the factory
Nom et adresse de l'usineRelco Srl
Via delle Azalee 6/A
20090 Buccinasco
(MI) ItalyNote: When more than one factory, please report on page 2
Note: Lorsque il y a plus d'une usine, veuillez utiliser la deuxième page Additional information on page 2Ratings and principal characteristics
Valeurs nominales et caractéristiques principales220 or 180 W, 220-240 V~, 50/60 Hz
Cl.II, IP66, IK09, 4000 K, ta 40 °C, distance from lighted objects 1 m.Trademark (if any)
Marque de fabrique (si elle existe)Type of Manufacturer's Testing Laboratories used
Type de programme du laboratoire d'essais constructeur

LED MAXISEMPIONE series

Model / Type Ref.
Ref. De type

See test report for product code involved.

 Additional information on page 2Additional information (if necessary may also be reported on page 2)
Les informations complémentaires (si nécessaire, peuvent être indiqués sur la deuxième page)A sample of the product was tested and found to be in conformity with
Un échantillon de ce produit a été essayé et a été considéré conforme à laIEC 60598-1:2014, IEC 60598-1:2014/AMD1:2017
IEC 60598-2-3:2002, IEC 60598-2-3:2002/AMD1:2011As shown in the Test Report Ref. No. which forms part of this Certificate
Comme indiqué dans le Rapport de tests numéro de référence qui constitue partie de ce Certificat

377848

This CB Test Certificate is issued by the National Certification Body
Ce Certificat de test OC est établi par l'Organisme National de Certification

CB TEST CERTIFICATE CERTIFICAT D'ESSAI OCProduct
Produit

LED Streetlight

Name and address of the applicant
Nom et adresse du demandeurRelco Srl
Via delle Azalee 6/A
20090 Buccinasco (MI)
ItalyName and address of the manufacturer
Nom et adresse du fabricantRelco Srl
Via delle Azalee 6/A
20090 Buccinasco (MI)
ItalyName and address of the factory
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Via delle Azalee 6/A
20090 Buccinasco
(MI) ItalyNote: When more than one factory, please report on page 2
Note: Lorsque il y a plus d'une usine, veuillez utiliser la deuxième page Additional information on page 2Ratings and principal characteristics
Valeurs nominales et caractéristiques principales120 or 95 W, 220-240 V~, 50/60 Hz
Cl.II, IP66, IK09, 4000 K, ta 45 °C, distance from lighted objects 1 m.Trademark (if any)
Marque de fabrique (si elle existe)Type of Manufacturer's Testing Laboratories used
Type de programme du laboratoire d'essais constructeur

LED SEMPIONE series

Model / Type Ref.
Ref. De type

See test report for product code involved.

 Additional information on page 2Additional information (if necessary may also be reported on page 2)
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IEC 60598-2-3:2002, IEC 60598-2-3:2002/AMD1:2011

As shown in the Test Report Ref. No. which forms part of this Certificate

377848

Comme indiqué dans le Rapport de tests numéro de référence qui constitue partie de ce Certificat

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CB TEST CERTIFICATE CERTIFICAT D'ESSAI OCProduct
Produit

LED Streetlight

Name and address of the applicant
Nom et adresse du demandeurRelco Srl
Via delle Azalee 6/A
20090 Buccinasco (MI)
ItalyName and address of the manufacturer
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Via delle Azalee 6/A
20090 Buccinasco (MI)
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20090 Buccinasco
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Note: Lorsque il y a plus d'une usine, veuillez utiliser la deuxième page Additional information on page 2Ratings and principal characteristics
Valeurs nominales et caractéristiques principales75 or 50 or 60 or 40 or 30 or 20 W, 220-240 V~, 50/60 Hz
Cl.II, IP66, IK09, 4000 K, ta 45 °C, distance from lighted objects 1 m.Trademark (if any)
Marque de fabrique (si elle existe)Type of Manufacturer's Testing Laboratories used
Type de programme du laboratoire d'essais constructeur

LED MINISEMPIONE series

Model / Type Ref.
Ref. De type

See test report for product code involved.

 Additional information on page 2Additional information (if necessary may also be reported on page 2)
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IEC 60598-2-3:2002, IEC 60598-2-3:2002/AMD1:2011

As shown in the Test Report Ref. No. which forms part of this Certificate

377848

Comme indiqué dans le Rapport de tests numéro de référence qui constitue partie de ce Certificat

This CB Test Certificate is issued by the National Certification Body
Ce Certificat de test OC est établi par l'Organisme National de CertificationPhilip Pedersen vei 11,
NO-1366 Lysaker, Norway

Date: 03-03-2020

Jiyea Gim

Signature: Jiyea Gim
Certification Department

Product LED Streetlight

Applicant Relco Srl
Via delle Azalee 6/A
20090 Buccinasco (MI)
Italy

Manufacturer Relco Srl
Via delle Azalee 6/A
20090 Buccinasco (MI)
Italy

Factory Relco Srl
Via delle Azalee 6/A
20090 Buccinasco (MI)
Italy

Ratings 220 or 180 W, 220-240 V~, 50/60 Hz

Trade mark



Relco (Components & Lighting)

Model / Type Ref. LED MAXISEMPIONE series

Principal characteristics CI.II, IP66, IK09, 4000 K, ta 40 °C, distance from lighted objects 1 m.
See test report for product code involved.

A sample of the product was tested and found to be in conformity with

LITE	EN 60598-1:2015;A1 EN 60598-2-3:2003;A1
EMC	EN 55015:2013;A1 EN 61547:2009 EN 61000-3-2:2014 EN 61000-3-3:2013

Validity This certificate documents conformity with the standards shown, and also applies as license for use of Nemkos name and certification mark. The certificate and license is valid as long as the applicable conditions are complied with, and provided that any changes to the product are notified to Nemko for acceptance prior to implementation.
New standards or amendments to the standards may imply that the product design must be updated and/or that re-testing and re-certification is necessary.

Additional information

Additional model(s) (2) See page 2

Date of issue 03-03-2020

Jiyea Gim

Jiyea Gim
Certification Department

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TEL +47 22 96 03 30 EMAIL info@nemko.com
ENTERPRISE NUMBER NO974404532

Additional model(s)

Product LED Streetlight
Pos. No 1
Model / Type Ref. LED SEMPIONE series
Trade mark (if different from page 1)
Rating 120 or 95 W, 220-240 V~, 50/60 Hz
Principal characteristics Cl.II, IP66, IK09, 4000 K, ta 45 °C, distance from lighted objects 1 m.
See test report for product code involved.

Product LED Streetlight
Pos. No 2
Model / Type Ref. LED MINISEMPIONE series
Trade mark (if different from page 1)
Rating 75 or 50 or 60 or 40 or 30 or 20 W, 220-240 V~, 50/60 Hz
Principal characteristics Cl.II, IP66, IK09, 4000 K, ta 45 °C, distance from lighted objects 1 m.
See test report for product code involved.

Date of issue 03-03-2020



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TEST REPORT
IEC 60598-2-3
Luminaires
Part 2: Particular requirements
Section 3: Luminaires for road and street lighting

Report Number..... : 377848
Date of issue..... : 2020-02-28
Total number of pages : 78 (included attachments)

Name of Testing Laboratory preparing the Report : Nemko S.p.A.

Applicant's name : **Relco Srl**

Address..... : Via delle Azalee 6/A -
 20090 Buccinasco (MI) - Italy

Test specification:

Standard..... : IEC 60598-2-3:2002, AMD1:2011 used in conjunction with IEC 60598-1:2014, AMD1:2017

Test procedure : CB Scheme

Non-standard test method : N/A

Test Report Form No. : IEC60598_2_3L

Test Report Form(s) Originator : Intertek Semko AB

Master TRF..... : Dated 2018-03-09

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Test item description :	LED Streetlight
Trade Mark :	
Manufacturer	same as Applicant
Model/Type reference :	LED MAXISEMPIONE Cod. 36251; LED MAXISEMPIONE Cod. 36251/3K; LED MAXISEMPIONE Cod. 36250; LED MAXISEMPIONE Cod. 36250/3K (see page 9 for variants)
Ratings :	210 or 160 W, 220-240 V~, 50/60 Hz, Cl.II, IP66, IK09, 4000 K, t _a 40 °C, distance from lighted objects 1 m (see page 9 for variants)

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	Nemko S.p.A.
Testing location/ address		Via del Carroccio, 4 – 20853 Biassono (MB) – Italy
Tested by (name, function, signature) :		Cristian Simone (Project Handler) 
Approved by (name, function, signature) .. :		Tore Ledaal (Verifier) 

<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
Testing location/ address		
Tested by (name, function, signature) :		
Approved by (name, function, signature) .. :		

<input type="checkbox"/>	Testing procedure: CTF Stage 2:	
Testing location/ address		
Tested by (name + signature) :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature) .. :		

<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	Testing procedure: CTF Stage 4:	
Testing location/ address		
Tested by (name, function, signature) :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature) .. :		
Supervised by (name, function, signature) :		

<p>List of Attachments (including a total number of pages in each attachment): ATTACHMENT 1: European Group Differences and National Differences (1 pages) ATTACHMENT 2: Additional tests for integral LED module according to EN 62031:2008+A1:2013+A2:2015 (12 pages) ATTACHMENT 3: Photo documentation (8 pages) ATTACHMENT 4: Best Measurement capability (3 pages)</p>	
<p>Summary of testing: Photo-biological tests according IEC/EN 62471 were performed and the luminaire has been classified as Exempt Group. See test report 377848TRFHO for details. Blue light hazard tests according to IEC TR 62778 were performed and the luminaire were classified as Risk Group 1 unlimited, see test report 377848-4TRFPHO. Mechanical impact test according to EN 62262 were performed and the luminaire fulfilled the requirement of rating IK09, see test report 387146-3TRFEnvEx. EMC test report test according to EN 55015 (2013) + A1 (2015) – EN 61547 (2009) + EN 61000-3-2 (2014) – EN 61000-3-3 (2013) were performed and the luminaire fulfilled the requirement, see test report 377848TRFEMC</p>	
<p>Tests performed (name of test and test clause): <u>All relevant tests performed on model:</u> LED MAXISEMPIONE Cod 36251 <u>Partially tests performed on models:</u> LED MAXISEMPIONE Cod. 36250 LED SEMPIONE Cod. 36200 LED MINISEMPIONE Cod. 36001</p> <p>The following Nemko technical procedures were also applied during testing: - WML0177: General routines for using instruments at Nemko. - WML1002: Measurement Uncertainty – Policy and Statement.</p> <p>Equipment used for testing is recorded and saved into the company archive as file 377848INS. It will be made available on request.</p> <p>Unless different values are declared in the test case, following ambient conditions apply for the tests:</p> <ul style="list-style-type: none"> - Ambient temperature 18-30 °C - Relative Humidity: 30-70 % - Atmospheric Pressure: 860-1060 hPa <p>Statement of the measurement uncertainty: See attachment 4 for best measurement capability.</p>	<p>Testing location: Nemko S.p.A. Via del Carroccio, 4 - 20853 Biassono (MB) – Italy</p>

Summary of compliance with National Differences:

List of countries addressed:
All CENELEC member countries.

The product fulfils the requirements of EN 60598-2-3: 2003 + A1:2011 used in conjunction with EN 60598-1:2015 + A1:2018

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

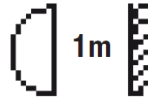
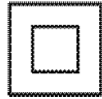
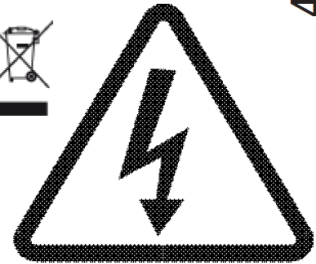


LED MAXISEMPIONE

صنع في إيطاليا

Cod. 36251
 Pin = 220W 4000 K CRI >70
 220-240V~ 50/60Hz
 t_a 40°C
 IK09 - IP66

45/19

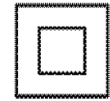
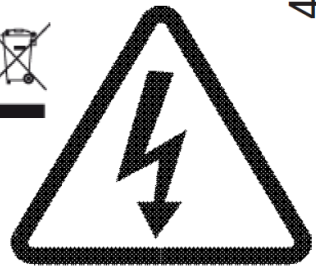
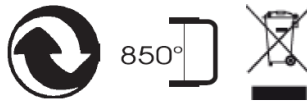


LED MAXISEMPIONE

صنع في إيطاليا

Cod. 36250
 Pin = 180W 4000 K CRI >70
 220-240V~ 50/60Hz
 t_a 40°C
 IK09 - IP66

45/19



	<p>LED SEMPIONE</p>	<p>صنع في إيطاليا</p>
	<p>Cod. 36200 Pin = 120W 4000 K CRI >70 220-240V~ 50/60Hz t_a 45°C IK09 - IP66</p>	<p>45/19</p>
	<p>LED MINISEMPIONE</p>	<p>صنع في إيطاليا</p>
	<p>Cod. 36001 Pin = 70W 4000 K CRI >70 220-240V~ 50/60Hz t_a 45°C IK09 - IP66</p>	<p>45/19</p>

Note: The marking plate for other models are the same as above labels except the model name, temperature color and customer code

<p>Calibration</p>	<p>All instruments used in the tests given in this test report are calibrated and traceable to national or international standards. Further information about traceability will be given on request.</p>
<p>Measurement uncertainty</p>	<p>The measurement uncertainty was calculated for each test and quantity listed in this test report, according to IEC Guide 115 and other specific test standard and is documented in Nemko Spa working manual WML1002.</p>
<p>Assessment of conformity</p>	<p>The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report: P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit. F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.</p>

Test item particulars : LED streetlight	
Classification of installation and use : Fixed on a mast arm or post top for normal outdoors use	
Supply Connection : Supply cord (type Y attachment) incorporating connector :	
Possible test case verdicts: - test case does not apply to the test object..... : N/A - test object does meet the requirement..... : P (Pass) - test object does not meet the requirement..... : F (Fail)	
Testing :	
Date of receipt of test item : 2019-10-01	
Date (s) of performance of tests : 2019-10-01-2019-10-30	
General remarks:	
<p>"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. The phase of sampling/collection is carried out by manufacturer Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p> <p>Clause numbers between brackets refer to clauses in IEC 60598-1</p>	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60598-1:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided :	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) : Nextronics S.A.R.L. Lot n. 6 Z.I. El Agba, 2087 Tunis, Tunisia	

General product information:

The LED streetlight under test consist of:

- Light source: integral LED matrix;
- Controlgear: built-in type with double/reinforced insulation input to output, constant current
- body: steel structure incorporating aluminium heatsink;
- Glazing: tempered glass.
- Mast arm or post top

List of models and their differences:

Model	Product code	Rated Wattage (W)	Control gears	Type of LED	Ambient temperature (°C)	Output current setting (mA)
LED MAXISEMPIONE	36251	210	2 x Xitanium 150W 0,70A 1-10V 230V S240 sXt or SIRIO 150/300-1050 BILEVEL BI 220-240 Vac 50-60 Hz	LH508A	t _a 40	900
LED MAXISEMPIONE	36251/3K	210	2 x Xitanium 150W 0,70A 1-10V 230V S240 sXt or SIRIO 150/300-1050 BILEVEL BI 220-240 Vac 50-60 Hz	LH508A	t _a 40	900
LED MAXISEMPIONE	36250	160	Xitanium 150W 0.2-0,70A 1-10V 230V S240 sXt or TCI MILANO IN LED 165 W/350-1050 4P	LM301 H	t _a 40	660
LED MAXISEMPIONE	36250/3K	160	Xitanium 150W 0.2-0,70A 1-10V 230V S240 sXt or TCI MILANO IN LED 165 W/350-1050 4P	LM301 H	t _a 40	660
Variants:						
LED SEMPIONE	36200	120	TCI MILANO 1 PN 110 W Cod. 145003 or SIRIO 150/300-1050	LH508A	t _a 45	800

			BILEVEL BI 220-240 Vac 50-60 Hz			
LED SEMPIONE	36200/3K	120	TCI MILANO 1 PN 110 W Cod. 145003 or SIRIO 150/300-1050 BILEVEL BI 220-240 Vac 50-60 Hz	LH508A	t _a 45	800
LED SEMPIONE	36100	95	TCI MILANO 1 PN 110 W Cod. 145003 or SIRIO 150/300-1050 BILEVEL BI 220-240 Vac 50-60 Hz	LM301 H	t _a 45	650
LED SEMPIONE	36100/3K	95	TCI MILANO 1 PN 110 W Cod. 145003 or SIRIO 150/300-1050 BILEVEL BI 220-240 Vac 50-60 Hz	LM301 H	t _a 45	650
LED MINISEMPIONE	36001	75	TCI MILANO 1 PN 75 W Cod. 145002 or Xitanium 75 W 1-10 V 230 V C165 Sxt	LM301 H	t _a 45	700
LED MINISEMPIONE	36001/3K	75	TCI MILANO 1 PN 75 W Cod. 145002 or Xitanium 75 W 1-10 V 230 V C165 Sxt	LM301 H	t _a 45	700
LED MINISEMPIONE	36000	50	TCI MILANO 1 PN 75 W Cod. 145002 or Xitanium 75 W 1-10 V 230 V C165 Sxt	LM301 H	t _a 45	500
LED MINISEMPIONE	36000/3K	50	TCI MILANO 1 PN 75 W Cod. 145002 or Xitanium 75 W 1-10 V 230 V C165 Sxt	LM301 H	t _a 45	500
LED MINISEMPIONE	36001/60	60	TCI MILANO 1 PN 75 W Cod. 145002	LM301 H	t _a 45	630

			or Xitanium 75 W 1-10 V 230 V C165 Sxt			
LED MINISEMPIONE	36000/40	40	TCI MILANO 1 PN 75 W Cod. 145002 or Xitanium 75 W 1-10 V 230 V C165 Sxt	LM301 H	t _a 45	410
LED MINISEMPIONE	36000/30	30	TCI MILANO 1 PN 75 W Cod. 145002 or Xitanium 75 W 1-10 V 230 V C165 Sxt	LM301 H	t _a 45	325
LED MINISEMPIONE	36000/20	20	TCI MILANO 1 PN 75 W Cod. 145002 or Xitanium 75 W 1-10 V 230 V C165 Sxt	LM301 H	t _a 45	220

S/n of models tested:

LED MAXISEMPIONE Cod 36251: 1/8 Assigned by Nemko Spa
 LED MAXISEMPIONE Cod. 36250: 3/8 Assigned by Nemko Spa
 LED SEMPIONE Cod. 36200: 7/8 Assigned by Nemko Spa
 LED MINISEMPIONE Cod. 36001: 4/8 Assigned by Nemko Spa

EN 60598-2-3			
Clause	Requirement + Test	Result - Remark	Verdict

3.2 (0)	GENERAL TEST REQUIREMENTS		P
3.2 (0.3)	More sections applicable..... :	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Section/s:	—
3.2 (0.5)	Components	(see Annex 1)	—
3.2 (0.7)	Information for luminaire design in light sources standards		—
3.2 (0.7.2)	Light source safety standard	IEC 62031	—
	Luminaire design in the light source safety standard		P

3.4 (2)	CLASSIFICATION OF LUMINAIRES		P
3.4 (2.2)	Type of protection	Class II	P
3.4 (2.3)	Degree of protection	IP66	—
3.4 (2.4)	Luminaire suitable for direct mounting on normally flammable surfaces..... :	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
3.4 (2.5)	Luminaire for normal use	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	Luminaire for rough service	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
3.4 (-)	Modes of installation of road or street lighting		—
	a) on a pipe	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	b) on a mast arm	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	c) on a post top	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	d) on span or suspension wires	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	e) on a wall	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—

3.5 (3)	MARKING		P
3.5 (3.2)	Mandatory markings		P
	Position of the marking		P
	Format of symbols/text		P
3.5 (3.3)	Additional information	Instruction manual	P
	Language of instructions	Italian and English versions checked	P
3.5 (3.3.1)	Combination luminaires		N/A
3.5 (3.3.2)	Nominal frequency in Hz	50/60 Hz	P
3.5 (3.3.3)	Operating temperature	t _a 40 °C (for all models MAXISEMPIONE) t _a 45 °C (for all models SEMPIONE and MINISEMPIONE)	P
3.5 (3.3.5)	Wiring diagram		N/A

EN 60598-2-3			
Clause	Requirement + Test	Result - Remark	Verdict
3.5 (3.3.6)	Special conditions	In instruction manual.	P
3.5 (3.3.7)	Metal halide lamp luminaire – warning		N/A
3.5 (3.3.8)	Limitation for semi-luminaires		N/A
3.5 (3.3.9)	Power factor and supply current		N/A
3.5 (3.3.10)	Suitability for use indoors		P
3.5 (3.3.11)	Luminaires with remote control		N/A
3.5 (3.3.12)	Clip-mounted luminaire – warning		N/A
3.5 (3.3.13)	Specifications of protective shields		N/A
3.5 (3.3.14)	Symbol for nature of supply	~ IEC 60417-5032 symbol marked on label.	P
3.5 (3.3.15)	Rated current of socket outlet		N/A
3.5 (3.3.16)	Rough service luminaire		N/A
3.5 (3.3.17)	Mounting instruction for type Y, type Z and some type X attachments		P
3.5 (3.3.18)	Non-ordinary luminaires with PVC cable		N/A
3.5 (3.3.19)	Protective conductor current in instruction if applicable	Class II	N/A
3.5 (3.3.20)	Provided with information if not intended to be mounted within arm's reach		N/A
3.5 (3.3.21)	Non-replaceable and non-user replaceable light sources information provided	Non- user replaceable	P
3.5 (3.3.22)	Controllable luminaires, classification of insulation provided		N/A
3.5 (3.3.23)	Luminaire without controlgear provided with necessary information for selection of appropriate component		N/A
3.5 (3.3.24)	If not supplied with terminal block, information on the packaging		N/A
3.5 (3.4)	Test with water		P
	Test with hexane		P
	Legible after test		P
	Label attached		P
3.5 (-)	Additional information in instruction leaflet		P
	a) Design attitude	Post top or on a mast arm	P
	b) Weight	7 kg	P
	c) Overall dimensions	676 mm x 347 mm x 112 mm	P
	d) Maximum projected area if applicable	0.37 m ²	P
	e) Cross-sectional area of wires if applicable		N/A

EN 60598-2-3			
Clause	Requirement + Test	Result - Remark	Verdict
	f) Suitability for indoors use		N/A
	g) Dimensions of the compartment		N/A
	h) Torque setting to be applied to bolts or screws	In instruction manual for details	P
	i) Maximum mounting height	Up to 15 m	P

3.6 (4)	CONSTRUCTION		P
3.6 (4.2)	Components replaceable without difficulty	Replacement by manufacturer or hid service agent only	P
3.6 (4.3)	Wireways smooth and free from sharp edges		P
3.6 (4.4)	Lampholders		N/A
3.6 (4.4.1)	Integral lampholder		N/A
3.6 (4.4.2)	Wiring connection		N/A
3.6 (4.4.3)	Lampholder for end-to-end mounting		N/A
3.6 (4.4.4)	Positioning		N/A
	- pressure test (N)		—
	After test the lampholder comply with relevant standard sheets and show no damage		N/A
	After test on single-capped lampholder the lampholder have not moved from its position and show no permanent deformation		N/A
	- bending test (N)		—
	After test the lampholder have not moved from its position and show no permanent deformation		N/A
3.6 (4.4.5)	Peak pulse voltage		N/A
3.6 (4.4.6)	Centre contact		N/A
3.6 (4.4.7)	Parts in rough service luminaires resistant to tracking		N/A
3.6 (4.4.8)	Lamp connectors		N/A
3.6 (4.4.9)	Caps and bases correctly used		N/A
3.6 (4.4.10)	Light source for lampholder or connection according IEC 60061 not connected another way		N/A
3.6 (4.5)	Starter holders		N/A
	Starter holder in luminaires other than class II		N/A
	Starter holder class II construction		N/A
3.6 (4.6)	Terminal blocks		N/A
	Tails		N/A
	Unsecured blocks		N/A
3.6 (4.7)	Terminals and supply connections		N/A

EN 60598-2-3			
Clause	Requirement + Test	Result - Remark	Verdict
3.6 (4.7.1)	Contact to metal parts		N/A
3.6 (4.7.2)	Test 8 mm live conductor		P
	Test 8 mm earth conductor		N/A
3.6 (4.7.3)	Terminals for supply conductors		P
3.6 (4.7.3.1)	Welded method and material		N/A
	- stranded or solid conductor		N/A
	- spot welding		N/A
	- welding between wires		N/A
	- Type Z attachment		N/A
	- mechanical test according to 15.6.2		N/A
	- electrical test according to 15.6.3		N/A
	- heat test according to 15.6.3.2.3 and 15.6.3.2.4		N/A
3.6 (4.7.4)	Terminals other than supply connection	Approved connector used in LED module part	P
3.6 (4.7.5)	Heat-resistant wiring/sleeves		N/A
3.6 (4.7.6)	Multi-pole plug		N/A
	- test at 30 N		N/A
3.6 (4.8)	Switches		N/A
	- adequate rating		N/A
	- adequate fixing		N/A
	- polarized supply		N/A
	- compliance with IEC 61058-1 for electronic switches		N/A
3.6 (4.9)	Insulating lining and sleeves		P
3.6 (4.9.1)	Retainment	Only for mechanical use	P
	Method of fixing.....:	Heating shrinkable tubing covered tied cable	P
3.6 (4.9.2)	Insulated linings and sleeves:		P
	Resistant to a temperature > 20 °C to the wire temperature or		N/A
	a) & c) Insulation resistance and electric strength	a) >100 MΩ (2 MΩ) c) 1480 V	P
	b) Ageing test. Temperature (°C).....:	50 °C + 20 °C	P
3.6 (4.10)	Double or reinforced insulation		P
3.6 (4.10.1)	No contact, mounting surface – accessible metal parts – wiring of basic insulation		P

EN 60598-2-3			
Clause	Requirement + Test	Result - Remark	Verdict
	Safe installation fixed luminaires		P
	Capacitors and switches		N/A
	Interference suppression capacitors according to IEC 60384-14		N/A
3.6 (4.10.2)	Assembly gaps:		P
	- not coincidental		P
	- no straight access with test probe		P
3.6 (4.10.3)	Retention of insulation:		P
	- fixed		P
	- unable to be replaced; luminaire inoperative		P
	- sleeves retained in position		P
	- lining in lampholder		N/A
3.6 (4.10.4)	Protective impedance device		N/A
	Double or reinforced insulation bridged by appropriate and at least two resistors or two Y2 capacitors or one Y1 capacitor		N/A
	Y1 or Y2 capacitors comply with IEC 60384-14		N/A
	Resistors comply with test (a) in 14.1 of IEC 60065		N/A
3.6 (4.11)	Electrical connections and current-carrying parts		P
3.6 (4.11.1)	Contact pressure		P
3.6 (4.11.2)	Screws:		N/A
	- self-tapping screws		N/A
	- thread-cutting screws		N/A
3.6 (4.11.3)	Screw locking:		N/A
	- spring washer		N/A
	- rivets		N/A
3.6 (4.11.4)	Material of current-carrying parts		P
3.6 (4.11.5)	No contact to wood or mounting surface		P
3.6 (4.11.6)	Electro-mechanical contact systems		N/A
3.6 (4.12)	Screws and connections (mechanical) and glands		P
3.6 (4.12.1)	Screws not made of soft metal		P
	Screws of insulating material		P
	Torque test: torque (Nm); part	7.85 mm: 8.0; screws at system adjusting pipe and pole fixing screws	P

EN 60598-2-3			
Clause	Requirement + Test	Result - Remark	Verdict
	Torque test: torque (Nm); part	4.0 mm; 1.2; screws at glass frame and knife switch switch	P
	Torque test: torque (Nm); part	3.0 mm; 0.5; screws used for fixing LED module and cord anchorage	P
	Torque test: torque (Nm); part		N/A
3.6 (4.12.2)	Screws with diameter < 3 mm screwed into metal		N/A
3.6 (4.12.4)	Locked connections:		P
	- fixed arms; torque (Nm)	2.5 Nm	P
	- lampholder; torque (Nm).....		N/A
	- push-button switches; torque 0,8 Nm		N/A
3.6 (4.12.5)	Screwed glands; force (Nm)	M 16; 5 (plastic material)	P
3.6 (4.13)	Mechanical strength		P
3.6 (4.13.1)	Impact tests:		P
	- fragile parts; energy (Nm)	Glass protection; 0.5	P
	- other parts; energy (Nm).....	Metal enclosure; 0.7	P
	1) live parts		P
	2) linings		N/A
	3) protection		P
	4) covers		P
3.6 (4.13.2)	Metal parts have adequate mechanical strength		P
3.6 (4.13.3)	Straight test finger	30 N	P
3.6 (4.13.4)	Rough service luminaires		N/A
	- IP54 or higher		N/A
	a) fixed		N/A
	b) hand-held		N/A
	c) delivered with a stand		N/A
	d) for temporary installations and suitable for mounting on a stand		N/A
3.6 (4.13.6)	Tumbling barrel		N/A
3.6 (4.14)	Suspensions, fixings and means of adjusting		P
3.6 (4.14.1)	Mechanical load:		P
	A) four times the weight	4 x 7 kg = 24 kg	P
	B) torque 2,5 Nm		N/A
	C) bracket arm; bending moment (Nm)		N/A
	D) load track-mounted luminaires		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	E) clip-mounted luminaires, glass-shelve. Thickness (mm)		N/A
	Metal rod. diameter (mm)		N/A
	Fixed luminaire or independent control gear without fixing devices		N/A
3.6 (4.14.2)	Load to flexible cables		N/A
	Mass (kg)		—
	Stress in conductors (N/mm ²)		N/A
	Mass (kg) of semi-luminaire		N/A
	Bending moment (Nm) of semi-luminaire		N/A
3.6 (4.14.3)	Adjusting devices:		P
	- flexing test; number of cycles	45	P
	- strands broken	No strand broken	P
	- electric strength test afterwards		P
3.6 (4.14.4)	Telescopic tubes: cords not fixed to tube; no strain on conductors		N/A
3.6 (4.14.5)	Guide pulleys		N/A
3.6 (4.14.6)	Strain on socket-outlets		N/A
3.6 (4.15)	Flammable materials		N/A
	- glow-wire test 650°C		N/A
	- spacing ≥30 mm		N/A
	- screen withstanding test of 13.3.1		N/A
	- screen dimensions		N/A
	- no fiercely burning material		N/A
	- thermal protection		N/A
	- electronic circuits exempted		N/A
3.6 (4.15.2)	Luminaires made of thermoplastic material with lamp control gear		N/A
	a) construction		N/A
	b) temperature sensing control		N/A
	c) surface temperature		N/A
3.6 (4.16)	Luminaires for mounting on normally flammable surfaces		P
	No lamp control gear	Electronic controlgear (compliance with Section 12)	P
	Provided with adaptor for a track meet the requirements for direct mounting on normally flammable surfaces		N/A
3.6 (4.16.1)	Lamp control gear spacing:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- spacing 35 mm		N/A
	- spacing 10 mm		N/A
3.6 (4.16.2)	Thermal protection:		N/A
	- in lamp control gear		N/A
	- external		N/A
	- fixed position		N/A
	- temperature marked lamp control gear		N/A
3.6 (4.16.3)	Design to satisfy the test of 12.6	(see clause 12.6)	N/A
3.6 (4.17)	Drain holes		N/A
	Clearance at least 5 mm		N/A
3.6 (4.18)	Resistance to corrosion		P
3.6 (4.18.1)	- rust-resistance		P
3.6 (4.18.2)	- season cracking in copper		P
3.6 (4.18.3)	- corrosion of aluminium		N/A
3.6 (4.19)	Igniters compatible with ballast		N/A
3.6 (4.20)	Rough service vibration		N/A
3.6 (4.21)	Protective shield		N/A
3.6 (4.21.1)	Shield fitted if tungsten halogen lamps or metal halide lamps		N/A
	Shield of glass if tungsten halogen lamps		N/A
3.6 (4.21.2)	Particles from a shattering lamp not impair safety		N/A
3.6 (4.21.3)	No direct path		N/A
3.6 (4.21.4)	Impact test on shield		N/A
	Glow-wire test on lamp compartment	See Test Table 3.15 (13.3.2)	N/A
3.6 (4.22)	Attachments to lamps not cause overheating or damage		N/A
3.6 (4.23)	Semi-luminaires comply Class II		N/A
3.6 (4.24)	Photobiological hazards		P
3.6 (4.24.1)	No excessive UV radiation if tungsten halogen lamps and metal halide lamps (Annex P)		N/A
3.6 (4.24.2)	Retinal blue light hazard		P
	Class of risk group assessed according to IEC/TR 62778	RG1 unlimited	—
	Luminaires with E_{thr} :		N/A
	a) Fixed luminaires		N/A
	- distance x m, borderline between RG1 and RG2....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- marking and instruction according 3.2.23		N/A
	b) Portable and handheld luminaires		N/A
	- marking according 3.2.23 if RG1 exceeded at 200 mm according to IEC/TR 62778		N/A
	Portable luminaires for children IEC 60598-2-10 and Mains socket outlet nightlights IEC 60598-2-12 not exceed RG1 at 200 mm according to IEC/62778		N/A
3.6 (4.25)	Mechanical hazard		P
	No sharp point or edges		P
3.6 (4.26)	Short-circuit protection		N/A
3.6 (4.26.1)	Adequate means of uninsulated accessible SELV parts		N/A
3.6 (4.26.2)	Short-circuit test with test chain according 4.26.3		N/A
	Test chain not melt through		N/A
	Test sample not exceed values of Table 12.1 and 12.2		N/A
3.6 (4.27)	Terminal blocks with integrated screwless earthing contacts		N/A
	Test according Annex V		N/A
	Pull test of terminal fixing (20 N)		N/A
	After test, resistance < 0,05 Ω		N/A
	Pull test of mechanical connection (50 N)		N/A
	After test, resistance < 0,05 Ω		N/A
	Voltage drop test, resistance < 0,05 Ω		N/A
3.6 (4.28)	Fixing of thermal sensing control		N/A
	Not plug-in or easily replaceable type		N/A
	Reliably kept in position		N/A
	No adhesive fixing if UV radiations from a lamp can degrade the fixing		N/A
	Not outside the luminaire enclosure		N/A
	Test of adhesive fixing:		N/A
	Max. temperature on adhesive material (°C)		—
	100 cycles between t min and t max		N/A
	Temperature sensing control still in position		N/A
3.6 (4.29)	Luminaires with non-replaceable light source		N/A
	Not possible to replace light source		N/A
	Live part not accessible after parts have been opened by hand or tools		N/A
3.6 (4.30)	Luminaires with non-user replaceable light source		P

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Clause	Requirement + Test	Result - Remark	Verdict
	If protective cover provide protection against electric shock and marked with “caution, electric shock risk” symbol:		P
	Minimum two fixing means		P
3.6 (4.31)	Insulation between circuits		P
	Circuits insulated from LV supply fulfil requirements according 4.31.1 – 4.31.3		P
	Controllable luminaires requiring same level of insulation for all components, the insulation between control terminals and LV supply fulfil requirements according 4.31.1 – 4.31.3		N/A
3.6 (4.31.1)	SELV circuits		N/A
	Used SELV source		N/A
	Voltage ≤ ELV		N/A
	Insulating of SELV circuits from LV supply		N/A
	Insulating of SELV circuits from other non SELV circuits		N/A
	Insulating of SELV circuits from FELV		N/A
	Insulating of SELV circuits from other SELV circuits		N/A
	SELV circuits insulated from accessible parts according Table X.1		N/A
	Plugs not able to enter socket-outlets of other voltage systems		N/A
	Socket outlets does not admit plugs of other voltage systems		N/A
	Plugs and socket-outlets does not have protective conductor contact		N/A
3.6 (4.31.2)	FELV circuits		N/A
	Used FELV source		N/A
	Voltage ≤ ELV		N/A
	Insulating of FELV circuits from LV supply		N/A
	FELV circuits insulated from accessible parts according Table X.1		N/A
	Plugs not able to enter socket-outlets of other voltage systems		N/A
	Socket outlets does not admit plugs of other voltage systems		N/A
	Socket-outlets does not have protective conductor contact		N/A
3.6 (4.31.3)	Other circuits		P
	Other circuits insulated from accessible parts according Table X.1		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Class II construction with equipotential bonding for protection against indirect contacts with live parts:		P
	- conductive parts are connected together		P
	- test according 7.2.3		P
	- conductive part not cause an electric shock in case of an insulation fault		P
	- equipotential bonding in master/slave applications		N/A
	- master luminaire provided with terminal for accessible conductive parts of slave luminaires		N/A
	- slave luminaire constructed as class I		N/A
3.6 (4.32)	Overvoltage protective devices		N/A
	Comply with IEC 61643-11		N/A
	External to controlgear and connected to earth:		N/A
	- only in fixed luminaires		N/A
	- only connected to protective earth		N/A
3.6.1 (-)	At least IP X3 or X5 respectively. IP		P
	Column-integrated luminaires:		N/A
	- parts below 2,5 m. IP		N/A
	- parts above 2,5 m. IP		N/A
3.6.2 (-)	Suspension on span wires		N/A
3.6.3 (-)	Means for attaching the luminaire or external parts to its support appropriate to the weight		P
3.6.3.1 (-)	Static load test		P
	- drag coefficient	1.2	P
	- loaded area (m ²)	In instruction manual. 0.37	P
	- used load (N)	735 N	P
	- measured deformation (cm/m)	No deformation	P
	- no rotation	No rotation	P
3.6.4 (-)	Adjustable lampholders		N/A
3.6.5 (-)	Luminaires installed above 5 m, glass covers shall be:		P
	a) glass that fractures into small pieces (test according to 3.6.5.1), or		N/A
	b) glass having a high impact shock resistance (test according to 3.6.5.2), or		P
	c) protected by any means to retain glass fragments		N/A
	For tunnel luminaires 3.6.5.1 apply		N/A
	Method of protection declared by the manufacturer		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
3.6.5.1 (-)	Protection by the use of glass that fractures into small pieces		N/A
	- number of particles is more than 40		N/A
3.6.5.2 (-)	Protection by the use of high impact resistant glass		P
3.6.5.2.1 (-)	Glass covers have high mechanical strength		P
	Test according IEC 62262 with test apparatus according IEC 60068-2-75 with impact energy of 5J on preconditioned sample		P
3.6.5.2.2 (-)	Glass covers not break into large pieces		P
	- test according 3.6.5.1, number of particles is more than 20	By the use of high impact resistant glass. IK09, particles measured = 60	P
3.6.6 (-)	Connection compartment of column-integrated luminaire		N/A
	- provides adequate space		N/A
	- means for attachment		N/A
	- means for attachment of metal corrosion-resistant		N/A
3.6.7 (-)	Compliance with ISO standard or other.....		N/A
3.6.8 (-)	Doors of column-integrated luminaires:		N/A
	- corrosion-resistant		N/A
	- opening only possible for an authorized person		N/A
	- impact test 5 Nm		N/A
	- sample show no damage		N/A
3.6.9 (-)	Column-integrated luminaire:		N/A
	- dimension of the cable entry slot (mm).....		N/A
	- cable path from the slot to the connection compartment (mm)		N/A
	- cable path free from obstruction that might cause abrasion of the cable		N/A

3.7 (11)	CREEPAGE DISTANCES AND CLEARANCES		P
3.7 (11.2.1)	Impulse withstand category (Normal category II)	Category II <input checked="" type="checkbox"/> Category III <input type="checkbox"/>	—
	Category III according Annex U		P
	Protected against pollution, reduced creepage and clearance according Annex P of IEC 61347-1		P
3.7 (11.2.2)	Creepage distances for frequency up to 30 kHz	See Test Table 3.7 (11.2) I	P
	Creepage distances for frequency over 30 kHz:		P
	- Controlgear marked with \hat{U}_{OUT} and f_{UOUT} according IEC 61347-1, clause 7.1, item w	Frequencies above 30 kHz only inside separately approved controlgear.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Requirements according IEC 60664-4 for controlgear not covered by IEC 61347	See Test Table 3.7 (11.2) II	N/A
3.7 (11.2.3)	Clearances for frequency up to 30 kHz	See Test Table 3.7 (11.2) I	N/A
	Clearances distances for frequency over 30 kHz:		N/A
	- Controlgear marked with U_p	Frequencies above 30 kHz only inside separately approved controlgear.	N/A
	- Requirements according IEC 60664-4 for controlgear not covered by IEC 61347	See Test Table 3.7 (11.2) II	N/A

3.8 (7)	PROVISION FOR EARTHING		N/A
3.8 (7.2.1 + 7.2.3)	Accessible metal parts		N/A
	Metal parts in contact with supporting surface		N/A
	Resistance < 0,5 Ω		N/A
	Self-tapping screws used		N/A
	Thread-forming screws		N/A
	Thread-forming screw used in a groove		N/A
	Earth makes contact first		N/A
	Terminal blocks with integrated screwless earthing contacts tested according Annex V		N/A
	Protective earthing of the luminaire not via built-in control gear		N/A
3.8 (7.2.2 + 7.2.3)	Earth continuity in joints, etc.		N/A
3.8 (7.2.4)	Locking of clamping means		N/A
	Compliance with 4.7.3		N/A
	Terminal blocks with integrated screwless earthing contacts tested according Annex V		N/A
3.8 (7.2.5)	Earth terminal integral part of connector socket		N/A
3.8 (7.2.6)	Earth terminal adjacent to mains terminals		N/A
3.8 (7.2.7)	Electrolytic corrosion of the earth terminal		N/A
3.8 (7.2.8)	Material of earth terminal		N/A
	Contact surface bare metal		N/A
3.8 (7.2.10)	Class II luminaire for looping-in		N/A
	Double or reinforced insulation to functional earth		N/A
3.8 (7.2.11)	Earthing core coloured green-yellow		N/A
	Length of earth conductor		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

3.8.1 (-)	Attachment prevented from rotation		N/A
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3.9 (14)	SCREW TERMINALS		P
	Separately approved; component list	Installation coupler, see Annex 1	P
	Part of the luminaire	Knife switch, see Annex 3	P

3.9 (15)	SCREWLESS TERMINALS AND ELECTRICAL CONNECTIONS		
	Separately approved; component list	Connector of LED, see Annex 1	P
	Part of the luminaire	(see Annex 4)	N/A

3.10 (5)	EXTERNAL AND INTERNAL WIRING		P
3.10 (5.2)	Supply connection and external wiring		P
3.10 (5.2.1)	Means of connection	Supply cable with separately approved connector. (see Annex 1)	P
	Outdoor luminaire has not PVC insulated external wiring if not class III or SELV ≤ 25 V a.c./60 V d.c. or protected from outdoor environment		N/A
3.10 (5.2.2)	Type of cable	H05RN-F	P
	Nominal cross-sectional area (mm ²)	2 x 1 mm ²	P
	Cables equal to IEC 60227 or IEC 60245	60245IEC 66	P
3.10 (5.2.3)	Type of attachment, X, Y or Z	Type Y	P
3.10 (5.2.5)	Type Z not connected to screws		N/A
3.10 (5.2.6)	Cable entries:		P
	- suitable for introduction		P
	- adequate degree of protection		P
3.10 (5.2.7)	Cable entries through rigid material have rounded edges		N/A
3.10 (5.2.8)	Insulating bushings:		P
	- suitably fixed	Plastic gland	P
	- material in bushings		P
	- material not likely to deteriorate		P
	- tubes or guards made of insulating material		N/A
3.10 (5.2.9)	Locking of screwed bushings		P
3.10 (5.2.10)	Cord anchorage:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- covering protected from abrasion		P
	- clear how to be effective		P
	- no mechanical or thermal stress		P
	- no tying of cables into knots etc.		P
	- insulating material or lining		P
3.10 (5.2.10.1)	Cord anchorage for type X attachment:		N/A
	a) at least one part fixed		N/A
	b) types of cable		N/A
	c) no damaging of the cable		N/A
	d) whole cable can be mounted		N/A
	e) no touching of clamping screws		N/A
	f) metal screw not directly on cable		N/A
	g) replacement without special tool		N/A
	Glands not used as anchorage		N/A
	Labyrinth type anchorages		N/A
3.10 (5.2.10.2)	Adequate cord anchorage for type Y and type Z attachment	Type Y	P
3.10 (5.2.10.3)	Tests:		P
	- impossible to push cable; unsafe		P
	- pull test: 25 times; pull (N)	60	P
	- torque test: torque (Nm).....	0.25	P
	- displacement ≤ 2 mm		P
	- no movement of conductors		P
	- no damage of cable or cord		P
	- function independent of electrical connection		P
3.10 (5.2.11)	External wiring passing into luminaire		P
3.10 (5.2.12)	Looping-in terminals		N/A
3.10 (5.2.13)	Wire ends not tinned		N/A
	Wire ends tinned: no cold flow		N/A
3.10 (5.2.14)	Mains plug same protection		N/A
	Class III luminaire plug		N/A
	No unsafe compatibility		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
3.10 (5.2.16)	Appliance inlets (IEC 60320)		N/A
	Installation couplers (IEC 61535)		N/A
	Other appliance inlet or connector according relevant IEC standard	Connector in compliance with IEC 61984	P
3.10 (5.2.17)	No standardized interconnecting cables properly assembled		N/A
3.10 (5.2.18)	Used plug in accordance with		N/A
	- IEC 60083		N/A
	- other standard		N/A
3.10 (5.3)	Internal wiring		P
3.10 (5.3.1)	Internal wiring of suitable size and type	FEP + FEP, 0.5 and 0.75 mm ² , double insulation	P
	Through wiring		N/A
	- not delivered/ mounting instruction		N/A
	- factory assembled		N/A
	- socket outlet loaded (A)		N/A
	- temperatures.....	(see Annex 2)	N/A
	Green-yellow for earth only		N/A
3.10 (5.3.1.1)	Internal wiring connected directly to fixed wiring		N/A
	Cross-sectional area (mm ²)		N/A
	Insulation thickness (mm)		N/A
	Extra insulation added where necessary		N/A
3.10 (5.3.1.2)	Internal wiring connected to fixed wiring via internal current-limiting device		N/A
	Cross-sectional area (mm ²)		N/A
3.10 (5.3.1.3)	Double or reinforced insulation for class II		N/A
3.10 (5.3.1.4)	Conductors without insulation		N/A
3.10 (5.3.1.5)	SELV current-carrying parts		N/A
3.10 (5.3.1.6)	Insulation thickness other than PVC or rubber		N/A
3.10 (5.3.2)	Sharp edges etc.		P
	No moving parts of switches etc.		N/A
	Joints, raising/lowering devices		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Telescopic tubes etc.		N/A
	No twisting over 360°		N/A
3.10 (5.3.3)	Insulating bushings:		P
	- suitable fixed		P
	- material in bushings		P
	- material not likely to deteriorate		P
	- cables with protective sheath		N/A
3.10 (5.3.4)	Joints and junctions effectively insulated		N/A
3.10 (5.3.5)	Strain on internal wiring		N/A
3.10 (5.3.6)	Wire carriers		N/A
3.10 (5.3.7)	Wire ends not tinned		N/A
	Wire ends tinned: no cold flow		P
3.10 (5.4)	Test to determine suitability of conductors having a reduced cross-sectional area		P
	Under test the temperature of the luminaire wiring insulation not exceed the limits stated in Table 12.2	see Annex 2	P
	No damage to luminaire wiring after test		P
3.10.1 (-)	Cord anchorage if applicable		P
	- pull test: 25 times; pull (N)	60	P
	- torque test: torque (Nm).....	0.25	P

3.11 (8)	PROTECTION AGAINST ELECTRIC SHOCK		P
3.11 (8.2.1)	Live parts not accessible		P
	Basic insulated parts not used on the outer surface without appropriate protection		P
	Basic insulated parts not accessible with standard test finger on portable, settable and adjustable luminaires		P
	Basic insulated parts not accessible with Ø 50 mm probe from outside, other types of luminaires		N/A
	Lamp and starterholders in portable and adjustable luminaires comply with double or reinforced insulation requirements		N/A
	Basic insulation only accessible under lamp or starter replacement		N/A
	Protection in any position		P
	Double-ended tungsten filament lamp		N/A
	Insulation lacquer not reliable		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Double-ended high-pressure discharge lamp		N/A
	Relevant warning according to 3.2.18 fitted to the luminaire		N/A
3.11 (8.2.2)	Portable luminaire adjusted in most unfavourable position		N/A
3.11 (8.2.3.a)	Class II luminaire:		P
	- basic insulated metal parts not accessible during starter or lamp replacement		N/A
	- basic insulation not accessible other than during starter or lamp replacement		P
	- glass protective shields not used as supplementary insulation		N/A
3.11 (8.2.3.b)	BC lampholder of metal in class I luminaires shall be earthed		N/A
3.11 (8.2.3.c)	SELV circuits with exposed current carrying parts:		N/A
	Ordinary luminaire:		N/A
	- voltage under load (V)		N/A
	- no-load voltage (V)		N/A
	- touch current if applicable (mA)		N/A
	One conductive part insulated if required		N/A
	Other than ordinary luminaire:		N/A
	- nominal voltage (V)		N/A
	Class III luminaire only for connection to SELV		N/A
	Class III luminaire not provided with means for protective earthing		N/A
3.11 (8.2.4)	Portable luminaire has protection independent of supporting surface		N/A
3.11 (8.2.5)	Compliance with the standard test finger or relevant probe		N/A
3.11 (8.2.6)	Covers reliably secured		P
3.11 (8.2.7)	Luminaire other than below with capacitor > 0,5 µF not exceed 50 V 1 min after disconnection		P
	Portable luminaire with capacitor > 0,1 µF (0.25) not exceed 34 V 1 s after disconnection		N/A
	Other luminaires with capacitor > 0,1 µF (0.25) with plug and track adaptors not exceed 60 V 5 s after disconnection		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
3.12 (12)	ENDURANCE TEST AND THERMAL TEST		P
3.12.2 (-)	If IP > IP 20 relevant test of (12.4), (12.5) and (12.6) after (9.2) before (9.3) specified in 3.13		—
3.12 (12.2)	Selection of lamps and ballasts		—
	Lamp used according Annex B	(Lamp used see Annex 2)	—
	Controlgear if separate and not supplied	(Controlgear used see Annex 2)	—
3.12 (12.3)	Endurance test		P
	a) mounting-position	Post top	—
	b) test temperature (°C)	50 for all models MAXISEMPIONE 55 for all models SEMPIONE and MINISEMPIONE	—
	c) total duration (h)	240	—
	d) supply voltage (V)	1.1 x 240 V = 264 V	—
	d) if not equipped with controlgear, constant voltage/current (V) or (A)		—
	e) luminaire ceases to operate		—
3.12 (12.3.2)	After endurance test:		P
	- no part unserviceable		P
	- luminaire not unsafe		P
	- no damage to track system		N/A
	- marking legible		P
	- no cracks, deformation etc.		P
3.12 (12.4)	Thermal test (normal operation)	(see Annex 2)	P
3.12 (12.5)	Thermal test (abnormal operation)	(see Annex 2)	P
3.12 (12.6)	Thermal test (failed lamp control gear condition):		N/A
3.12 (12.6.1)	Through wiring or looping-in wiring loaded by a current of (A)		—
	- case of abnormal conditions		—
	- electronic lamp control gear		N/A
	- measured winding temperature (°C): at 1,1 Un		—
	- measured mounting surface temperature (°C) at 1,1 Un		N/A
	- calculated mounting surface temperature (°C)		N/A
	- track-mounted luminaires		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
3.12 (12.6.2)	Temperature sensing control		N/A
	- case of abnormal conditions		—
	- thermal link		N/A
	- manual reset cut-out		N/A
	- auto reset cut-out		N/A
	- measured mounting surface temperature (°C)		N/A
	- track-mounted luminaires		N/A
3.12 (12.7)	Thermal test (failed lamp control gear in plastic luminaires):		N/A
3.12 (12.7.1)	Luminaire without temperature sensing control		N/A
3.12 (12.7.1.1)	Luminaire with fluorescent lamp ≤ 70W		N/A
	Test method 12.7.1.1 or Annex W		—
	Test according to 12.7.1.1:		N/A
	- case of abnormal conditions		—
	- Ballast failure at supply voltage (V)		—
	- Components retained in place after the test		N/A
	- Test with standard test finger after the test		N/A
	Test according to Annex W:		N/A
	- case of abnormal conditions		—
	- measured winding temperature (°C): at 1,1 Un.....:		—
	- measured temperature of fixing point/exposed part (°C): at 1,1 Un		—
	- calculated temperature of fixing point/exposed part (°C).....:		—
	Ball-pressure test	See Test Table 3.15 (13.2.1)	N/A
3.12 (12.7.1.2)	Luminaire with discharge lamp, fluorescent lamp > 70W, transformer > 10 VA		N/A
	- case of abnormal conditions		—
	- measured winding temperature (°C): at 1,1 Un.....:		—
	- measured temperature of fixing point/exposed part (°C): at 1,1 Un		—
	- calculated temperature of fixing point/exposed part (°C).....:		—
	Ball-pressure test	See Test Table 3.15 (13.2.1)	N/A
3.12 (12.7.1.3)	Luminaire with short circuit proof transformers ≤ 10 VA		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- case of abnormal conditions		—
	- Components retained in place after the test		N/A
	- Test with standard test finger after the test		N/A
3.12 (12.7.2)	Luminaire with temperature sensing control		N/A
	- thermal link	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	- manual reset cut-out	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	- auto reset cut-out	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	- case of abnormal conditions		—
	- highest measured temperature of fixing point/ exposed part (°C):.....		—
	Ball-pressure test:	See Test Table 3.15 (13.2.1)	
3.12.1 (-)	Temperature reduction if for outdoor use only		P
3.12.2 (-)	(See above)		—
3.12.3 (-)	Glass covers used within the thermal limits declared by the glass manufacturer	280 °C	P

3.13 (9)	RESISTANCE TO DUST AND MOISTURE		P
3.13.1 (-)	If IP > IP 20 the order of tests as specified in clause 3.12		P
3.13 (9.2)	Tests for ingress of dust, solid objects and moisture:		P
	- classification according to IP	IP66	—
	- mounting position during test.....	As the normal use	—
	- fixing screws tightened; torque (Nm)	cable used for test is indicated in manual instruction	—
	- tests according to clauses	9.2.2; 9.2.7	—
	- electric strength test afterwards		P
	a) no deposit in dust-proof luminaire		N/A
	b) no talcum in dust-tight luminaire		P
	c) no trace of water on current-carrying parts or on insulation where it could become a hazard		P
	c.1) For luminaires without drain holes – no water entry		P
	c.2) For luminaires with drain holes – no hazardous water entry		N/A
	d) no water in watertight or pressure watertight luminaire		N/A
	e) no contact with live parts (IP 2X)		N/A
	e) no entry into enclosure (IP 3X and IP 4X)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	e) no contact with live parts through drain holes and ventilation slots (IP3X and IP4X)		N/A
	f) no trace of water on part of lamp requiring protection from splashing water		N/A
	g) no damage of protective shield or glass envelope		P
3.13 (9.3)	Humidity test 48 h	95°C 25 %	P

3.14 (10)	INSULATION RESISTANCE AND ELECTRIC STRENGTH		P
3.14 (10.2.1)	Insulation resistance test		
	Cable or cord covered by metal foil or replaced by a metal rod of mm Ø	Cable covered by metal foil.	—
	Insulation resistance (MΩ)	> 4 MΩ	—
	SELV		N/A
	- between current-carrying parts of different polarity :		N/A
	- between current-carrying parts and mounting surface		N/A
	- between current-carrying parts and metal parts of the luminaire		N/A
	- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts		N/A
	- Insulation bushings as described in Section 5		N/A
	Other than SELV		P
	- between live parts of different polarity	> 100 MΩ	P
	- between live parts and mounting surface	> 100 MΩ	P
	- between live parts and metal parts	> 100 MΩ	P
	- between live parts of different polarity through action of a switch		N/A
	- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts	> 100 MΩ	P
	- Insulation bushings as described in Section 5	> 100 MΩ	P
3.14 (10.2.2)	Electric strength test		P
	Dummy lamp		N/A
	Luminaires with ignitors after 24 h test		N/A
	Luminaires with manual ignitors		N/A
	Test voltage (V)		N/A
	SELV		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- between current-carrying parts of different polarity :		N/A
	- between current-carrying parts and mounting surface		N/A
	- between current-carrying parts and metal parts of the luminaire		N/A
	- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts		N/A
	- Insulation bushings as described in Section 5		N/A
	Other than SELV		P
	- between live parts of different polarity	1480 V	P
	- between live parts and mounting surface	2960 V (Primary to accessible parts) 3280 V (Secondary to accessible)	P
	- between live parts and metal parts	2960 V (Primary to metal parts) 1640 V (Secondary to metal parts)	P
	- between live parts of different polarity through action of a switch		N/A
	- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts		N/A
	- Insulation bushings as described in Section 5		N/A
3.14 (10.3)	Touch current or protective conductor current (mA):	0.339 mA _{peak} (limit: 0.7 mA _{peak})	P

3.15 (13)	RESISTANCE TO HEAT, FIRE AND TRACKING		P
3.15 (13.2.1)	Ball-pressure test	See Test Table 3.15 (13.2.1)	N/A
3.15 (13.3.1)	Needle-flame test (10 s).....	See Test Table 3.15 (13.3.1)	N/A
3.15 (13.3.2)	Glow-wire test (650°C).....	See Test Table 3.15 (13.3.2)	N/A
3.15 (13.4)	Proof tracking test (IEC 60112)	See Test Table 3.15 (13.4)	N/A

5.7 (11.2)	TABLE: Creepage distances and clearances				P		
	Minimum distances (mm) for a.c. (50/60 Hz) sinusoidal voltages						
	Applicable part of IEC 60598-1 Table 11.1* and 11.2*						
	Insulation type **	Measured clearance	Required		Measured creepage	Required	
			clearance	*Table		creepage	*Table

EN 60598-2-3							
Clause	Requirement + Test			Result - Remark			Verdict
Distance 1:	B	3.7	1.5	11.1	5.1	2.5	11.1
Working voltage (V).....:				240			—
PTI.....:				< 600 <input checked="" type="checkbox"/> ≥ 600 <input type="checkbox"/>			—
Pulse voltage if applicable (kV)							—
Supplementary information: Current-carrying parts of different polarity							
Distance 2:	B	3.7	1.5	11.1	5.1	2.5	11.1
Working voltage (V).....:				240			—
PTI.....:				< 600 <input checked="" type="checkbox"/> ≥ 600 <input type="checkbox"/>			—
Pulse voltage if applicable (kV)							—
Supplementary information: Current-carrying parts (input circuits) and accessible parts							
Distance 3:	B	3.7	1.5	11.1	5.1	2.5	11.1
Working voltage (V).....:				240			—
PTI.....:				< 600 <input checked="" type="checkbox"/> ≥ 600 <input type="checkbox"/>			—
Pulse voltage if applicable (kV)							—
Supplementary information: Output circuits and accessible parts							
Distance 4:	R	7.2	3	11.1	8.8	5	11.1
Working voltage (V).....:				320 V (max output of the controlgear)			—
PTI.....:				< 600 <input checked="" type="checkbox"/> ≥ 600 <input type="checkbox"/>			—
Pulse voltage if applicable (kV)							—
Supplementary information: Between input and output							

** Insulation type: B – Basic; S – Supplementary; R – Reinforced. See also IEC 60598-1 Annex M.

3.7 (11.2)	TABLE II: Creepage distances and clearances						N/A
Minimum distances (mm) for a.c. higher than 30 kHz sinusoidal voltages							
Applicable part of IEC 61347-1 Table 7 and 8* or IEC 60664-4 Table 1 and 2							
Distances	Insulation type **	Measured clearance	Required		Measured creepage	Required	
			clearance	*Table		creepage	*Table
Distance 1:							
Working voltage (V).....:							—
Frequency if applicable (kHz).....:							—
PTI.....:				< 600 <input type="checkbox"/> ≥ 600 <input type="checkbox"/>			—
Peak value of the working voltage \hat{U}_{out} if applicable (kV)							—
Supplementary information:							

EN 60598-2-3							
Clause	Requirement + Test				Result - Remark		Verdict
Distance 2:							
Working voltage (V).....:							—
Frequency if applicable (kHz).....:							—
PTI.....:					< 600 <input type="checkbox"/> ≥ 600 <input type="checkbox"/>		—
Peak value of the working voltage \hat{U}_{out} if applicable (kV)							—
Supplementary information:							
Distance 3:							
Working voltage (V).....:							—
Frequency if applicable (kHz).....:							—
PTI.....:					< 600 <input type="checkbox"/> ≥ 600 <input type="checkbox"/>		—
Peak value of the working voltage \hat{U}_{out} if applicable (kV)							—
Supplementary information:							

** Insulation type: B – Basic; S – Supplementary; R – Reinforced.

3.15 (13.2.1)	TABLE: Ball Pressure Test of Thermoplastics				N/A
Allowed impression diameter (mm)		2		—	
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)		
Supplementary information:					

3.15 (13.3.1)	TABLE: Needle-flame test (IEC 60695-11-5)				N/A
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict
Supplementary information:					

EN 60598-2-3				
Clause	Requirement + Test	Result - Remark		Verdict
3.15 (13.3.2)	TABLE: Glow-wire test (IEC 60695-2-11)			N/A
Glow wire temperature		650°C		—
Object/ Part No./ Material	Manufacturer/ trademark	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict
Supplementary information:				

3.15 (13.4)	TABLE: Proof tracking test (IEC 60112)			N/A
Test voltage PTI		175 V		—
Object/ Part No./ Material	Manufacturer/ trademark	Withstand 50 drops without failure on three places or on three specimens		Verdict
Supplementary information:				

EN 60598-2-3			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX 1	TABLE: Critical components information						P
Object / part No.	Code	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity	
LED MAXISEMPIONE							
Supply connector	A	STUCCHI	3702/V-2P	16 A, 250 V, T110, IP66/68	EN 61984	IMQ	
External cable	A	ELETTROBRES CIA	H05RN-F	300/500 V 2 x 1 mm ² T90	EN 50525-2-21	IMQ DAT950031 77	
Gland	C	WKK	M16 B	M16 x 1.5 T90	IEC/EN 60598-1 IEC/EN 60598-2-3	Tested in appliance	
Internal wiring (Controlgear – Knife switch)	C	EMC COLOSIO	TD17	FEP+FEP 300/300 V 0.75 mm ² T180	IEC/EN 60598-1 IEC/EN 60598-2-3	Tested in appliance	
Sleeves for mechanical protection	C	RTE	GVS series	Silicon glass, diameter 4 mm, 1500 V, T250	IEC/EN 60598-1 IEC/EN 60598-2-3	Tested in appliance	
Internal wiring (LED)	C	EMC COLOSIO	TE10	FEP+FEP 300/300 V 0.5 mm ² T180	IEC/EN 60598-1 IEC/EN 60598-2-3	Tested in appliance	
Cord anchorage	C	L.C. RELCO	62002000	Polycarbonate	IEC/EN 60598-1 IEC/EN 60598-2-3	Tested in appliance	
Knife switch	C	SINEYi	M29M	450 V, 16 A, T110 Class II	IEC/EN 61984	TUV SUD Cert. No.:B15099 2724002	

EN 60598-2-3						
Clause	Requirement + Test			Result - Remark	Verdict	
LED Control Gear	B	Philips Lighting B.V	Xitanium 150W 0.70A 1-10V 230V S240 sXt	Input: Max. 150 W 220-240 Vac 0.8-0.67A 50/60 Hz. Output: 100-214 V, 700mA, Uout max 320 V tc 85 °C ta +55 °C Built-in control gear with protective separation (reinforced insulation between input and output)	EN 61347-1 EN 61347-2-13 EN 62384	ENEC 05 Cert. No.:219366 201
LED Control Gear	B	T.C.I	SIRIO 150/200-700 BILEVEL BI 220-240 Vac 50-60 Hz	Input: Max. 121 W 220-240 Vac 0.77A 50/60 Hz. Output:150 W Uout max= 290 V, 200-700mA, max tc 80 °C Built-in control gear with protective separation (reinforced insulation between input and output)	EN 61347-1 EN 61347-2-13 EN 62384	ENEC 05 Cert. No.:81-108919

EN 60598-2-3						
Clause	Requirement + Test			Result - Remark	Verdict	
LED Control Gear	D	TCI	TCI MILANO IN LED 165 W/350-1050 4P	Input: 220-240 Vac 1 50/60 Hz. Output:165 W Uout max= 300 V, 120-1050 mA, max tc 85 °C Built-in control gear with protective separation (reinforced insulation between input and output)	EN 61347-1 EN 61347-2-13 EN 62384	ENEC 10 Cert. No.:DE1- 61295
LEDs Matrix	C	SAMSUNG	LH508A+	Forward Current: 880 mA @ Forward Voltage: 6.4 Vmax, T100,3000/400 0 K	IEC/EN 62031 IEC/EN 60598- 1 IEC/EN 60598- 2-3 IEC/EN 62471 IEC/TR 62778	Tested as component by Nemko Spa See test report 377848- 2TRFPHOa nd test report 377848- 3TRFPHO
LEDs Matrix	C	SAMSUNG	LM301H	Forward Current: 200 mA Forward Voltage: 2.7 Vmax, T85, 3000/4000 K	IEC/EN 62031 IEC/EN 60598- 1 IEC/EN 60598- 2-3 IEC/EN 62471 IEC/TR 62778	Tested as component by Nemko Spa See test report 377848- 2TRFPHOa nd test report 377848- 3TRFPHO
PCB for LED module	C	Finest Printed Circuit Board Ltd	LDT-AL	Min Thickness 1.6 mm, V-0, T90	IEC/EN 60598- 1 IEC/EN 60598- 2-3 UL 796	*UL (E337137), Tested in appliance

EN 60598-2-3						
Clause	Requirement + Test			Result - Remark		Verdict
Connector for the LED module	B	WAGO	2060-402	130 V, 9 A, 0.75 mm ² rigid and flexible, T105	IEC/EN 60998-1 IEC/EN 60998-2-2 IEC/EN 60598-1	KEMA-KEUR
Glass cover	C	PALEARI FRATELLI	Soda lime silicate float glass	Thickness 4 mm T280	IEC/EN 60598-1 IEC/EN 60598-2-3	Tested in appliance
LED SEMPIONE (only components differents)						
LED Control Gear	B	TCI	MILANOinLED 110W/200-1050 4PN	Input: 220-240 Vac 50/60 Hz. Output:110 W Uout max= 250 V, 200-1050 mA, max tc 85 °C Built-in control gear with protective separation (reinforced insulation between input and output)	EN 61347-1 EN 61347-2-13 EN 62384	ENEC 10 Cert. No.:DE1-61294
LED Control Gear	D	T.C.I	SIRIO 150/300-1050 BILEVEL BI 220-240 Vac 50-60 Hz	Input: 220-240 Vac 0.77A 50/60 Hz. Output:150 W Uout max= 290 V, 300-1050 mA, max tc 80 °C Built-in control gear with protective separation (reinforced insulation between input and output)	EN 61347-1 EN 61347-2-13 EN 62384	ENEC 05 Cert. No.:81-108919
LED MINSEMPIONE						

EN 60598-2-3			
Clause	Requirement + Test	Result - Remark	Verdict

LED Control Gear	B Philips Lighting B.V	Xitanium 75W 0.7A 1-10V 230V C165 sXt	Input: Max. 84 W 220-240 Vac 0.4-0.34A 50/60 Hz. Output:75 W 52-107 V, 700mA, max 160 V tc 85 °C ta +55 °C Built-in controlgear with protective separation (reinforced insulation between input and output)	EN 61347-1 EN 61347-2-13 EN 62384	ENEC 05 Cert. No.:219707 801
LED Control Gear	B TCI	MILANOinLED 110W/200-1050 4PN	Input: 220-240 Vac 50/60 Hz. Output:110 W Uout max= 250 V, 200-1050 mA, max tc 85 °C Built-in control gear with protective separation (reinforced insulation between input and output)	EN 61347-1 EN 61347-2-13 EN 62384	ENEC 10 Cert. No.:DE1-61294

Supplementary information:

The codes above have the following meaning:

- A - The component is replaceable with another one, also certified, with equivalent characteristics
- B - The component is replaceable if authorised by the test house
- C - Integrated component tested together with the appliance
- D - Alternative component

EN 60598-2-3			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX 2a	TABLE: Temperature measurements, thermal tests of Section 12				P		
	Type reference	LED MAXISEMPIONE (Cod. 36251)		—			
	Lamp used	Enclosed LEDs		—			
	Lamp control gear used	2 x Xitanium 150W 0,70A 1-10V 230V S240 sXt		—			
	Mounting position of luminaire	Pipe mounted		—			
	Supply wattage (W)	test 1: 218.3 test 2: 217.2		—			
	Supply current (A)	test 1: 0.961 test 2: 0.951		—			
	Calculated power factor	test 1: 0.942 test 2: 0.923		—			
	Table: measured temperatures corrected for $t_a = 40^\circ\text{C}$:			P			
	- abnormal operating mode	LED controlgear output short circuited		—			
	- test 1: rated voltage	240 V		—			
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage	254.4 V		—			
	- test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage	—		—			
	- test 4: 1,1 times rated voltage or 1,05 times rated wattage	264 V		—			
	Through wiring or looping-in wiring loaded by a current of A during the test	—		—			
Temperature measurements ($^\circ\text{C}$)							
Part	Ambient	Clause 12.4 – normal				Clause 12.5 – abnormal	
		test 1	test 2	test 3	limit	test 4	limit
to LED Control gear	40	70	72	—	85	—	—
Disconnecting switch	40	39	39	—	110	—	—
External wire	40	49	50	—	90	—	—
LED	40	96	97	—	100	—	—
LED's cable	40	73	75	—	180	—	—
Connector for LED module	40	77	78	—	105	—	—

EN 60598-2-3							
Clause	Requirement + Test				Result - Remark		Verdict
Internal wire T180 (CG – knife switch)	40	51	53	—	180	—	—
Sleeves	40	49	50		250	—	
PCB	40	87	88	—	90	—	—
Lighted surface (0.5 m)	40	35	35	—	90	—	—
Mounting surface	40	36	36	—	90	—	—
Supplementary information: *) For all the measured temperatures indicated in this table, it has been applied the reduction of 10°C foreseen in § 3.12.1 of IEC/EN 60598-2-3. The controlgear unit is protected when subjected to the s-c of the output, therefore there is no further temperature was measured.							

EN 60598-2-3			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX 2b	TABLE: Temperature measurements, thermal tests of Section 12		P
	Type reference	LED MAXISEMPIONE Cod. 36250	—
	Lamp used	Enclosed LEDs	—
	Lamp control gear used	MILANOinLED 110W/200-1050 4PN	—
	Mounting position of luminaire	Pipe mounted	—
	Supply wattage (W)	test 1: 176.1 test 2: 171.3	—
	Supply current (A)	test 1: 0.76 test 2: 0.71	—
	Calculated power factor	test 1: 0.963 test 2: 0.947	—
	Table: measured temperatures corrected for $t_a = 45^\circ\text{C}$:		P
	- abnormal operating mode	LED controlgear output short circuited	—
	- test 1: rated voltage	240 V	—
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage	254.4 V	—
	- test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage	—	—
	- test 4: 1,1 times rated voltage or 1,05 times rated wattage	264 V	—
	Through wiring or looping-in wiring loaded by a current of A during the test	—	—

Temperature measurements ($^\circ\text{C}$)

Part	Ambient	Clause 12.4 – normal				Clause 12.5 – abnormal	
		test 1	test 2	test 3	limit	test 4	limit
tc LED Control Gear	45	60	63	—	85	—	—
Disconnecting switch	45	38	39	—	110	—	—
External wire	45	47	49	—	90	—	—
LED	45	93	94	—	100	—	—
LED's cable	45	72	74	—	180	—	—
Connector for LED module	45	74	77	—	105	—	—

EN 60598-2-3							
Clause	Requirement + Test				Result - Remark		Verdict
Internal wire T180 (CG – knife switch)	45	50	52	—	180	—	—
Sleeves	45	47	48		250	—	
PCB	45	71	74	—	90	—	—
Lighted surface (1 m)	45	33	34	—	90	—	—
Mounting surface	45	34	34	—	90	—	—
Supplementary information: *) For all the measured temperatures indicated in this table, it has been applied the reduction of 10°C foreseen in § 3.12.1 of IEC/EN 60598-2-3. The controlgear unit is protected when subjected to the s-c of the output, therefore there is no further temperature was measured.							

EN 60598-2-3			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX 2c	TABLE: Temperature measurements, thermal tests of Section 12		P
	Type reference	LED SEMPIONE Cod. 36200	—
	Lamp used	Enclosed LEDs	—
	Lamp control gear used	SIRIO 150/200-700 BILEVEL BI 220-240 Vac 50-60 Hz	—
	Mounting position of luminaire	Pipe mounted	—
	Supply wattage (W)	test 1: 116.3 test 2: 115	—
	Supply current (A)	test 1: 0.52 test 2: 0.49	—
	Calculated power factor	test 1: 0.928 test 2: 0.906	—
	Table: measured temperatures corrected for $t_a = 45^\circ\text{C}$:		P
	- abnormal operating mode	LED controlgear output short circuited	—
	- test 1: rated voltage	240 V	—
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage	254.4 V	—
	- test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage	—	—
	- test 4: 1,1 times rated voltage or 1,05 times rated wattage	264 V	—
	Through wiring or looping-in wiring loaded by a current of A during the test	—	—

Temperature measurements ($^\circ\text{C}$)							
Part	Ambient	Clause 12.4 – normal				Clause 12.5 – abnormal	
		test 1	test 2	test 3	limit	test 4	limit
tc LED Control Gear	45	64	66	—	80	—	—
Disconnecting switch	45	35	36	—	110	—	—
External wire	45	44	46	—	90	—	—
LED	45	73	74	—	100	—	—
LED's cable	45	62	64	—	180	—	—
Connector for LED module	45	64	67	—	105	—	—

EN 60598-2-3							
Clause	Requirement + Test				Result - Remark	Verdict	
Internal wire T180 (CG – knife switch)	45	50	52	—	180	—	—
Sleeves	45	45	46		250	—	
PCB	45	61	64	—	90	—	—
Lighted surface (1 m)	45	33	34	—	90	—	—
Mounting surface	45	34	34	—	90	—	—
Supplementary information: *) For all the measured temperatures indicated in this table, it has been applied the reduction of 10°C foreseen in § 3.12.1 of IEC/EN 60598-2-3. The controlgear unit is protected when subjected to the s-c of the output, therefore there is no further temperature was measured.							

EN 60598-2-3			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX 2d	TABLE: Temperature measurements, thermal tests of Section 12		P
	Type reference	LED SEMPIONE Cod. 36200	—
	Lamp used	Enclosed LEDs	—
	Lamp control gear used	MILANOinLED 110W/200-1050 4PN	—
	Mounting position of luminaire	Pipe mounted	—
	Supply wattage (W)	test 1: 118.3 test 2: 115.1	—
	Supply current (A)	test 1: 0.52 test 2: 0.50	—
	Calculated power factor	test 1: 0.923 test 2: 0.903	—
	Table: measured temperatures corrected for ta = 45°C:		P
	- abnormal operating mode	LED controlgear output short circuited	—
	- test 1: rated voltage	240 V	—
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage	254.4 V	—
	- test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage	—	—
	- test 4: 1,1 times rated voltage or 1,05 times rated wattage	264 V	—
	Through wiring or looping-in wiring loaded by a current of A during the test	—	—

Temperature measurements (°C)							
Part	Ambient	Clause 12.4 – normal				Clause 12.5 – abnormal	
		test 1	test 2	test 3	limit	test 4	limit
tc LED Control Gear	45	58	61	—	85	—	—
Disconnecting switch	45	34	36	—	110	—	—
External wire	45	44	45	—	90	—	—
LED	45	73	75	—	100	—	—
LED's cable	45	65	66	—	180	—	—
Connector for LED module	45	64	67	—	105	—	—

EN 60598-2-3							
Clause	Requirement + Test				Result - Remark		Verdict
Internal wire T180 (CG – knife switch)	45	50	52	—	180	—	—
Sleeves	45	46	47		250	—	
PCB	45	70	71	—	90	—	—
Lighted surface (1 m)	45	33	34	—	90	—	—
Mounting surface	45	34	34	—	90	—	—
Supplementary information: *) For all the measured temperatures indicated in this table, it has been applied the reduction of 10°C foreseen in § 3.12.1 of IEC/EN 60598-2-3. The controlgear unit is protected when subjected to the s-c of the output, therefore there is no further temperature was measured.							

EN 60598-2-3			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX 2e	TABLE: Temperature measurements, thermal tests of Section 12		P
	Type reference	LED MINISEMPIONE Cod. 36001	—
	Lamp used	Enclosed LEDs	—
	Lamp control gear used	Xitanium 75W 0.7A 1-10V 230V C165 sXt	—
	Mounting position of luminaire	Pipe mounted	—
	Supply wattage (W)	test 1: 69 test 2: 68	—
	Supply current (A)	test 1: 0.52 test 2: 0.50	—
	Calculated power factor	test 1: 0.923 test 2: 0.913	—
	Table: measured temperatures corrected for $t_a = 45^\circ\text{C}$:		P
	- abnormal operating mode	LED controlgear output short circuited	—
	- test 1: rated voltage	240 V	—
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage	254.4 V	—
	- test 3: Load on wiring to socket-outlet, 1,06 times voltage or 1,05 times wattage	—	—
	- test 4: 1,1 times rated voltage or 1,05 times rated wattage	264 V	—
	Through wiring or looping-in wiring loaded by a current of A during the test	—	—

Temperature measurements (°C)

Part	Ambient	Clause 12.4 – normal				Clause 12.5 – abnormal	
		test 1	test 2	test 3	limit	test 4	limit
to LED Control Gear	45	61	65	—	85	—	—
Disconnecting switch	45	34	36	—	110	—	—
External wire	45	44	45	—	90	—	—
LED	45	69	71	—	100	—	—
LED's cable	45	61	63	—	180	—	—
Connector for LED module	45	62	63	—	105	—	—

EN 60598-2-3							
Clause	Requirement + Test				Result - Remark		Verdict
Internal wire T180 (CG – knife switch)	45	49	50	—	180	—	—
Sleeves	45	47	48		250	—	
PCB	45	71	74	—	90	—	—
Lighted surface (1 m)	45	33	34	—	90	—	—
Mounting surface	45	32	33	—	90	—	—
Supplementary information: *) For all the measured temperatures indicated in this table, it has been applied the reduction of 10°C foreseen in § 3.12.1 of IEC/EN 60598-2-3. The controlgear unit is protected when subjected to the s-c of the output, therefore there is no further temperature was measured.							

EN 60598-2-3			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX 3	Screw terminals (part of the luminaire)		N/A
(14)	SCREW TERMINALS		N/A
(14.2)	Type of terminal		—
	Rated current (A)		—
(14.3.2.1)	One or more conductors		N/A
(14.3.2.2)	Special preparation		N/A
(14.3.2.3)	Terminal size		N/A
	Cross-sectional area (mm ²)		—
(14.3.3)	Conductor space (mm)		N/A
(14.4)	Mechanical tests		N/A
(14.4.1)	Minimum distance		N/A
(14.4.2)	Cannot slip out		N/A
(14.4.3)	Special preparation		N/A
(14.4.4)	Nominal diameter of thread (metric ISO thread).....		N/A
	External wiring		N/A
	No soft metal		N/A
(14.4.5)	Corrosion		N/A
(14.4.6)	Nominal diameter of thread (mm)		N/A
	Torque (Nm).....		N/A
(14.4.7)	Between metal surfaces		N/A
	Lug terminal		N/A
	Mantle terminal		N/A
	Pull test; pull (N).....		N/A
(14.4.8)	Without undue damage		N/A

EN 60598-2-3			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX 4	Screwless terminals (part of the luminaire)		N/A
(15)	SCREWLESS TERMINALS		N/A
(15.2)	Type of terminal		—
	Rated current (A)		—
(15.3.1)	Material		N/A
(15.3.2)	Clamping		N/A
(15.3.3)	Stop		N/A
(15.3.4)	Unprepared conductors		N/A
(15.3.5)	Pressure on insulating material		N/A
(15.3.6)	Clear connection method		N/A
(15.3.7)	Clamping independently		N/A
(15.3.8)	Fixed in position		N/A
(15.3.10)	Conductor size		N/A
	Type of conductor		N/A
(15.5.1)	Terminals internal wiring		N/A
(15.5.1.1)	Pull test spring-type terminals (4 N, 4 samples)		N/A
(15.5.1.2)	Pull test pin or tab terminals (4 N, 4 samples)		N/A
	Insertion force not exceeding 50 N		N/A
(15.5.1.2)	Permanent connections: pull-off test (20 N)		N/A
(15.5.2)	Electrical tests		N/A
	Voltage drop (mV) after 1 h (4 samples)		N/A
	Voltage drop of two inseparable joints		N/A
	Number of cycles:		—
	Voltage drop (mV) after 10th alt. 25th cycle (4 samples)		N/A
	Voltage drop (mV) after 50th alt. 100th cycle (4 samples)		N/A
	After ageing, voltage drop (mV) after 10th alt. 25th cycle (4 samples)		N/A
	After ageing, voltage drop (mV) after 50th alt. 100th cycle (4 samples)		N/A
(15.6)	Terminals external wiring		N/A
	Terminal size and rating		N/A
(15.6.2.1)	Pull test spring-type terminals or welded connections (4 samples); pull (N)		N/A

EN 60598-2-3											
Clause	Requirement + Test									Result - Remark	Verdict
	Pull test pin or tab terminals (4 samples); pull (N)										N/A
(15.6.3.1)	TABLE: Contact resistance test										N/A
	Voltage drop (mV) after 1 h										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
	Voltage drop of two inseparable joints										
	Voltage drop after 10th alt. 25th cycle										
	Max. allowed voltage drop (mV)										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
	Voltage drop after 50th alt. 100th cycle										
	Max. allowed voltage drop (mV)										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
	Continued ageing: voltage drop after 10th alt. 25th cycle										
	Max. allowed voltage drop (mV)										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
	Continued ageing: voltage drop after 50th alt. 100th cycle										
	Max. allowed voltage drop (mV)										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
Supplementary information: None											

(15.6.3.1) (15.6.3.2)	TABLE: Contact resistance test / Heating tests										
	Voltage drop (mV) after 1 h										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
	Voltage drop of two inseparable joints										
	Voltage drop after 10th alt. 25th cycle										
	Max. allowed voltage drop (mV)										—
terminal	1	2	3	4	5	6	7	8	9	10	

EN 60598-2-3											
Clause	Requirement + Test									Result - Remark	Verdict
voltage drop (mV)											
	Voltage drop after 50th alt. 100th cycle										
	Max. allowed voltage drop (mV)										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
	Continued ageing: voltage drop after 10th alt. 25th cycle										
	Max. allowed voltage drop (mV)										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
	Continued ageing: voltage drop after 50th alt. 100th cycle										
	Max. allowed voltage drop (mV)										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											

IEC60598_2_3L ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
ATTACHMENT 1 TO TEST REPORT IEC 60598-2-3 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES Luminaires Part 2: Particular requirements Section 3: Luminaires for road and street lighting			
Differences according to EN 60598-2-3:2003, AMD1:2011 used in conjunction with EN 60598-1:2015, AMD1:2018			
Annex Form No. EU_GD_IEC60598_2_3L Annex Form Originator Intertek Semko AB Master Annex Form 2018-12-07			
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CENELEC COMMON MODIFICATIONS (EN)			
3.6 (4)	CONSTRUCTION		
3.6 (4.11.6)	Electro-mechanical contact systems		
3.10 (5)	EXTERNAL AND INTERNAL WIRING		
3.10 (5.2.2)	Cables equal to EN 50525		
	Replace table 5.1 – Supply cord		
3.12 (12)	ENDURANCE TESTS AND THERMAL TESTS		
3.12 (12.4.2c)	Thermal test (normal operation) see footnote c to table 12.2 relating to unsleeved fixed wiring		
ZB	ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)		
(3.3)	DK: power supply cords of class I luminaires with label		
(4.5.1)	DK: socket-outlets		
(5.2.1)	CY, DK, FI, GB: type of plug		
ZC	ANNEX ZC, NATIONAL DEVIATIONS (EN)		
(4 & 5)	FR: Shuttered socket-outlets 10/16A		
	FR: Safety requirements for high buildings <i>(Decree of 30 December 2011 on safety regulations for the construction of high-rise buildings and their protection against fire and panic risks; Section VIII; Article GH 48, Lighting)</i> Glow-wire test for outer parts of luminaires:		
	- 850°C for luminaires in stairways and horizontal travel paths		
	- 650°C for indoor luminaires		
	GB: Requirements according to United Kingdom Building Regulation		

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT 2: Additional tests for integral LED module according to IEC 62031:2008+A1:2012+A2:2014

4	GENERAL REQUIREMENTS		P
4.4	Integral modules tested assembled in the luminaire		P
4.5	Independent modules complies with requirements in IEC 60598-1		N/A

5	GENERAL TEST REQUIREMENTS		P
5.5	SELV-operated LED modules comply with Annex I of IEC 61347-2-13	(see Annex 1)	N/A
	General conditions for tests in Annex A	(see Annex A)	P

6	CLASSIFICATION		P
	Built-in module	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	Independent module	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	Integral module	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	For Integral module; Note to 1.2.1 in IEC 60598-1 applies.		—

7	MARKING		N/A
7.1	Mandatory markings for built-in or independent modules		N/A
	a) mark of origin		N/A
	b) model number, type reference		N/A
	c1) constant voltage module; rated supply voltage and supply frequency		N/A
	c2) constant current module; rated supply current and supply frequency		N/A
	d) nominal power		N/A
	e) indication of connections, wiring diagram		N/A
	f) value of t_c and place on the module		N/A
	g) E_{thr} if required		N/A
	h) symbol for built-in modules		N/A
	i) heat transfer temperature t_d		N/A
	j) power for heat-conduction P_d		N/A
	k) working voltage for insulation		N/A
7.2	Location of marking		N/A
	- marking of a), b), c) and f) on the modules		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
	- marking of d), e), g), h), i) and j) on the modules or data sheet		N/A
	- marking of k) in manufactures literature		N/A
	- integral modules a) to g) in literature		N/A
7.3	Durable and legibility of marking		N/A
	- marking of a), b), c) and f) legible after test with water		N/A
	- marking of d) to j) inspection of compliance		N/A

8	TERMINALS		P
	Screw terminals according section 14 of IEC 60598-1:		N/A
	Separately approved; component list	(see Annex 2)	N/A
	Part of the luminaire	(see Annex 3)	N/A
	Screwless terminals according section 15 of IEC 60598-1:		N/A
	Separately approved; component list	(see Annex 2)	N/A
	Part of the luminaire	(see Annex 4)	N/A
	Connectors according IEC 60838-2-2:		P
	Separately approved; component list	LED module connector, see annex 1	P

9 (9)	PROVISION FOR PROTECTIVE EARTHING	N/A
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10 (10)	PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS Note: It is relied on the luminaire for protection.		N/A
- (10.1)	Controlgear protected against accidental contact with live parts		N/A
- (A2)	The current flowing between the part concerned and earth is measured and does not exceed 0,7 mA (peak) or 2 mA d.c. :		N/A
- (A2)	For frequencies above 1 kHz, the current does not exceed 0,7 mA (peak) multiplied by the value of the frequency in kilohertz or 70 mA (peak) :		N/A
- (A3)	The voltage between the part concerned and any accessible part is measured and does not exceed 34 V (peak)..... :		N/A
- (10.1)	Lacquer or enamel not used for protection or insulation		N/A
	Adequate mechanical strength on parts providing protection		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
- (10.2)	Capacitors > 0,5 µF: voltage after 1 min (V): < 50 V:		N/A
- (10.3)	Controlgear providing SELV		N/A
	Accessible conductive parts are insulated from live parts by double or reinforced insulation in SELV controlgear		N/A
	No connection between output circuit and the body or protective earthing circuit		N/A
	No possibility of connection between output circuit and the body or protective earthing circuit through other conductive parts		N/A
	SELV outputs separated by at least basic insulation		N/A
	ELV conductive parts insulated as live parts		N/A
	Tests according Annex L of IEC 61347-1		N/A
- (10.4)	Accessible conductive parts in SELV circuits		N/A
	Output voltage under load ≤ 25 V r.m.s. or ≤ 60 V d.c.		N/A
	If output voltage > 25 V r.m.s. or > 60 V d.c.; No load output ≤ 35 V peak or ≤ 60 V d.c and touch current does not exceed 0.7 mA (peak) or 2 mA d.c.:		N/A
	One conductive part is insulated if output voltage or current exceeding the values above and withstand test voltage 500 V		N/A
	Double or reinforced insulation bridged by appropriate and at least two resistors or two Y2 capacitors or one Y1 capacitor		N/A
	Y1 or Y2 capacitors comply with IEC 60384-14		N/A
	Resistors comply with test (a) in 14.1 of IEC 60065		N/A

11 (11)	MOISTURE RESISTANCE AND INSULATION		P
	After storage 48 h at 91-95% relative humidity and 20-30 °C measuring of insulation resistance with d.c. 500 V (MΩ):		P
	For basic insulation ≥ 2 MΩ	>100 MΩ	P
	For double or reinforced insulation ≥ 4 MΩ		N/A
	Between primary and secondary circuits in controlgear providing SELV, values in Annex L in IEC 61347-1		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
12 (12)	ELECTRIC STRENGTH		P
	Immediately after clause 11 electric strength test for 1 min		P
	Basic insulation for SELV, test voltage 500 V		N/A
	Working voltage ≤ 50 V, test voltage 500 V		N/A
	Working voltage > 50 V ≤ 1000 V, test voltage (V):		P
	Basic insulation, 2U + 1000 V	1640 V	P
	Supplementary insulation, 2U + 1000 V		N/A
	Double or reinforced insulation, 4U + 2000 V		N/A
	No flashover or breakdown		P
	Solid or thin sheet insulation for double or reinforced insulation fulfil the requirements in Annex N in IEC 61347-1		N/A

13 (14)	FAULT CONDITIONS		P
- (14)	When operated under fault conditions the controlgear:		P
	- does not emit flames or molten material		P
	- does not produce flammable gases		P
	- protection against accidental contact not impaired		P
	Thermally protected controlgear does not exceed the marked temperature value		N/A
	Fault conditions: capacitors, resistors or inductors without proof of compliance with relevant specifications have been short-circuited or disconnected	(see appended table)	N/A
- (14.1)	Short-circuit of creepage distances and clearances if less than specified in clause 16 in Part 1 (except between live parts and accessible metal parts)	(see appended table)	N/A
	Creepage distances on printed boards less than specified in clause 16 in Part 1 provided with coating according to IEC 60664-3		N/A
- (14.2)	Short-circuit or interruption of semiconductor devices	LED	P
- (14.3)	Short-circuit across insulation consisting of lacquer, enamel or textile	(see appended table)	N/A
- (14.4)	Short-circuit across electrolytic capacitors	(see appended table)	N/A
- (14.5)	After the tests has been carried out on three samples:		N/A
	The insulation resistance ≥ 1 MΩ	> 100 MΩ	P
	No flammable gases		P
	No accessible parts have become live		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
	During the tests, a five-layer tissue paper, where the test specimen is wrapped, does not ignite		N/A
- (14.6)	Relevant fault condition tests with high-power supply		N/A
13.2	Overpower condition		N/A
	Module withstands overpower condition >15 min.	P measured= 208.7 W (177.4+127.2) Vdc 0.695 A); 1.5 x Pn =1.5 x 208.7 W = 312 W	P
	Module with automatic protective device or power limiter, test performed 15 min. at limit.		N/A
	No fire, smoke or flammable gas is produced		P
	Molten material does not ignite tissue paper, spread below the module		P
15	CONSTRUCTION		P
	Wood, cotton, silk, paper and similar fibrous material not used as insulation		P
16 (16)	CREEPAGE DISTANCES AND CLEARANCES		P
- (16)	Creepage and distances and clearances in compliance with IEC 61347-1	(see appended table)	P
	Insulating lining of metallic enclosures		N/A
	Basic insulation on printed boards tested according to clause 14		N/A
	Distances subjected to both sinusoidal voltage as non-sinusoidal pulses not less than value in Table 16		N/A
	Creepage distances not less than minimum clearance		P
16 (-)	Conductive accessible parts in compliance with applicable parts of IEC 60598-1		P
17 (17)	SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS		P
	Cl. 17 refer to Cl. 17 of IEC 61347-1 which refer to Cl. 4.11 and 4.12 of IEC 60598-1 (clause numbers between parentheses refer to IEC 60598-1)		—
(4.11)	Electrical connections		P
(4.11.1)	Contact pressure		N/A
(4.11.2)	Screws:		N/A
	- self-tapping screws		N/A
	- thread-cutting screws		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
(4.11.3)	Screw locking:		N/A
	- spring washer		N/A
	- rivets		N/A
(4.11.4)	Material of current-carrying parts		P
(4.11.5)	No contact to wood or mounting surface		P
(4.11.6)	Electro-mechanical contact systems		N/A
(4.12)	Mechanical connections and glands		N/A
(4.12.1)	Screws not made of soft metal		N/A
	Screws of insulating material		N/A
	Torque test: torque (Nm); part :		N/A
	Torque test: torque (Nm); part :		N/A
	Torque test: torque (Nm); part :		N/A
(4.12.2)	Screws with diameter < 3 mm screwed into metal		N/A
(4.12.4)	Locked connections:		N/A
	- fixed arms; torque (Nm) :		N/A
	- lampholder; torque (Nm) :		N/A
	- push-button switches; torque 0,8 Nm :		N/A
(4.12.5)	Screwed glands; force (Nm) :		N/A

18 (18)	RESISTANCE TO HEAT, FIRE AND TRACKING		N/A
- (18.1)	Ball-pressure test :	See Test Table 18 (18.1)	N/A
- (18.3)	Glow-wire test (650°C) :	See Test Table 18 (18.3)	N/A
- (18.4)	Needle-flame test (10 s) :	See Test Table 18 (18.4)	N/A
- (18.5)	Proof tracking test :	See Test Table 18 (18.5)	N/A

19 (19)	RESISTANCE TO CORROSION		N/A
	- test according 4.18.1 of IEC 60598-1		N/A
	- adequate varnish on the outer surface		N/A

20	INFORMATION FOR LUMINAIRE DESIGN		N/A
	Information in Annex D (informative)		—

21	HEAT MANAGEMENT		N/A
21.1	General		N/A
	Exchangeability is safeguarded by cap or base		N/A

IEC 62031						
Clause	Requirement + Test	Result - Remark	Verdict			
21.2	Heat-conducting foil and paste		N/A			
	Heat-conducting foil delivered with the module if necessary		N/A			
22	PHOTOBIOLOGICAL SAFETY		P			
22.1	UV radiation		N/A			
	Luminous radiation not exceed 2mW/klm		N/A			
22.2	Blue light hazard		P			
	Assessed according to IEC TR 62778	See Nemko test report 377848-2TRFPHO	P			
22.3	Infrared radiation		N/A			
	Requirements for infrared radiation when required		N/A			
A	ANNEX A - TESTS		P			
	All tests performed in accordance with the advice given in Annex H of IEC 61347-1, if applicable		P			
13 (14)	TABLE: tests of fault conditions		P			
Part	Simulated fault		Hazard			
LED	Short-circuited: the equipment goes on working normally, LEDs are drive with constant current, no hazards		NO			
LED	Open-circuited: in case of o-c of LED, the LEDs matrix stopped working. The rest of equipment works normally.		NO			
16 (16)	TABLES: Creepage distances and clearances		P			
Table 3	Minimum distances (mm) for a.c. (50/60 Hz) sinusoidal voltages		P			
RMS working voltage (V) not exceeding	50	150	250	500	750	1000
Creepage distances						

IEC 62031							
Clause	Requirement + Test			Result - Remark			Verdict
Required basic insulation, PTI ≥ 600	0,6	0,8	1,5	3	4	5,5	
Measured							
Required basic insulation, PTI < 600	1,2	1,6	2,5	5	8	10	
Measured				5.5 ¹⁾ 5.5 ²⁾			
Required supplementary insulation PTI ≥ 600	-	0,8	1,5	3	4	5,5	
Measured							
Required supplementary insulation PTI < 600	-	1,6	2,5	5	8	10	
Measured							
Required reinforced insulation	-	3,2	5	6	8	11	
Measured							
Clearances							
Required basic insulation	0,2	0,8	1,5	3	4	5,5	
Measured				5.1 ¹⁾ 5.1 ²⁾			
Required supplementary insulation	-	0,8	1,5	3	4	5,5	
Measured							
Required reinforced insulation	-	1,6	3	6	8	11	
Measured							
Table 4	Minimum distances (mm) for non-sinusoidal pulse voltages						
Rated pulse voltage (peak kV)	2,0	2,5	3,0	4,0	5,0	6,0	8,0
Required clearances	1,0	1,5	2	3	4	5,5	8
Measured							
Rated pulse voltage (peak kV)	10	12	15	20	25	30	40
Required clearances	11	14	18	25	33	40	60
Measured							
Rated pulse voltage (peak kV)	50	60	80	100	-	-	-
Required clearances	75	90	130	170	-	-	-
Measured							
¹⁾ Current-carrying parts of different polarity ²⁾ Current-carrying parts and accessible parts: Double/reinforced insulation considered between input and output of LED control gear, so only a basic insulation has been considered between current carrying parts of LED module and accessible parts/supporting surface according to Annex X of IEC 60598-1, since accessible metal parts are connected together by means of equipotential bonding.							

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict

18 (18.1)	TABLE: Ball Pressure Test of Thermoplastics			N/A
Allowed impression diameter (mm) :				—
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)	
Supplementary information: None				

18 (18.3)	TABLE: Glow-wire test				N/A
Glow wire temperature :				650°C	—
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict
Any flame or glowing of the sample extinguished within 30 s of withdrawing the glow-wire, and any burning or molten drop did not ignite the underlying parts (Yes/No).....:					
Supplementary information: None					

18 (18.4)	TABLE: Needle-flame test				N/A
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict
Supplementary information: None					

18 (18.5)	TABLE: Proof tracking test			N/A
Test voltage PTI :			175 V	—
Object/ Part No./ Material	Manufacturer/ trademark	Withstand 50 drops without failure on three places or on three specimens		Verdict
Supplementary information: None				

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
ANNEX 1	SELV-operated LED modules		N/A
	Cl. 5.5 refer to ANNEX I of IEC 61347-2-13 which refer to ANNEX L of IEC 61347-1 (clause numbers between parentheses refer to ANNEX L of IEC 61347-1)		—
(L.3)	Classification		N/A
	Class I	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	Class II	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	Class III	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	non-inherently short circuit proof controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	inherently short circuit proof controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	fail safe controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	non-short-circuit proof controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
(L.4)	Marking		N/A
	Adequate symbols are used		N/A
(L.5)	Protection against electric shock		N/A
	Comply with 9.2 of IEC 61558-1		N/A
(L.6)	Heating		N/A
	No excessive temperatures in normal use		N/A
	Value if capacitor tc marked		—
	Winding insulation classified as Class		—
	Comply with tests of clause 14 of IEC 61558-1 with adjustments		N/A
(L.7)	Short-circuit and overload protection		N/A
	Comply with tests of clause 15 of IEC 61558-1 with adjustments		N/A
(L.8)	Insulation resistance and electric strength		N/A
(L.8.1)	Conditioned 48 h between 91 % and 95 %		N/A
(L.8.2)	Insulation resistance		N/A
	Between input- and output circuits not less than 5 MΩ		N/A
	Between metal parts of class II convertors which are separated from live parts by basic insulation only and the body not less than 5 MΩ		N/A
	Between metal foil in contact with the inner and outer surfaces of enclosures of insulating material not less than 2 MΩ		N/A
(L.8.3)	Electric strength		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
	1) Between live parts of input circuits and live parts of output circuits		N/A
	2) Over basic or supplementary insulation between:		N/A
	a) live parts having different polarity		N/A
	b) live parts and body if intended to be connected to protective earth		N/A
	c) accessible metal parts and a metal rod of the same diameter as the flexible cable or cord		N/A
	d) live parts and an intermediate metal part		N/A
	e) intermediate metal parts and the body		N/A
	f) each input circuit and all other input circuits		N/A
	3) Over reinforced insulation between the body and live parts		N/A
(L.9)	Construction		N/A
(L.9.1)	Transformer comply with 19.12 of IEC 61558-1 and 19 of IEC 61558-2-6		N/A
	HF transformer comply with 19 of IEC 61558-2-16		N/A
(L.10)	Components		N/A
	Protective devices comply with 20.6 – 20.11 of IEC 61558-1		N/A
(L.11)	Creepage distances and clearances		N/A
	1. Insulation between input and output circuits, basic insulation:		N/A
	a) measured values \geq specified values (mm)		N/A
	b) measured values \geq specified values (mm)		N/A
	c) measured values \geq specified values (mm)		N/A
	2. Insulation between input and output circuits, double or reinforced insulation:		N/A
	a) measured values \geq specified values (mm)		N/A
	b) measured values \geq specified values (mm)		N/A
	c) measured values \geq specified values (mm)		N/A
	3. Insulation between adjacent <u>output</u> circuits		N/A
	- measured values \geq specified values (mm)		N/A
	4. Insulation between terminals for external connection:		N/A
	- measured values \geq specified values (mm)		N/A
	5. Basic or supplementary insulation:		N/A
	a) measured values \geq specified values (mm)		N/A
	b) measured values \geq specified values (mm)		N/A
	c) measured values \geq specified values (mm)		N/A

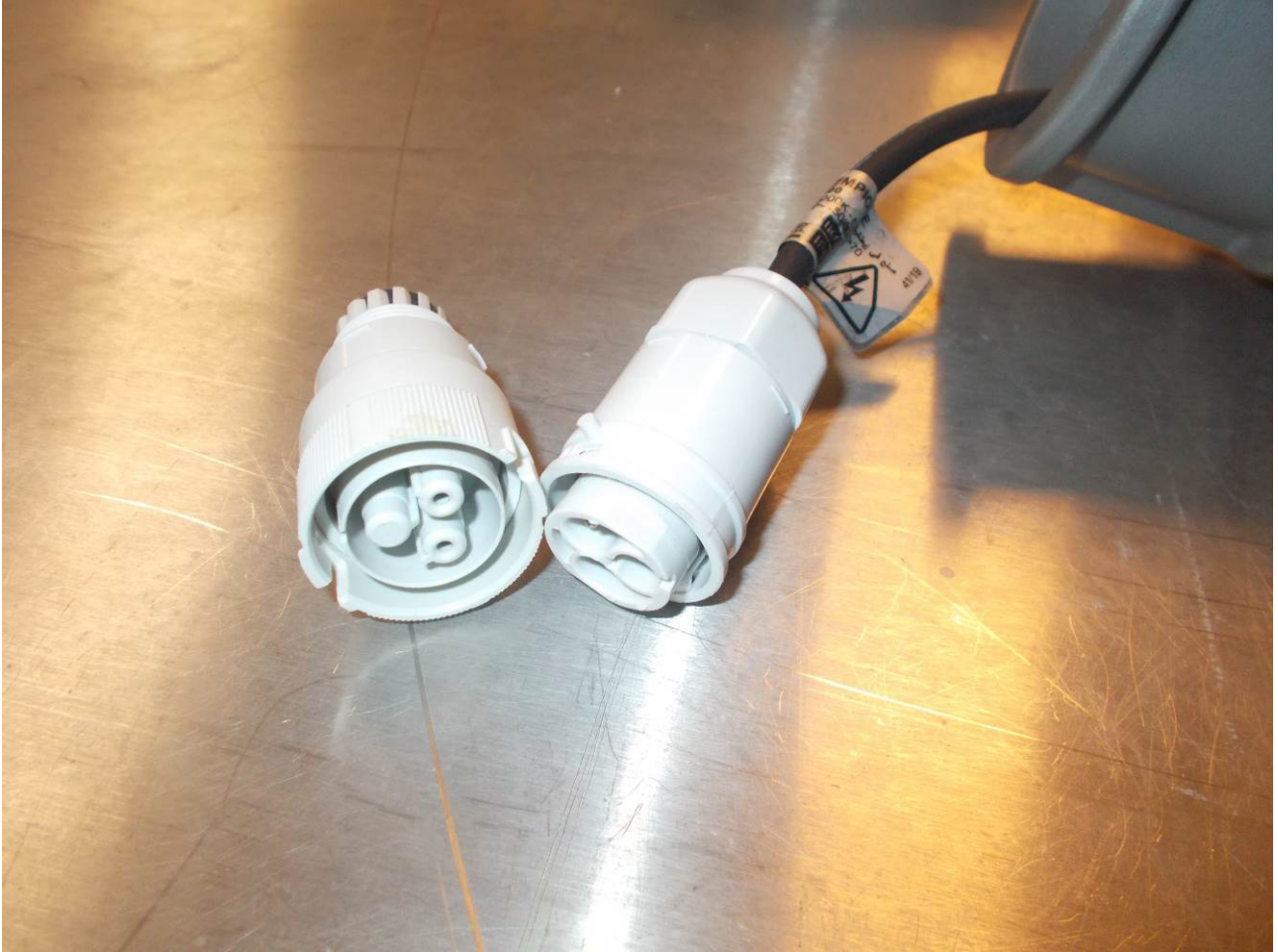
IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
	d) measured values \geq specified values (mm) :		N/A
	e) measured values \geq specified values (mm) :		N/A
	6. Reinforced insulation or insulation:		N/A
	Between body and output circuit: measured values \geq specified values (mm) :		N/A
	Between body and output circuit if provision against transient voltages: measured values \geq specified values (mm) :		N/A
	7. Distance through insulation:		N/A
	a) measured values \geq specified values (mm) :		N/A
	b) measured values \geq specified values (mm) :		N/A
	c) measured values \geq specified values (mm) :		N/A

ATTACHMENT 3: Photo documentation

LED MAXISEMPIONE Cod 36251:



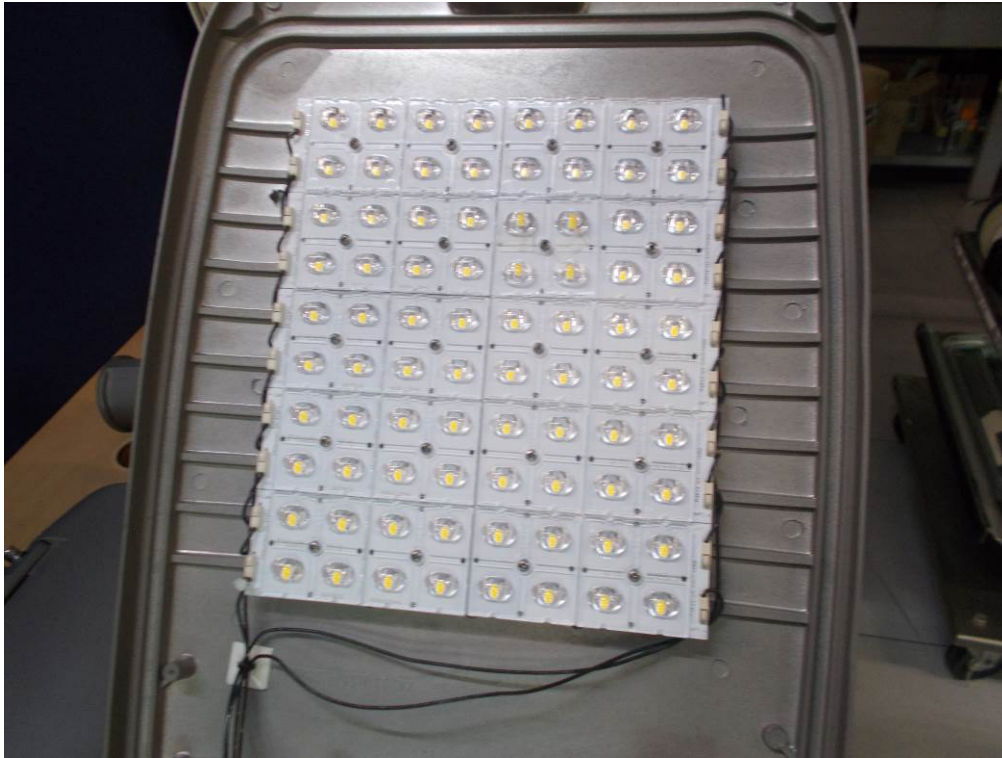
Pic.1: Front view



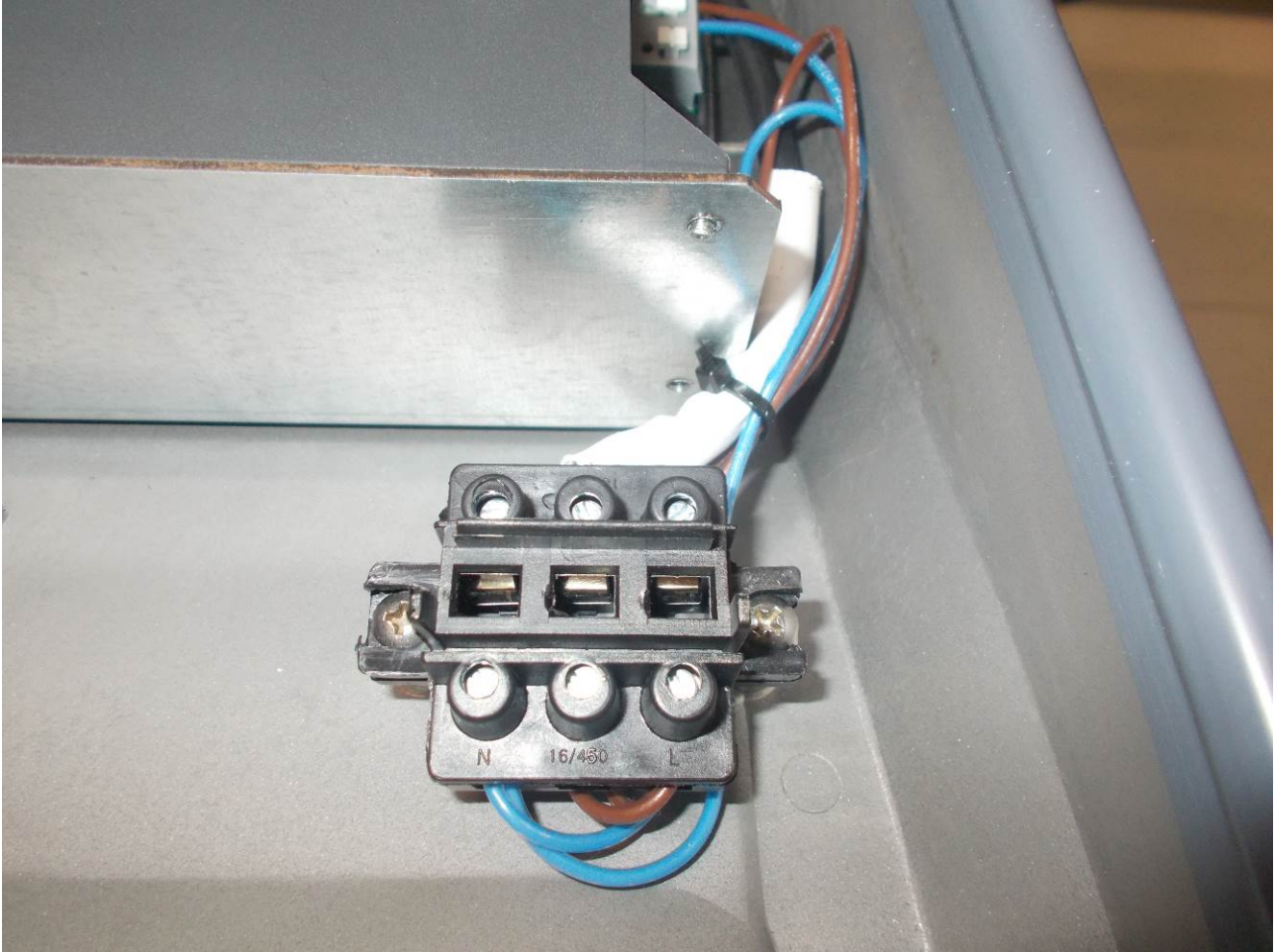
Pic.2: installation coupler



Pic.3: internal view



Pic.4: internal view



Pic.5: knife switch



Pic.6: gland



Pic.7: controlgear

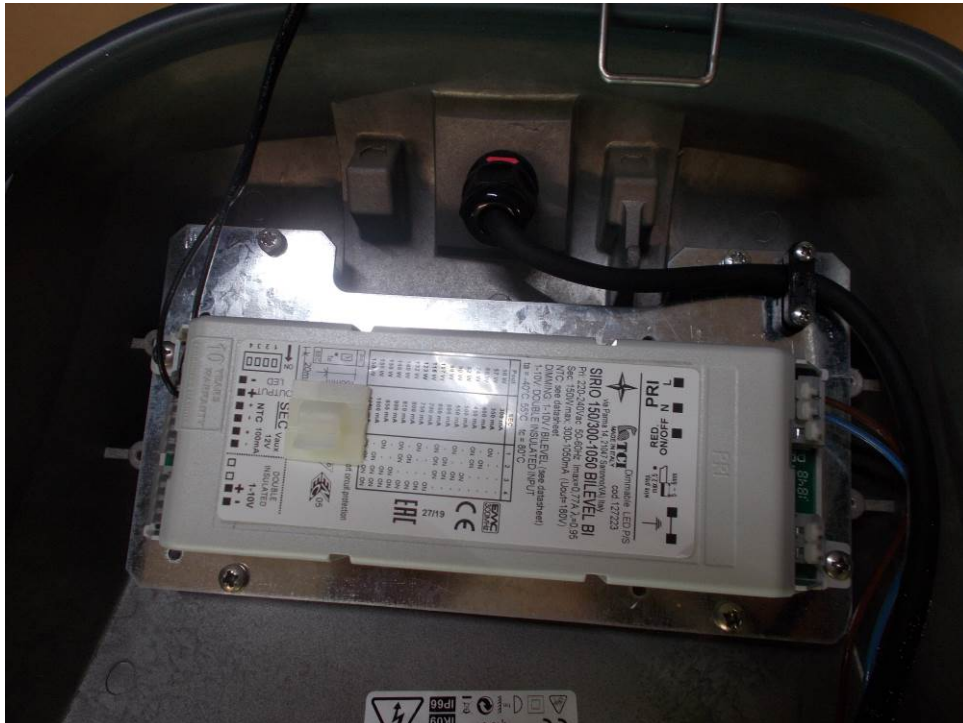
LED MAXISEMPIONE Cod. 36250:

TRF No. IEC60598_2_3L



Pic.8: internal view

LED SEMPIONE Cod. 36200:



Pic.9: internal view

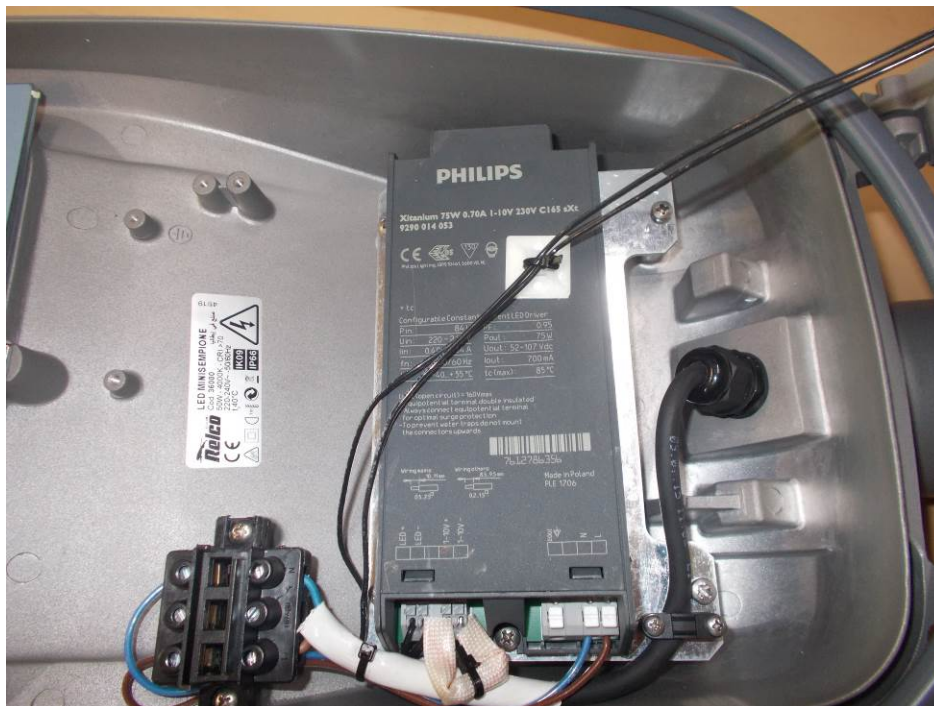
LED MINISEMPIONE Cod. 36001

TRF No. IEC60598_2_3L



Pic.10: internal view

LED MINISEMPIONE Cod. 36000:



Pic.11: internal view

ATTACHMENT 4: Best Measurement capability
Measurement uncertainty for Environmental and Safety testing

Test	Range	Measurement Uncertainty	Note
Environmental testing	Temperature -70 °C ÷ 180 °C	1.8 °C	(1)
	Relative Humidity 10 % ÷ 98 %	6 %	(1)
IP protection	Water flow 0.5 l/min ÷ 100 l/min	5 %	(1)
	Air flow	5 %	(1)
	Force 50 N, 30 N, 3 N, 1 N	10 %	(1)
	Dimensions 50 mm, 12.5 mm, 2.5 mm, 1 mm	0.05 mm	(1)
	AC/DC Voltage 10 mV ÷ 1000 V up to 5 kHz	1.5. %	(1)
Construction verifications	AC/DC Voltage 10 mV ÷ 1000 V 5÷100 kHz	2.5. %	(1)
	AC/DC Current 0.1 mA ÷ 5 A up to 1 kHz	1.5. %	(1)
	AC/DC Current 5 A ÷ 400 A up to 1 kHz	2.5. %	(1)
	Resistance 100 mΩ ÷ 10 MΩ	2.0. %	(1)
	Active/Apparent Power 200 mW ÷ 1 W	20 mW	(1)
	Active/Apparent Power 1 W ÷ 6 kW	3.0 %	(1)
	Power factor	0.05	(1)
	Frequency	0.2 %	(1)
	Dimensions 0 ÷ 200 mm	0.05 mm	(1)
	Dimensions 0.2 ÷ 200 m	0.5 %	(1)
	Force 0.2 ÷ 2.5 kN	3 %	(1)
	Torque 0.2 ÷ 200 Nm	5 %	(1)
	Weight 1 g ÷ 2 kg	1.0 % or 0.1 g	(1)
	Weight 2 kg ÷ 100 kg	2 %	(1)
	Heating	Temperature 20 °C ÷ 400 °C	4.5 °C
Pressure measurement	Pressure -0.5 bar ÷ 700 bar	1.0. %	(1)
Temperature measurement	Temperature -40 °C ÷ 300 °C	2.0 °C	(1)
Protection against access to live parts	Dimensions 1 ÷ 1000 mm	0.08 mm or 0.3 %	(1)
	Force 0.2 ÷ 1000 N	3%	(1)
Power input and current	Active/Apparent Power 0.2 W ÷ 6 kW	20 mW or 3 %	(1)
	AC/DC Current 1 mA ÷ 5 A up to 1kHz	1.5 %	(1)
Leakage current	AC Current 0.01 mA ÷ 200 mA up to 5kHz	3.0 %	(1)
	AC Current 0.01 mA ÷ 200 mA 5kHz to 1MHz	10.0 %	(1)
Earth impedance	Impedance 1 mΩ ÷ 10 kΩ	3 mΩ or 4 %	(1)
Continuity resistance	AC 10 mΩ ÷ 2 Ω, 5A ÷ 32A	3 mΩ or 5 %	(1)
	AC 2 Ω ÷ 100 Ω, 100 mA or 200 mA	5 %	(1)
	DC 1 mΩ ÷ 1 kΩ, 0.01 A ÷ 10 A	5 %	(1)
Insulation resistance	10 kΩ ÷ 200 GΩ, 10 V ÷ 1000 V	3.0. %	(1)
	200 GΩ ÷ 1000 GΩ, 500 V ÷ 1000 V	10. %	(1)
Dielectric strength	AC Voltage 0.1 kV ÷ 5 kV (50 Hz or 60 Hz)	3.0 %	(1)
	DC Voltage 0.1 kV ÷ 6 kV	3.0 %	(1)
	AC/DC Current 0.1 mA ÷ 200 mA up to 1 kHz	5 %	(1)
Transients	Pulse voltage	10. %	(1)
Tracking test	Voltage, Current	1.5 %	(1)
	Drops - count	7	(1)

NOTES:

(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which has been derived from the assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95 %.

Test	Range	Measurement Uncertainty	Note
Moisture resistance	See Environmental testing and IP protection		(1)
Overload protection	See Construction verifications and Heating		(1)
Abnormal operation	See Construction verifications and Heating		(1)
Mechanical strength Impact energy	Force 0.2 ÷ 2.5 kN Length 1 ÷ 1000 mm	See Construction verifications	(1)
Resistance to heat and fire(Ball pressure test)	See Environmental testing and Construction verifications		(1)
Resistance to heat and fire (Glow wire test)	Glow wire temperature	3 °C	(1)
Time Measurements	10 ms ÷ 8 h	1 %	(1)
Velocity Measurements	0 ÷ 5 m/s	5 %	(1)
Salt mist	See 60068-2-11	(2)	(1)
Vibration	5 Hz ÷ 2 kHz	5.0 %	(1)
Sound power/pressure level	31 Hz ÷ 4 kHz	3.0 dB	(1)
	4 kHz ÷ 10 kHz	6.0 dB	(1)
	A-weighted, C-weighted	2.0 dB	(1)
<p>NOTES:</p> <p>(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which has been derived from the assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95 %.</p> <p>(2) The instruments used for this test is according to the tolerances requested by the standard 60068-2-11</p>			



Test	Range	Measurement Uncertainty	Note
Radiance Blue light, Retinal thermal, Retinal thermal weak visual stimulus	0 ÷ 0.1 MW/(sr·m ²) 300 ÷ 1400 nm	7.0 %	(1)
	0.1 ÷ 100 MW/(sr·m ²) 300 ÷ 1400 nm	8.0 %	(4)
Luminance	0 ÷ 0.1 Mcd/m ²	7.0 %	(1)
	0.1 ÷ 100 Mcd/m ²	8.0 %	
Irradiance Actinic UV, Near UV, Blue light small source, IR radiation, eye	0 ÷ 0.1 MW/(m ²) 200 ÷ 300 nm	9.2 %	(1) (5)
	0.1 ÷ 100 MW/(m ²) 200 ÷ 300 nm	10.0 %	
	0 ÷ 0.1 MW/(m ²) 300 ÷ 3000 nm	6.4 %	
	0.1 ÷ 100 MW/(m ²) 300 ÷ 3000 nm	7.2 %	
Illuminance	0 ÷ 20 klx	4.0 %	(1)
Spectral Radiance	0 ÷ 0.1 MW/(sr·m ² ·nm) 300 ÷ 1400 nm	6.2 %	(1)
	0.1 ÷ 1 MW/(sr·m ² ·nm) 300 ÷ 1400 nm	7.0 %	
Spectral Irradiance	0 ÷ 0.1 MW/(m ² ·nm) 200 ÷ 300 nm	8.6 %	(1)
	0.1 ÷ 1 MW/(m ² ·nm) 200 ÷ 300 nm	9.2 %	
	0-0.1 MW/(m ² ·nm) 300 ÷ 3000nm	5.4 %	
	0.1 ÷ 1 MW/(m ² ·nm) 300 ÷ 3000 nm	6.4 %	
Radiant power Laser radiation Output power	350 ÷ 400 nm 950 ÷ 3000 nm 30 uW ÷ 30 W	9.0 %	(1), (2), (3)
	400 ÷ 950 nm 50 nW ÷ 3 W	4.6 %	(1), (2), (3)
Radiant energy Laser radiation	350 ÷ 400 nm 950 ÷ 3000 nm 20 uJ ÷ 2 J	9.0 %	(1), (2)
	400 ÷ 950 nm 20 uJ ÷ 2 J	4.6 %	(1), (2)
Wavelength	200 ÷ 3000 nm	4.5 %	(1)
Length in optical measurement	0 ÷ 20 mm	0.5 mm	(1)
	20 ÷ 200 mm	2 mm	
	0.2 ÷ 200 m	0.5 %	

NOTES:

- (1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which has been derived from the assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95 %
- (2) In the standard 60825-1 laser radiation can indicate radiant power or radiant energy
- (3) In the standard 60825-1 the radiant power can be called also output power
- (4) The uncertainty value expressed in W/(m²) is the maximum value between the value measured and the limit stated in the standard (see IEC/EN62471) multiplied to the measurement uncertainty stated in the table
- (5) The uncertainty value expressed in W/(sr·m²) is the maximum value between the value measured and the limit stated in the standard (see IEC/EN62471) multiplied to the measurement uncertainty stated in the table



TEST REPORT IEC 62471 Photobiological safety of lamps and lamp systems	
Report Reference No.	377848-3TRFPHO
Date of issue	2020-03-12
Total number of pages	24
Name of Testing Laboratory preparing the Report	Nemko Spa Via del Carroccio, 4 - 20853 Biassono (MB) – ITALY
Applicant's name	Relco Srl
Address	Via delle Azalee, 6/A -20090- Buccinasco (MI) - Italy
Test specification:	
Standard	IEC 62471:2006
Test procedure	Testing
Non-standard test method	N/A
Test Report Form No.	IEC62471
TRF Originator	Nemko Spa
Master TRF	Dated 2019-09
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Test item description	LED Streetlight	
Trade Mark.....		
Manufacturer	L.C. Relco Spa Via delle Azalee 6/A - 20090 Buccinasco (MI) - Italy	
Model/Type reference.....	LED MAXISEMPIONE cod. 36250	
Ratings.....	180 W 220-240 V 50/60 Hz 4000 K	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	Testing Laboratory:	
Testing location/ address	Nemko Spa, Via del Carroccio, 4 – Biassono (MB) – Italy	
Tested by (name, function, signature)	Oscar Segantin (Project Handler)	
Approved by (name, function, signature) ..	Giulio Tassinari (Verifier)	
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
Testing location/ address		
Tested by (name, function, signature)		
Approved by (name, function, signature) ..		
<input type="checkbox"/>	Testing procedure: CTF Stage 2:	
Testing location/ address		
Tested by (name + signature).....		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature) .. :		
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	Testing procedure: CTF Stage 4:	
Testing location/ address		
Tested by (name, function, signature)		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature) .. :		
Supervised by (name, function, signature) :		

<p>List of Attachments (including a total number of pages in each attachment):</p> <ul style="list-style-type: none"> - Attachment 1: Best Measurement Capability (1 page) - Attachment 2: European group differences and national differences (2 pages) - Attachment 3: Labelling requirements of IEC/TR 62471-2 (2 pages) - Attachment 4: Characteristics of lamps (1 page) - Attachment 5: Photo documentation (2 pages) - Attachment 6: Equipment used for testing (1 page) 	
<p>Summary of testing:</p> <p>The EuT is a LED streetlight with 80 LEDs. According to the standard, it has been considered as a general lighting service (GLS).</p> <ul style="list-style-type: none"> - The radiation measures are carried out at the distance of 500 lx as requested by the standard 	
<p>Tests performed (name of test and test clause):</p> <p>Cl. 4- Exposure Limits Cl. 5- Measurement of lamp and lamp system Cl. 6- Lamp classification</p> <p>Note: The following Nemko technical procedures were also applied during testing:</p> <ul style="list-style-type: none"> - WML0177 General routines for using instruments at Nemko. - WML1002: Measurement Uncertainty – Policy and Statement. - WML0066: Procedure for measurement of Photobiological safety of lamps and lamp systems <p>Statement of the measurement uncertainty:</p> <p>See Attachment 1 for best measurement uncertainty</p> <p>Unless different values are declared in the test case, following ambient conditions apply for the tests:</p> <ul style="list-style-type: none"> - Ambient temperature 18-33 °C - Relative Humidity 30-70 % - Atmospheric Pressure 860-1060 hPa <p>Equipment used for testing is recorded and saved into Attachment 6 to this test report.</p>	<p>Testing location:</p> <p>Nemko Spa Via del Carroccio, 4 – 20853 Biassono (MB) –Italy (for all tests)</p>
<p>Summary of compliance with National Differences (List of countries addressed):</p> <ul style="list-style-type: none"> - European Countries <p><input checked="" type="checkbox"/> The product fulfils the requirements of:</p> <ul style="list-style-type: none"> - EN 62471:2008 	

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



<p>Calibration</p>	<p>All instruments used in the tests given in this test report are calibrated and traceable to national or international standards. Further information about traceability will be given on request.</p>
<p>Measurement uncertainty</p>	<p>The measurement uncertainty was calculated for each test and quantity listed in this test report, according to IEC Guide 115 and other specific test standard and is documented in Nemko Spa working manual WML1002.</p>
<p>Assessment of conformity</p>	<p>The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report: P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit. F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.</p>

Test item particulars	Streetlight LED
Tested lamp	<input checked="" type="checkbox"/> continuous wave lamps <input type="checkbox"/> pulsed lamps
Tested lamp system	LEDs
Lamp classification group.....	<input checked="" type="checkbox"/> exempt <input type="checkbox"/> risk 1 <input type="checkbox"/> risk 2 <input type="checkbox"/> risk 3
Lamp cap	--
Bulb	--
Rated of the lamp	Refer to first page of this test report
Furthermore marking on the lamp	--
Seasoning of lamps according IEC standard	--
Used measurement instrument.....	Monochromator with its optical accessories. See also Attachment 5.
Temperature by measurement	26 °C
Information for safety use.....	None
Possible test case verdicts:	
– test case does not apply to the test object : N/A (not applicable)	
– test object does meet the requirement : P (Pass)	
– test object does not meet the requirement : F (Fail)	
Testing:	
Date of receipt of test item	: 2019-10-01
Date (s) of performance of tests	: 2019-10-21
General remarks:	
<p>"The phase of sampling / collection of equipment under test is carried out by the customer." "(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. The phase of sampling/collection is carried out by manufacturer. Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.</p>	
General product information and other remarks:	
<p>The equipment under test is a streetlight LED for general purpose composed by 10 module LEDs with 32 LEDs for each module (total 320 LEDs) manufactured by SAMSUNG model LM301, with street optic lens (characteristics of LED are described to attachment 4). Equipment has been supplied by a controlgear model Xitanium 150W 0.2-0.70A SI 230V S240 sXi manufactured by PHILIPS with ratings: Input: 162 W 220-240 V, 50/60 Hz, 0,79 Amax Output: 150 W 90-283 V 200-700 mA</p> <p>S/n: 377848 "2/2 identified by Nemko"</p>	

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
4	EXPOSURE LIMITS		
4.1	General		P
	The exposure limits in this standard is not less than 0,01 ms and not more than any 8-hour period and should be used as guides in the control of exposure		P
	Detailed spectral data of a light source are generally required only if the luminance of the source exceeds $10^4 \text{ cd}\cdot\text{m}^{-2}$	see clause 4.3	P
4.3	Hazard exposure limits		P
4.3.1	Actinic UV hazard exposure limit for the skin and eye		P
	The exposure limit for effective radiant exposure is $30 \text{ J}\cdot\text{m}^{-2}$ within any 8-hour period		P
	To protect against injury of the eye or skin from ultraviolet radiation exposure produced by a broad-band source, the effective integrated spectral irradiance, E_s , of the light source shall not exceed the levels defined by:		P
	$E_s \cdot t = \sum_{200}^{400} \sum_t E_\lambda(\lambda, t) \cdot S_{UV}(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 30 \quad \text{J}\cdot\text{m}^{-2}$		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		P
	$t_{\max} = \frac{30}{E_s} \quad \text{s}$		P
4.3.2	Near-UV hazard exposure limit for eye		P
	For the spectral region 315 nm to 400 nm (UV-A) the total radiant exposure to the eye shall not exceed $10000 \text{ J}\cdot\text{m}^{-2}$ for exposure times less than 1000 s. For exposure times greater than 1000 s (approximately 16 minutes) the UV-A irradiance for the unprotected eye, E_{UVA} , shall not exceed $10 \text{ W}\cdot\text{m}^{-2}$.		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s, shall be computed by:		P
	$t_{\max} \leq \frac{10\,000}{E_{UVA}} \quad \text{s}$		P
4.3.3	Retinal blue light hazard exposure limit		P
	To protect against retinal photochemical injury from chronic blue-light exposure, the integrated spectral radiance of the light source weighted against the blue-light hazard function, $B(\lambda)$, i.e., the blue-light weighted radiance, L_B , shall not exceed the levels defined by:		P

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	$L_B \cdot t = \sum_{300}^{700} \sum_t L_\lambda(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 10^6 \quad \text{J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	for $t \leq 10^4$ s $t_{\max} = \frac{10^6}{L_B}$	N/A
	$L_B = \sum_{300}^{700} L_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \quad \text{W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	for $t > 10^4$ s	P
4.3.4	Retinal blue light hazard exposure limit - small source		N/A
	Thus the spectral irradiance at the eye E_λ , weighted against the blue-light hazard function $B(\lambda)$ shall not exceed the levels defined by:	see table 4.2	N/A
	$E_B \cdot t = \sum_{300}^{700} \sum_t E_\lambda(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \quad \text{J} \cdot \text{m}^{-2}$	for $t \leq 100$ s	N/A
	$E_B = \sum_{300}^{700} E_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq 1 \quad \text{W} \cdot \text{m}^{-2}$	for $t > 100$ s	N/A
4.3.5	Retinal thermal hazard exposure limit		P
	To protect against retinal thermal injury, the integrated spectral radiance of the light source, L_λ , weighted by the burn hazard weighting function $R(\lambda)$ (from Figure 4.2 and Table 4.2), i.e., the burn hazard weighted radiance, shall not exceed the levels defined by:		P
	$L_R = \sum_{380}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{50\,000}{\alpha \cdot t^{0,25}} \quad \text{W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	($10 \mu\text{s} \leq t \leq 10$ s)	P
4.3.6	Retinal thermal hazard exposure limit – weak visual stimulus		N/A
	For an infrared heat lamp or any near-infrared source where a weak visual stimulus is inadequate to activate the aversion response, the near infrared (780 nm to 1400 nm) radiance, L_{IR} , as viewed by the eye for exposure times greater than 10 s shall be limited to:		N/A
	$L_{IR} = \sum_{780}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{6\,000}{\alpha} \quad \text{W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	$t > 10$ s	N/A
4.3.7	Infrared radiation hazard exposure limits for the eye		P
	The avoid thermal injury of the cornea and possible delayed effects upon the lens of the eye (cataractogenesis), ocular exposure to infrared radiation, E_{IR} , over the wavelength range 780 nm to 3000 nm, for times less than 1000 s, shall not exceed:		P
	$E_{IR} = \sum_{780}^{3000} E_\lambda \cdot \Delta\lambda \leq 18\,000 \cdot t^{-0,75} \quad \text{W} \cdot \text{m}^{-2}$	$t \leq 1000$ s	N/A
	For times greater than 1000 s the limit becomes:		P
	$E_{IR} = \sum_{780}^{3000} E_\lambda \cdot \Delta\lambda \leq 100 \quad \text{W} \cdot \text{m}^{-2}$	$t > 1000$ s	P

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Clause	Requirement + Test	Result – Remark	Verdict
4.3.8	Thermal hazard exposure limit for the skin		P
	Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:	Refer below:	P
	$E_{H,t} = \sum_{380}^{3000} \sum_t E_{\lambda}(\lambda,t) \cdot \Delta t \cdot \Delta \lambda \leq 20\,000 \cdot t^{0,25} \quad \text{J} \cdot \text{m}^{-2}$	Limit value: 3560 W/m ² Measured: 1,5 W/m ²	P
5	MEASUREMENT OF LAMPS AND LAMP SYSTEMS		-
5.1	Measurement conditions		P
	Measurement conditions shall be reported as part of the evaluation against the exposure limits and the assignment of risk classification.		P
5.1.1	Lamp ageing (seasoning)		P
	Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.		P
5.1.2	Test environment	Refer below:	P
	For specific test conditions, see the appropriate IEC lamp standard or in absence of such standards, the appropriate national standards or manufacturer's recommendations.	Considered.	P
5.1.3	Extraneous radiation	Refer below:	P
	Careful checks should be made to ensure that extraneous sources of radiation and reflections do not add significantly to the measurement results.	Dark room	P
5.1.4	Lamp operation	Refer below:	P
	Operation of the test lamp shall be provided in accordance with:	Refer below:	P
	– the appropriate IEC lamp standard, or		N/A
	– the manufacturer's recommendation		P
5.1.5	Lamp system operation	Refer below:	P
	The power source for operation of the test lamp shall be provided in accordance with:	Refer below:	P
	– the appropriate IEC standard, or		N/A
	– the manufacturer's recommendation		P
5.2	Measurement procedure		P
5.2.1	Irradiance measurements	Refer below:	P
	Minimum aperture diameter 7mm.		P
	Maximum aperture diameter 50 mm.		P
	The measurement shall be made in that position of the beam giving the maximum reading.		P
	The measurement instrument is adequate calibrated.		P

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Clause	Requirement + Test	Result – Remark	Verdict
5.2.2	Radiance measurements	Refer below:	P
5.2.2.1	Standard method	Refer below:	P
	The measurements made with an optical system.		P
	The instrument shall be calibrated to read in absolute radiant power per unit receiving area and per unit solid angle to acceptance averaged over the field of view of the instrument.		P
5.2.2.2	Alternative method	Refer below:	N/A
	Alternatively to an imaging radiance set-up, an irradiance measurement set-up with a circular field stop placed at the source can be used to perform radiance measurements.		N/A
5.2.3	Measurement of source size	Refer below:	P
	The determination of α , the angle subtended by a source, requires the determination of the 50% emission points of the source.	Considered source size (LxH) 210X250 mm. $\alpha = 51,1$ mrad	P
5.2.4	Pulse width measurement for pulsed sources		N/A
	The determination of Δt , the nominal pulse duration of a source, requires the determination of the time during which the emission is > 50% of its peak value.		N/A
5.3	Analysis methods		P
5.3.1	Weighting curve interpolations	Refer below:	P
	To standardize interpolated values, use linear interpolation on the log of given values to obtain intermediate points at the wavelength intervals desired.	see table 4.1	P
5.3.2	Calculations	Refer below:	P
	The calculation of source hazard values shall be performed by weighting the spectral scan by the appropriate function and calculating the total weighted energy.		P
5.3.3	Measurement uncertainty	Refer below:	P
	The quality of all measurement results must be quantified by an analysis of the uncertainty.	see Annex C in the norm	P
6	LAMP CLASSIFICATION		-
	For the purposes of this standard it was decided that the values shall be reported as follows:	see table 6.1	P
	– for lamps intended for general lighting service, the hazard values shall be reported as either irradiance or radiance values at a distance which produces an illuminance of 500 lux, but not at a distance less than 200 mm	500 lx measured at 4,5 m	P
	– for all other light sources, including pulsed lamp sources, the hazard values shall be reported at		N/A

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Clause	Requirement + Test	Result – Remark	Verdict
	a distance of 200 mm		
6.1	Continuous wave lamps		P
6.1.1	Except Group		P
	In the except group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not pose:		P
	– an actinic ultraviolet hazard (E_S) within 8-hours exposure (30000 s), nor		P
	– a near-UV hazard (E_{UVA}) within 1000 s, (about 16 min), nor		P
	– a retinal blue-light hazard (L_B) within 10000 s (about 2,8 h), nor		P
	– a retinal thermal hazard (L_R) within 10 s, nor		P
	– an infrared radiation hazard for the eye (E_{IR}) within 1000 s		P
6.1.2	Risk Group 1 (Low-Risk)		N/A
	In this group are lamps, which exceeds the limits for the except group but that does not pose:		N/A
	– an actinic ultraviolet hazard (E_S) within 10000 s, nor		N/A
	– a near ultraviolet hazard (E_{UVA}) within 300 s, nor		N/A
	– a retinal blue-light hazard (L_B) within 100 s, nor		N/A
	– a retinal thermal hazard (L_R) within 10 s, nor		N/A
	– an infrared radiation hazard for the eye (E_{IR}) within 100 s		N/A
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 100 s are in Risk Group 1.		N/A
6.1.3	Risk Group 2 (Moderate-Risk)		N/A
	This requirement is met by any lamp that exceeds the limits for Risk Group 1, but that does not pose:		N/A
	– an actinic ultraviolet hazard (E_S) within 1000 s exposure, nor		N/A
	– a near ultraviolet hazard (E_{UVA}) within 100 s, nor		N/A
	– a retinal blue-light hazard (L_B) within 0,25 s (aversion response), nor		N/A
	– a retinal thermal hazard (L_R) within 0,25 s (aversion response), nor		N/A
	– an infrared radiation hazard for the eye (E_{IR}) within 10 s		N/A
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared reti-		N/A

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	nal hazard (L _R), within 10 s are in Risk Group 2.		
6.1.4	Risk Group 3 (High-Risk)		N/A
	Lamps which exceed the limits for Risk Group 2 are in Group 3.		N/A
6.2	Pulsed lamps		N/A
	Pulse lamp criteria shall apply to a single pulse and to any group of pulses within 0,25 s.		N/A
	A pulsed lamp shall be evaluated at the highest nominal energy loading as specified by the manufacturer.		N/A
	The risk group determination of the lamp being tested shall be made as follows:		N/A
	– a lamp that exceeds the exposure limit shall be classified as belonging to Risk Group 3 (High-Risk)		N/A
	– for single pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance does is below the EL shall be classified as belonging to the Exempt Group		N/A
	– for repetitively pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance dose is below the EL, shall be evaluated using the continuous wave risk criteria discussed in clause 6.1, using time averaged values of the pulsed emission		N/A
			N/A

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Clause	Requirement + Test	Result – Remark	Verdict

Table 4.1		Spectral weighting function for assessing ultraviolet hazards for skin and eye		-
Wavelength ¹ λ , nm	UV hazard function $S_{uv}(\lambda)$	Wavelength λ , nm	UV hazard function $S_{uv}(\lambda)$	
200	0,030	313*	0,006	
205	0,051	315	0,003	
210	0,075	316	0,0024	
215	0,095	317	0,0020	
220	0,120	318	0,0016	
225	0,150	319	0,0012	
230	0,190	320	0,0010	
235	0,240	322	0,00067	
240	0,300	323	0,00054	
245	0,360	325	0,00050	
250	0,430	328	0,00044	
254*	0,500	330	0,00041	
255	0,520	333*	0,00037	
260	0,650	335	0,00034	
265	0,810	340	0,00028	
270	1,000	345	0,00024	
275	0,960	350	0,00020	
280*	0,880	355	0,00016	
285	0,770	360	0,00013	
290	0,640	365*	0,00011	
295	0,540	370	0,000093	
297*	0,460	375	0,000077	
300	0,300	380	0,000064	
303*	0,120	385	0,000053	
305	0,060	390	0,000044	
308	0,026	395	0,000036	
310	0,015	400	0,000030	

¹ Wavelengths chosen are representative: other values should be obtained by logarithmic interpolation at intermediate wavelengths.
* Emission lines of a mercury discharge spectrum.

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Wavelength nm	Blue-light hazard function B (λ)	Burn hazard function R (λ)
300	0,01	
305	0,01	
310	0,01	
315	0,01	
320	0,01	
325	0,01	
330	0,01	
335	0,01	
340	0,01	
345	0,01	
350	0,01	
355	0,01	
360	0,01	
365	0,01	
370	0,01	
375	0,01	
380	0,01	0,1
385	0,013	0,13
390	0,025	0,25
395	0,05	0,5
400	0,10	1,0
405	0,20	2,0
410	0,40	4,0
415	0,80	8,0
420	0,90	9,0
425	0,95	9,5
430	0,98	9,8
435	1,00	10,0
440	1,00	10,0
445	0,97	9,7
450	0,94	9,4
455	0,90	9,0
460	0,80	8,0
465	0,70	7,0
470	0,62	6,2
475	0,55	5,5
480	0,45	4,5
485	0,40	4,0
490	0,22	2,2
495	0,16	1,6
500-600	$10^{[(450-\lambda)/50]}$	1,0
600-700	0,001	1,0
700-1050		$10^{[(700-\lambda)/500]}$
1050-1150		0,2
1150-1200		$0,2 \cdot 10^{0,02(1150-\lambda)}$
1200-1400		0,02

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Table 5.4 Summary of the ELs for the surface of the skin or cornea (irradiance based values)					-
Hazard Name	Relevant equation	Wavelength range nm	Exposure duration sec	Limiting aperture rad (deg)	EL in terms of constant irradiance $W \cdot m^{-2}$
Actinic UV skin & eye	$E_S = \sum E_\lambda \cdot S(\lambda) \cdot \Delta\lambda$	200 – 400	< 30000	1,4 (80)	30/t
Eye UV-A	$E_{UVA} = \sum E_\lambda \cdot \Delta\lambda$	315 – 400	≤1000 >1000	1,4 (80)	10000/t 10
Blue-light small source	$E_B = \sum E_\lambda \cdot B(\lambda) \cdot \Delta\lambda$	300 – 700	≤100 >100	< 0,011	100/t 1,0
Eye IR	$E_{IR} = \sum E_\lambda \cdot \Delta\lambda$	780 – 3000	≤1000 >1000	1,4 (80)	18000/t ^{0,75} 100
Skin thermal	$E_H = \sum E_\lambda \cdot \Delta\lambda$	380 – 3000	< 10	2π sr	20000/t ^{0,75}

Table 5.5 Summary of the ELs for the retina (radiance based values)					-
Hazard Name	Relevant equation	Wavelength range nm	Exposure duration sec	Field of view radians	EL in terms of constant radiance $W \cdot m^{-2} \cdot sr^{-1}$
Blue light	$L_B = \sum L_\lambda \cdot B(\lambda) \cdot \Delta\lambda$	300 – 700	0,25 – 10 10-100 100-10000 ≥ 10000	0,011·√(t/10) 0,011 0,0011·√t 0,1	10 ⁶ /t 10 ⁶ /t 10 ⁶ /t 100
Retinal thermal	$L_R = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	380 – 1400	< 0,25 0,25 – 10	0,0017 0,011·√(t/10)	50000/(α·t ^{0,25}) 50000/(α·t ^{0,25})
Retinal thermal (weak visual stimulus)	$L_{IR} = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	780 – 1400	> 10	0,011	6000/α

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Clause	Requirement + Test	Result – Remark
		Verdict

Risk	Action spectrum	Symbol	Units	Emission Measurement						P
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV(\lambda)}$	E_s	$W \cdot m^{-2}$	0,001	0,00004	0,003	-	0,03	-	
Near UV		E_{UVA}	$W \cdot m^{-2}$	10	0,0	33	-	100	-	
Blue light	$B(\lambda)$	L_b	$W \cdot m^{-2} \cdot sr^{-1}$	100	29,7	10000	-	4000000	-	
Blue light, small source	$B(\lambda)$	E_b	$W \cdot m^{-2}$	1,0*	-	1,0	-	400	-	
Retinal thermal	$R(\lambda)$	L_r	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α = 550000	1570	28000/ α	-	71000/ α	-	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	6000/ α	-	6000/ α	-	6000/ α	-	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,0	570	-	3200	-	

* Small source defined as one with $\alpha < 0,01$ radian. Averaging field of view at 10000 s is 0,1 radian.

** Involves evaluation of non-GLS source

ATTACHMENT 1: BEST MEASUREMENT UNCERTAINTY

Test	Range	Measurement Uncertainty	Note
Radiance Blue light, Retinal thermal, Retinal thermal weak visual stimulus	0 ÷ 0.1 MW/(sr·m ²) 300 ÷ 1400 nm	7.0 %	(1)
	0.1 ÷ 100 MW/(sr·m ²) 300 ÷ 1400 nm	8.0 %	(4)
Luminance	0 ÷ 0.1 Mcd/m ²	7.0 %	(1)
	0.1 ÷ 100 Mcd/m ²	8.0 %	
Irradiance Actinic UV, Near UV, Blue light small source, IR radiation, eye	0 ÷ 0.1 MW/(m ²) 200 ÷ 300 nm	9.2 %	(1) (5)
	0.1 ÷ 100 MW/(m ²) 200 ÷ 300 nm	10.0 %	
	0 ÷ 0.1 MW/(m ²) 300 ÷ 3000 nm	6.4 %	
	0.1 ÷ 100 MW/(m ²) 300 ÷ 3000 nm	7.2 %	
Illuminance	0 ÷ 20 lx	4.0 %	(1)
Spectral Radiance	0 ÷ 0.1 MW/(sr·m ² ·nm) 300 ÷ 1400 nm	6.2 %	(1)
	0.1 ÷ 1 MW/(sr·m ² ·nm) 300 ÷ 1400 nm	7.0 %	
Spectral Irradiance	0 ÷ 0.1 MW/(m ² ·nm) 200 ÷ 300 nm	8.6 %	(1)
	0.1 ÷ 1 MW/(m ² ·nm) 200 ÷ 300 nm	9.2 %	
	0-0.1 MW/(m ² ·nm) 300 ÷ 3000nm	5.4 %	
	0.1 ÷ 1 MW/(m ² ·nm) 300 ÷ 3000 nm	6.4 %	
Radiant power Laser radiation Output power	350 ÷ 400 nm 950 ÷ 3000 nm 30 uW ÷ 30 W	9.0 %	(1), (2), (3)
	400 ÷ 950 nm 50 nW ÷ 3 W	4.6 %	(1), (2), (3)
Radiant energy Laser radiation	350 ÷ 400 nm 950 ÷ 3000 nm 20 uJ ÷ 2 J	9.0 %	(1), (2)
	400 ÷ 950 nm 20 uJ ÷ 2 J	4.6 %	(1), (2)
Wavelength	200 ÷ 3000 nm	4.5 %	(1)
Length in optical measurement	0 ÷ 20 mm	0.5 mm	(1)
	20 ÷ 200 mm	2 mm	
	0.2 ÷ 200 m	0.5 %	

NOTES:

- (1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which has been derived from the assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95 %
- (2) In the standard 60825-1 laser radiation can indicate radiant power or radiant energy
- (3) In the standard 60825-1 the radiant power can be called also output power
- (4) The uncertainty value expressed in W/(m²) is the maximum value between the value measured and the limit stated in the standard (see IEC/EN62471) multiplied to the measurement uncertainty stated in the table
- (5) The uncertainty value expressed in W/(sr·m²) is the maximum value between the value measured and the limit stated in the standard (see IEC/EN62471) multiplied to the measurement uncertainty stated in the table

IEC62471A - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT 2 TO TEST REPORT IEC 62471 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES Photobiological safety of lamps and lamps systems			
Differences according to: EN 62471:2008			
Attachment Form No.: EU_GD_IEC62471			
Attachment Originator: Nemko Spa			
Master Attachment: 2019-09			
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	CENELEC COMMON MODIFICATIONS (EN)		P
4	EXPOSURE LIMITS		P
	Contents of the whole Clause 4 of IEC 62471:2006 moved into a new informative Annex ZB		—
	Clause 4 replaced by the following:		P
	Limits of the Artificial Optical Radiation Directive (2006/25/EC) have been applied instead of those fixed in IEC 62471:2006	See appended Table 6.1	P
4.1	General		P
	First paragraph deleted		—

Table 6.1		Emission limits and evaluation based on EU Directive 2006/25/EC				P
Risk	Action spectrum	Symbol	Units	Limit ⁽¹⁾	Result ⁽²⁾	
Actinic UV	SUV(λ)	E_s	$W \cdot m^{-2}$	0,00104 ⁽⁵⁾	0,00004	
Near UV		E_{UVA}	$W \cdot m^{-2}$	0,347 ⁽⁵⁾	0,0	
Blue light	B(λ)	L_B	$W \cdot m^{-2} \cdot sr^{-1}$ s	$L_B = 100$ $t > 10000$ s	L = 29,7 t \geq 0	
				$L_B = 10^6/t$ $t \leq 10000$ s	—	
Blue light, small source ⁽³⁾	B(λ)	E_B	$W \cdot m^{-2}$ s	$E_B = 0,01$ $t > 10000$ s	—	
				$E_B = 100/t$ $t \leq 10000$ s	—	
Retinal thermal	R(λ)	L_R	$W \cdot m^{-2} \cdot sr^{-1}$ s	$L_R = 2,8 \cdot 10^4/\alpha$ $t > 10$ s	L = 1570 t \geq 0	
				$L_R = 5 \cdot 10^4/(\alpha \cdot t^{0,25})$ $10 \mu s \leq t \leq 10$ s	—	
				$L_R = 8,89 \cdot 10^5/\alpha$ $t < 10 \mu s$	—	
Retinal thermal, weak visual stimulus ⁽⁴⁾	R(λ)	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$ s	$L_{IR} = 6000/\alpha$ $t > 10$ s	—	
				$L_{IR} = 5 \cdot 10^4/(\alpha \cdot t^{0,25})$ $10 \mu s \leq t \leq 10$ s	—	
				$L_{IR} = 8,89 \cdot 10^5/\alpha$ $t < 10 \mu s$	—	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$ s	$E_{IR} = 100$ $t > 1000$ s	E = 0,0 t \geq 0	
				$E_{IR} = 18000 \cdot t^{-0,75}$ $t \leq 1000$ s	—	
<p>(1) α is expressed in radians. (2) t is the exposure time of the lamp and is expressed in seconds; if $t \geq 0$ there is no limitation is the exposure. (3) Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian. (4) Involves evaluation of non-GLS source. (5) The limits $H_{eff} = 30$ and $H_{UVA} = 10^4 J \cdot m^{-2}$ are converted in $W \cdot m^{-2}$ considering the exposure time of 8 hours.</p>						
<p>NOTE The action functions: see Table 4.1 and Table 4.2 The applicable aperture diameters: see 4.2.1 The limitations for the angular subtenses: see 4.2.2 The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5.</p>						

ATTACHMENT 3 TO TEST REPORT IEC/EN 62471 REQUIREMENT OF IEC/TR 62471-2 Photobiological safety of lamps and lamps systems – Part 2: Guidance on manufacturing requirement relating to non-laser optical radiation safety	
Originator	Nemko S.p.A.
Date of issue	2013 – 04

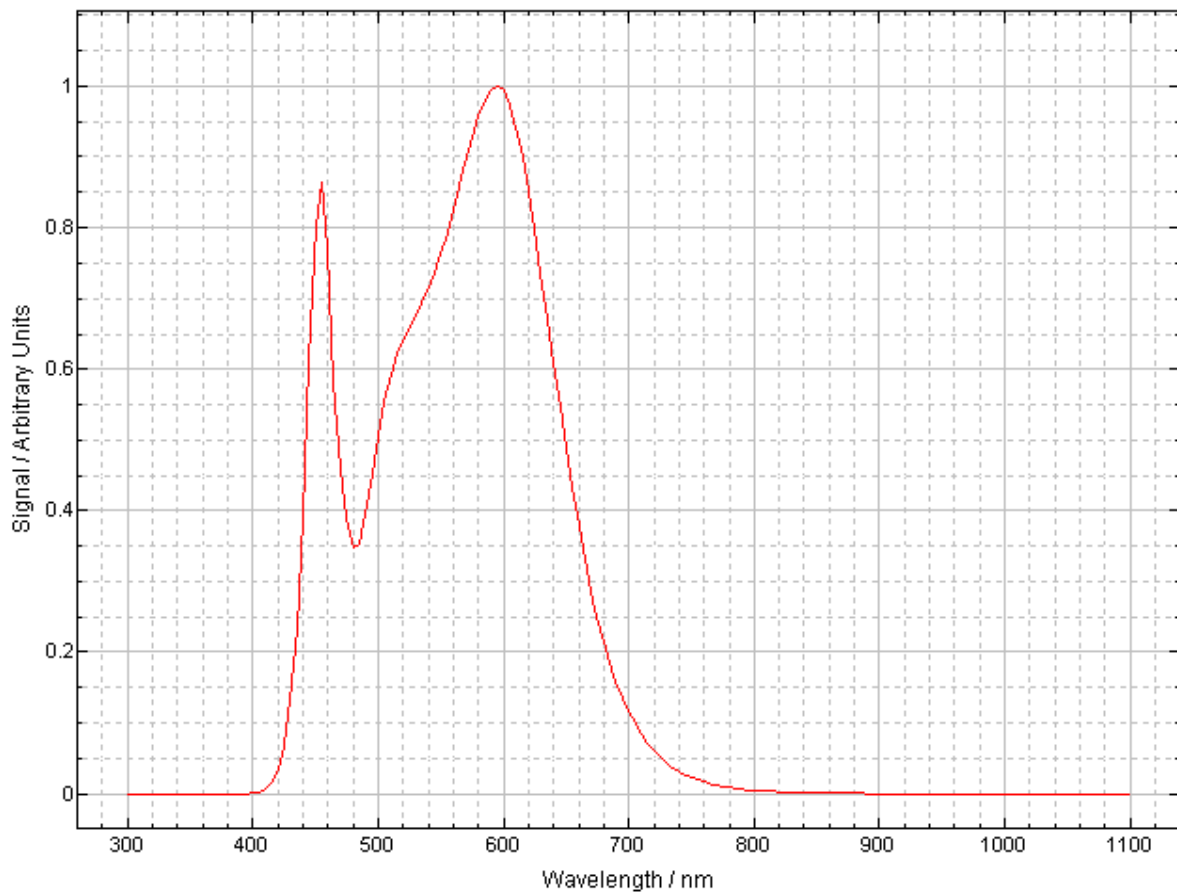
5.4	Labelling required	-			
<table border="1" style="margin: auto;"> <tr><td style="text-align: center;">Exempt</td></tr> <tr><td style="text-align: center;">No Labelling Required</td></tr> <tr><td style="text-align: center;"><i>Product tested against IEC62471</i></td></tr> </table>			Exempt	No Labelling Required	<i>Product tested against IEC62471</i>
Exempt					
No Labelling Required					
<i>Product tested against IEC62471</i>					

Table 1	Hazard-related risk group labelling of lamp systems				-
Hazard	Exempt Risk Group	Risk Group 1	Risk Group 2	Risk Group 3	
Ultraviolet hazard 200nm to 400nm	Not required	NOTICE UV emitted from this product	CAUTION UV emitted from this product	WARNING UV emitted from this product	
Retinal blue light hazard 300nm to 400nm	Not required	Not required	CAUTION Possibly hazard- ous optical radi- ation emitted from this product	WARNING Possibly hazardous optical radiation emitted from this product	
Retinal blue light or thermal hazard 400nm to 780nm	Not required	Not required	CAUTION Possibly hazard- ous optical radi- ation emitted from this product	WARNING Possibly hazardous optical radiation emitted from this product	
Cornea/lens infrared hazard 780nm to 3000nm	Not required	NOTICE IR emitted from this product	CAUTION IR emitted from this product	WARNING IR emitted from this product	
Retinal thermal hazard weak visual stimulus 780nm to 1400nm	Not required	WARNING IR emitted from this product	WARNING IR emitted from this product	WARNING IR emitted from this product	
Supplementary information: in bold explanation of labelling information and guidance on control measures					

Table 2		Explanation of labelling information and guidance on control measure			-
Hazard	Exempt Risk Group	Risk Group 1	Risk Group 2	Risk Group 3	
Ultraviolet hazard 200nm to 400nm	Not required	Minimise exposure to eyes or skin. Use appropriate shielding.	Eye or skin irritation may result from exposure. Use appropriate shielding.	Avoid eye and skin exposure to unshielded product.	
Retinal blue light hazard 300nm to 400nm	Not required	Not required	Do not stare at operating lamp. May be harmful to the eyes.	Do not look at operating lamp. Eye injury may result.	
Retinal blue light or thermal hazard 400nm to 780nm	Not required	Not required	Do not stare at operating lamp. May be harmful to the eyes.	Do not look at operating lamp. Eye injury may result.	
Cornea/lens infrared hazard 780nm to 3000nm	Not required	Use appropriate shielding or eye protection.	Avoid eye exposure. Use appropriate shielding or eye protection.	Avoid eye exposure. Use appropriate shielding or eye protection.	
Retinal thermal hazard weak visual stimulus 780nm to 1400nm	Not required	Do not stare at operating lamp.	Do not stare at operating lamp.	Do not look at operating lamp.	
Supplementary information: in bold explanation of labelling information and guidance on control measures					

ATTACHMENT 4: CHARACTERISTICS OF LAMP

Application / Function	Manufacturer trademark	Type / Model	Technical data	Standard	Mark(s) of conformity evidence of acceptance
LED	SAMSUNG	LM301H	$V_F: 2,9 V_{max}$ $I_F: 200 mA_{max}$ CRI 80 4000 K	IEC/EN 62471	Tested in appliance



Spectral measurement normalized

ATTACHMENT 5: PHOTO DOCUMENTATION



a)



b)



d)



e)

ATTACHMENT 6: EQUIPMENT USED FOR TESTING

MEASUREMENT EQUIPMENT			
Manufacturer	Type of equipment	Type designation	Serial number
Bentham instruments	Double monochromator	IDR300	12290
	Calibration lamp for irradiance measurement	CL6-H	12094/5
	Calibration lamp for irradiance measurements (UV)	CL7	12281/3
	Calibration lamp for radiance measurements	SRS12	12283/3
	Telescope for radiance measurements	TEL309	12280/3
	Illuminance detector	DH400_vl	12284/3
	Power supply	PSU605	12236/4
	Power supply	PSU705	12295
	Diffuser	DIFF_D7	12279/3
	Source Profiler	PSL_Profiler	12698/4
Other instruments	Tape	Stanley 8 m	30-457
	Distance meter	Bosch DLE70	005558860
	Multimeter	Fluke 8846	9673012
	Power supply	Philips	003926
	Data logger	Testo 176P1+0572 6174	41002029+206 38516

-End of Report-



TEST REPORT IEC TR 62778 Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires	
Report Number.....	377848-1TRFPHO
Date of issue.....	2020-03-12
Total number of pages	12
Name of Testing Laboratory preparing the Report	Nemko Spa Via del Carroccio, 4 - 20853 Biassono (MB) – ITALY
Applicant's name	Relco Srl
Address.....	Via delle Azalee 6/A 20090 Buccinasco (MI) – Italy
Test specification:	
Standard.....	IEC TR 62778:2014 (Second Edition)
Test procedure	Testing
Non-standard test method	N/A
Test Report Form No.	IEC62778A
Test Report Form(s) Originator	TÜV SÜD Product Service GmbH
Master TRF	Dated 2016-02
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General disclaimer:	
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.	

Test item description :	LED Streetlight	
Trade Mark :		
Manufacturer	L.C. Relco Spa	
Model/Type reference :	Via delle Azalee 6/A - 20090 Buccinasco (MI) - Italy	
Ratings :	LED MAXISEMPIONE cod. 36251	
s/n of model tested :	220 W 220-240 V 50/60 Hz 4000 K	
	377848 "1/1 identified by Nemko"	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	Testing Laboratory:	
	Testing location/ address	Nemko Spa Via del Carroccio, 4 – 20853 Biassono (MB) – Italy
<input type="checkbox"/>	Associated Testing Laboratory:	
	Testing location/ address	
	Tested by (name, function, signature) :	Oscar Segantin (Project handler) 
	Approved by (name, function, signature) .. :	Giulio Tassinari (Verifier) 
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
	Testing location/ address	
	Tested by (name, function, signature) :	
	Approved by (name, function, signature) .. :	
<input type="checkbox"/>	Testing procedure: CTF Stage 2:	
	Testing location/ address	
	Tested by (name + signature) :	
	Witnessed by (name, function, signature) . :	
	Approved by (name, function, signature) .. :	
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	Testing procedure: CTF Stage 4:	
	Testing location/ address	
	Tested by (name, function, signature) :	
	Witnessed by (name, function, signature) . :	
	Approved by (name, function, signature) .. :	
	Supervised by (name, function, signature) :	

<p>List of Attachments (including a total number of pages in each attachment):</p> <ul style="list-style-type: none"> - Attachment 1: Best Measurement Capability (1 page) - Attachment 2: Characteristics of lamps (1 page) - Attachment 3: Photo documentation (2 pages) - Attachment 4: Equipment used for testing (1 page) 	
<p>Summary of testing: The equipment under test is a LED streetlight. The tests were performed with the following settings: 1- Distance of 200mm (IEC_62778)</p>	
<p>Tests performed (name of test and test clause): Cl. 8 – Risk Group classification</p> <p>Note: The following Nemko technical procedures were also applied during testing:</p> <ul style="list-style-type: none"> - WML0177 General routines for using instruments at Nemko. - WML1002: Measurement Uncertainty – Policy and Statement. - WML0066: Procedure for measurement of Photobiological safety of lamps and lamp systems <p>Statement of the measurement uncertainty: See Attachment 1 for best measurement uncertainty</p> <p>Unless different values are declared in the test case, following ambient conditions apply for the tests:</p> <ul style="list-style-type: none"> - Ambient temperature 18-33 °C - Relative Humidity 30-70 % - Atmospheric Pressure 860-1060 hPa <p>Equipment used for testing is recorded and saved into Attachment 4 to this test report.</p>	<p>Testing location:</p> <p>Nemko Spa Via del Carroccio, 4 – 20853 Biassono (MB) –Italy (for all tests)</p>
<p>Summary of compliance with National Differences (List of countries addressed):</p> <ul style="list-style-type: none"> - European countries (no deviation listed on IECEE website) 	

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



Calibration	All instruments used in the tests given in this test report are calibrated and traceable to national or international standards. Further information about traceability will be given on request.
Measurement uncertainty	The measurement uncertainty was calculated for each test and quantity listed in this test report, according to IEC Guide 115 and other specific test standard and is documented in Nemko Spa working manual WML1002.
Assessment of conformity	The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report: P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit. F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.

Test item particulars	: LED streetlight
Product evaluated	: <input type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input checked="" type="checkbox"/> Luminaire
Rated voltage (V)	: 220-240 V
Rated current (mA)	: Not declared (210 W marked)
Rated CCT (K)	: 4000 K
Rated Luminance (Mcd/m²)	: -
Component report data used	: <input checked="" type="checkbox"/> Not applicable <input type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp Report number: -
Possible test case verdicts:	
- test case does not apply to the test object.....	: N/A (Not applicated)
- test object does meet the requirement.....	: P (Pass)
- test object does not meet the requirement.....	: F (Fail)
Testing	
Date of receipt of test item	: 2019-10-01
Date (s) of performance of tests	: 2019-10-02
General remarks:	
<p>"The phase of sampling / collection of equipment under test is carried out by the customer." "(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. The phase of sampling/collection is carried out by manufacturer. Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.</p> <p>-</p>	
Name and address of factory (ies)	: Nextronics S.A.R.L. Lot n. 6 Z.I. El Agba, 2087 Tunis, Tunisia
General product information:	
<p>The equipment under test is a streetlight LED for general purpose composed by 80 LEDs modules manufactured by SAMSUNG model LH508A+, with street optic lens (characteristics of LED are described to attachment 4). Equipment has been supplied by two controlgear model SIRIO 150/300-1050 BILEVEL BI manufactured by TCI with ratings: Input: 220-240 V, 50/60 Hz, 0,77 Amax Output: 150 W, 300-1050mA 180 V</p> <p>S/n: 377848 "1/1 identified by Nemko"</p>	

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict
7	MEASUREMENT INFORMATION FLOW		P
7.1	Basic flow		P
	'Law of conservation of luminance' applied		P
	Use of only true luminance/radiance values		P
	In case of luminaire: The light source is operated in the luminaire under similar conditions as when tested as a component		P
	In case E_{thr} value for RG2 was established the peak value was derived from angular light distribution		P
7.2	Conditions for the radiance measurement		P
	Standard condition applied (200mm distance, 0,011rad field of view)		P
	Non-standard condition applied		N/A
7.3	Special cases (I): Replacement by a lamp or LED module of another type		N/A
	Light source is a white light source		N/A
	Evaluation done based on highest luminance		N/A
	Evaluation done based on CCT value		N/A
7.4	Special cases (II): Arrays and clusters of primary light sources		N/A
	LED package is evaluated as : <input type="checkbox"/> RG0 unlimited <input type="checkbox"/> RG1 unlimited		N/A
	E_{thr} of LED package applies to array		N/A
8	RISK GROUP CLASSIFICATION		P
	Risk group achieved:		P
	- .. Risk Group 0 unlimited		N/A
	- .. Risk Group 1 unlimited		N/A
	- E_{thr} (lx) : Distance to reach RG1 (m) :	996 3,5	P

TABLE: Spectroradiometric measurement					P
Measurement performed on:		<input type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input checked="" type="checkbox"/> Luminaire			
Model number.....:		377848 "1-1 (Identified by Nemko Spa)			
Test voltage (V)		240 V			—
Test current (mA)		-			—
Test frequency (Hz).....:		50 Hz			—
Ambient, t (°C).....:		26			—
Measurement distance		<input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm			—
Source size		<input checked="" type="checkbox"/> Non-small <input type="checkbox"/> Small : mm			—
Field of view		<input type="checkbox"/> 100 mrad <input checked="" type="checkbox"/> 11 mrad <input type="checkbox"/> 1,7 mrad (for small sources)			—
Item	Symbol	Units	Result	Remark	
Correlated colour temperature	CCT	K	N/A	See component datasheet	
x/y colour coordinates			N/A	See component datasheet	
Blue light hazard radiance	LB	W/(m ² •sr)	6,9E05	RG2	
Blue light hazard irradiance	EB	W/m ²	N/A		
Luminance	L	cd/m ²	6,9E08 cd/ m²		
Illuminance	E	lx	N/A		
Supplementary information:					

ATTACHMENT 1: BEST MEASUREMENT UNCERTAINTY

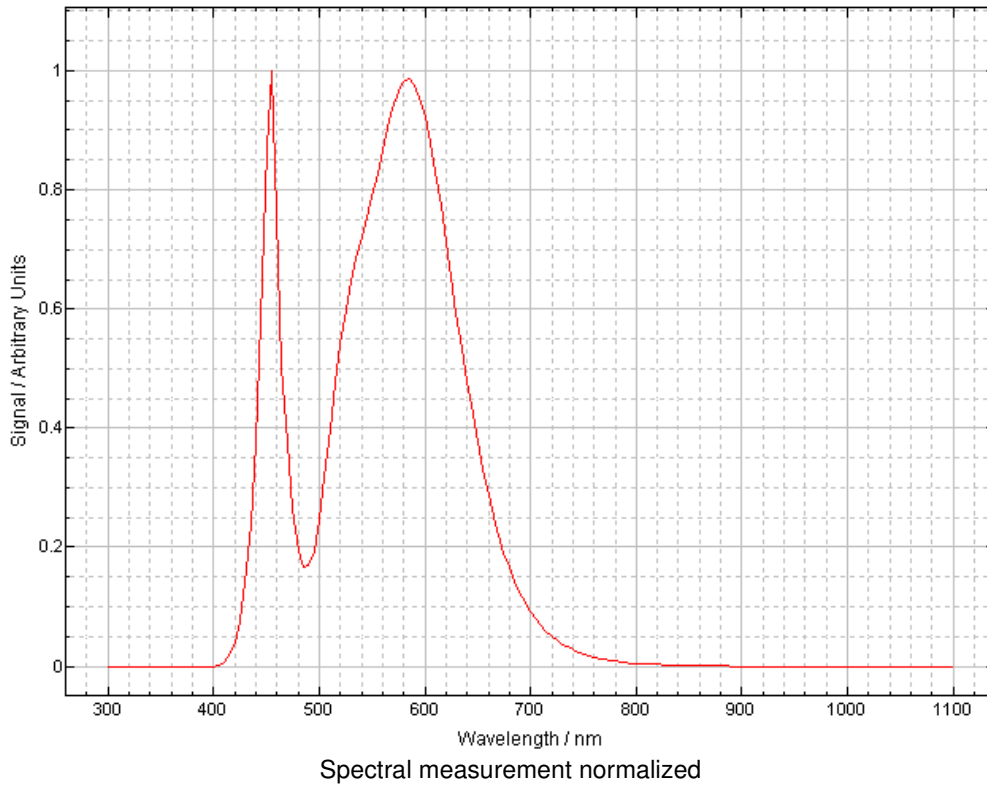
Test	Range	Measurement Uncertainty	Note
Radiance Blue light, Retinal thermal, Retinal thermal weak visual stimulus	0 ÷ 0.1 MW/(sr·m ²) 300 ÷ 1400 nm	7.0 %	(1)
	0.1 ÷ 100 MW/(sr·m ²) 300 ÷ 1400 nm	8.0 %	(4)
Luminance	0 ÷ 0.1 Mcd/m ²	7.0 %	(1)
	0.1 ÷ 100 Mcd/m ²	8.0 %	
Irradiance Actinic UV, Near UV, Blue light small source, IR radiation, eye	0 ÷ 0.1 MW/(m ²) 200 ÷ 300 nm	9.2 %	(1) (5)
	0.1 ÷ 100 MW/(m ²) 200 ÷ 300 nm	10.0 %	
	0 ÷ 0.1 MW/(m ²) 300 ÷ 3000 nm	6.4 %	
	0.1 ÷ 100 MW/(m ²) 300 ÷ 3000 nm	7.2 %	
Illuminance	0 ÷ 20 klx	4.0 %	(1)
Spectral Radiance	0 ÷ 0.1 MW/(sr·m ² ·nm) 300 ÷ 1400 nm	6.2 %	(1)
	0.1 ÷ 1 MW/(sr·m ² ·nm) 300 ÷ 1400 nm	7.0 %	
Spectral Irradiance	0 ÷ 0.1 MW/(m ² ·nm) 200 ÷ 300 nm	8.6 %	(1)
	0.1 ÷ 1 MW/(m ² ·nm) 200 ÷ 300 nm	9.2 %	
	0-0.1 MW/(m ² ·nm) 300 ÷ 3000nm	5.4 %	
	0.1 ÷ 1 MW/(m ² ·nm) 300 ÷ 3000 nm	6.4 %	
Radiant power Laser radiation Output power	350 ÷ 400 nm 950 ÷ 3000 nm 30 uW ÷ 30 W	9.0 %	(1), (2), (3)
	400 ÷ 950 nm 50 nW ÷ 3 W	4.6 %	(1), (2), (3)
Radiant energy Laser radiation	350 ÷ 400 nm 950 ÷ 3000 nm 20 uJ ÷ 2 J	9.0 %	(1), (2)
	400 ÷ 950 nm 20 uJ ÷ 2 J	4.6 %	(1), (2)
Wavelength	200 ÷ 3000 nm	4.5 %	(1)
Length in optical measurement	0 ÷ 20 mm	0.5 mm	(1)
	20 ÷ 200 mm	2 mm	
	0.2 ÷ 200 m	0.5 %	

NOTES:

- (1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which has been derived from the assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95 %
- (2) In the standard 60825-1 laser radiation can indicate radiant power or radiant energy
- (3) In the standard 60825-1 the radiant power can be called also output power
- (4) The uncertainty value expressed in W/(m²) is the maximum value between the value measured and the limit stated in the standard (see IEC/EN62471) multiplied to the measurement uncertainty stated in the table
- (5) The uncertainty value expressed in W/(sr·m²) is the maximum value between the value measured and the limit stated in the standard (see IEC/EN62471) multiplied to the measurement uncertainty stated in the table

ATTACHMENT 2: CHARACTERISTICS OF LAMP

Application / Function	Manufacturer trademark	Type / Model	Technical data	Standard	Mark(s) of conformity evidence of acceptance
LED	SAMSUNG	LH508A+	VF: 6,4 Vmax IF: 880 mAmax CRI 70 4000 K	IEC 62778	Tested in appliance



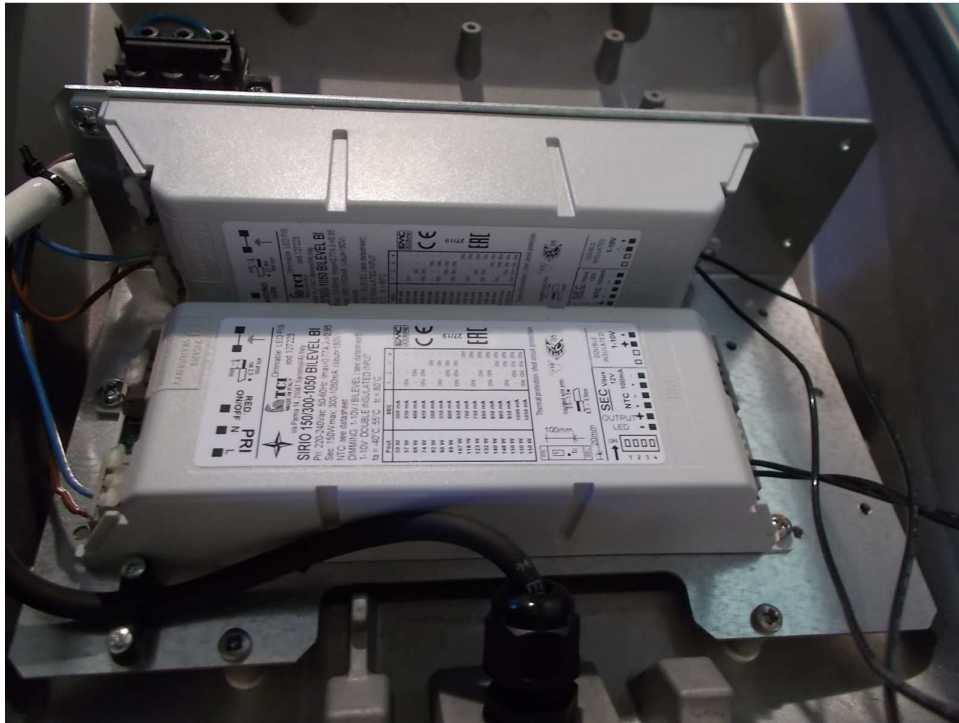
ATTACHMENT 3: PHOTO DOCUMENTATION



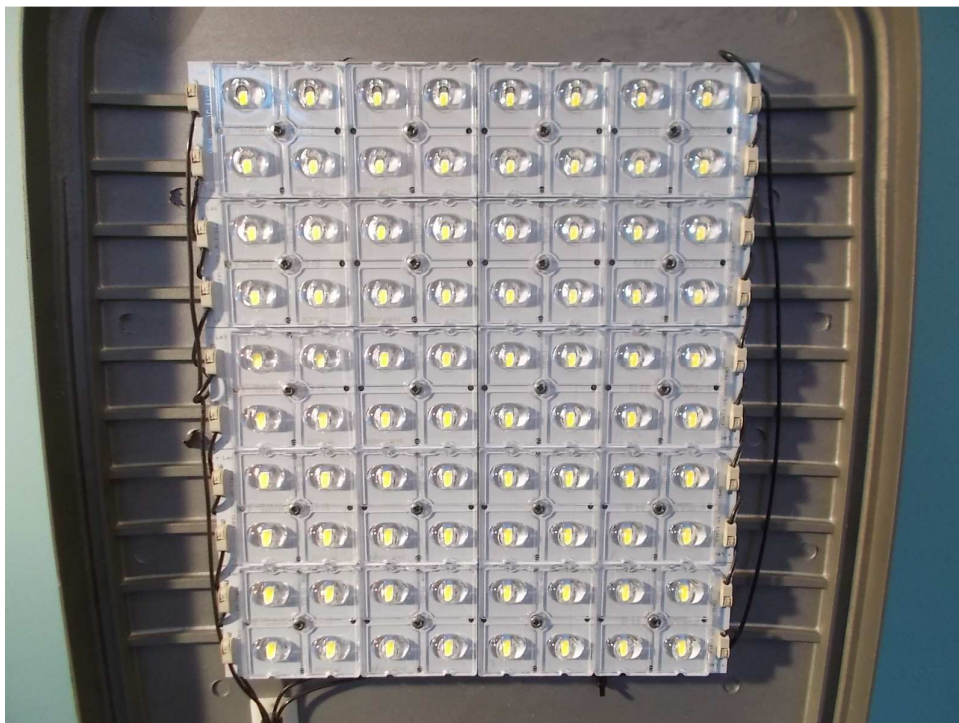
a)



b)



d)



e)

ATTACHMENT 4: EQUIPMENT USED FOR TESTING

MEASUREMENT EQUIPMENT			
Manufacturer	Type of equipment	Type designation	Serial number
Bentham instruments	Double monochromator	IDR300	12290
	Calibration lamp for irradiance measurement	CL6-H	12094/5
	Calibration lamp for irradiance measurements (UV)	CL7	12281/3
	Calibration lamp for radiance measurements	SRS12	12283/3
	Telescope for radiance measurements	TEL309	12280/3
	Illuminance detector	DH400_vl	12284/3
	Power supply	PSU605	12236/4
	Power supply	PSU705	12295
	Diffuser	DIFF_D7	12279/3
	Source Profiler	PSL_Profiler	12698/4
Other instruments	Tape	Stanley 8 m	30-457
	Distance meter	Bosch DLE70	005558860
	Multimeter	Fluke 8846	9673012
	Power supply	Philips	003926
	Data logger	Testo 176P1+0572 6174	41002029+20638516

END OF TEST REPORT



TEST REPORT IEC TR 62778 Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires	
Report Number.....	377848-4TRFPHO
Date of issue.....	2020-03-12
Total number of pages	12
Name of Testing Laboratory preparing the Report	Nemko Spa Via del Carroccio, 4 - 20853 Biassono (MB) – ITALY
Applicant's name	Relco Srl
Address.....	Via delle Azalee 6/A 20090 Buccinasco (MI) – Italy
Test specification:	
Standard.....	IEC TR 62778:2014 (Second Edition)
Test procedure	Testing
Non-standard test method	N/A
Test Report Form No.	IEC62778A
Test Report Form(s) Originator	TÜV SÜD Product Service GmbH
Master TRF	Dated 2016-02
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General disclaimer:	
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Test item description :	LED Streetlight	
Trade Mark :		
Manufacturer	L.C. Relco Spa	
Model/Type reference :	Via delle Azalee 6/A - 20090 Buccinasco (MI) - Italy	
Ratings :	LED MAXISEMPIONE cod. 36250	
s/n of model tested :	180 W 220-240 V 50/60 Hz 4000 K	
	377848 "2/2 identified by Nemko"	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	Testing Laboratory:	
	Testing location/ address	Nemko Spa Via del Carroccio, 4 – 20853 Biassono (MB) – Italy
<input type="checkbox"/>	Associated Testing Laboratory:	
	Testing location/ address	
	Tested by (name, function, signature) :	Oscar Segantin (Project handler) 
	Approved by (name, function, signature) .. :	Giulio Tassinari (Verifier)
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
	Testing location/ address	
	Tested by (name, function, signature) :	
	Approved by (name, function, signature) .. :	
<input type="checkbox"/>	Testing procedure: CTF Stage 2:	
	Testing location/ address	
	Tested by (name + signature) :	
	Witnessed by (name, function, signature) . :	
	Approved by (name, function, signature) .. :	
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	Testing procedure: CTF Stage 4:	
	Testing location/ address	
	Tested by (name, function, signature) :	
	Witnessed by (name, function, signature) . :	
	Approved by (name, function, signature) .. :	
	Supervised by (name, function, signature) :	

<p>List of Attachments (including a total number of pages in each attachment):</p> <ul style="list-style-type: none"> - Attachment 1: Best Measurement Capability (1 page) - Attachment 2: Characteristics of lamps (1 page) - Attachment 3: Photo documentation (2 pages) - Attachment 4: Equipment used for testing (1 page) 	
<p>Summary of testing: The equipment under test is a LED streetlight. The tests were performed with the following settings: 1- Distance of 200mm (IEC_62778)</p>	
<p>Tests performed (name of test and test clause): Cl. 8 – Risk Group classification</p> <p>Note: The following Nemko technical procedures were also applied during testing:</p> <ul style="list-style-type: none"> - WML0177 General routines for using instruments at Nemko. - WML1002: Measurement Uncertainty – Policy and Statement. - WML0066: Procedure for measurement of Photobiological safety of lamps and lamp systems <p>Statement of the measurement uncertainty: See Attachment 1 for best measurement uncertainty</p> <p>Unless different values are declared in the test case, following ambient conditions apply for the tests:</p> <ul style="list-style-type: none"> - Ambient temperature 18-33 °C - Relative Humidity 30-70 % - Atmospheric Pressure 860-1060 hPa <p>Equipment used for testing is recorded and saved into Attachment 4 to this test report.</p>	<p>Testing location:</p> <p>Nemko Spa Via del Carroccio, 4 – 20853 Biassono (MB) –Italy (for all tests)</p>
<p>Summary of compliance with National Differences (List of countries addressed):</p> <ul style="list-style-type: none"> - European countries (no deviation listed on IECEE website) 	

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Calibration	All instruments used in the tests given in this test report are calibrated and traceable to national or international standards. Further information about traceability will be given on request.
Measurement uncertainty	The measurement uncertainty was calculated for each test and quantity listed in this test report, according to IEC Guide 115 and other specific test standard and is documented in Nemko Spa working manual WML1002.
Assessment of conformity	The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report: P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit. F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.

Test item particulars : LED streetlight	
Product evaluated :	<input type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input checked="" type="checkbox"/> Luminaire
Rated voltage (V) :	220-240 V
Rated current (mA)	Not declared
Rated CCT (K) :	4000 K
Rated Luminance (Mcd/m²)	-
Component report data used	<input checked="" type="checkbox"/> Not applicable <input type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp Report number: -
Possible test case verdicts:	
- test case does not apply to the test object..... :	N/A (Not applicated)
- test object does meet the requirement..... :	P (Pass)
- test object does not meet the requirement..... :	F (Fail)
Testing :	
Date of receipt of test item	2019-10-01
Date (s) of performance of tests	2019-10-21
General remarks:	
<p>"The phase of sampling / collection of equipment under test is carried out by the customer." "(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. The phase of sampling/collection is carried out by manufacturer. Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.</p> <p>-</p>	
Name and address of factory (ies)	Nextronics S.A.R.L. Lot n. 6 Z.I. El Agba, 2087 Tunis, Tunisia
General product information:	
<p>The equipment under test is a streetlight LED for general purpose composed by 10 module LEDs with 32 LEDs for each module (total 320 LEDs) manufactured by SAMSUNG model LM301, with street optic lens (characteristics of LED are described to attachment 4). Equipment has been supplied by a controlgear model Xitanium 150W 0.2-0.70A SI 230V S240 sXt manufactured by PHILIPS with ratings: Input: 162 W 220-240 V, 50/60 Hz, 0,79 Amax Output: 150 W 90-283 V 200-700 mA</p> <p>S/n: 377848 "2/2 identified by Nemko"</p>	

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict
7	MEASUREMENT INFORMATION FLOW		P
7.1	Basic flow		P
	'Law of conservation of luminance' applied		P
	Use of only true luminance/radiance values		P
	In case of luminaire: The light source is operated in the luminaire under similar conditions as when tested as a component		P
	In case E_{thr} value for RG2 was established the peak value was derived from angular light distribution		P
7.2	Conditions for the radiance measurement		P
	Standard condition applied (200mm distance, 0,011 rad field of view)		P
	Non-standard condition applied		N/A
7.3	Special cases (I): Replacement by a lamp or LED module of another type		N/A
	Light source is a white light source		N/A
	Evaluation done based on highest luminance		N/A
	Evaluation done based on CCT value		N/A
7.4	Special cases (II): Arrays and clusters of primary light sources		N/A
	LED package is evaluated as : <input type="checkbox"/> RG0 unlimited <input type="checkbox"/> RG1 unlimited		N/A
	E_{thr} of LED package applies to array		N/A
8	RISK GROUP CLASSIFICATION		P
	Risk group achieved:		P
	- .. Risk Group 0 unlimited		N/A
	- .. Risk Group 1 unlimited		P
	- E_{thr} (lx) : - Distance to reach RG1 (m) : -		N/A

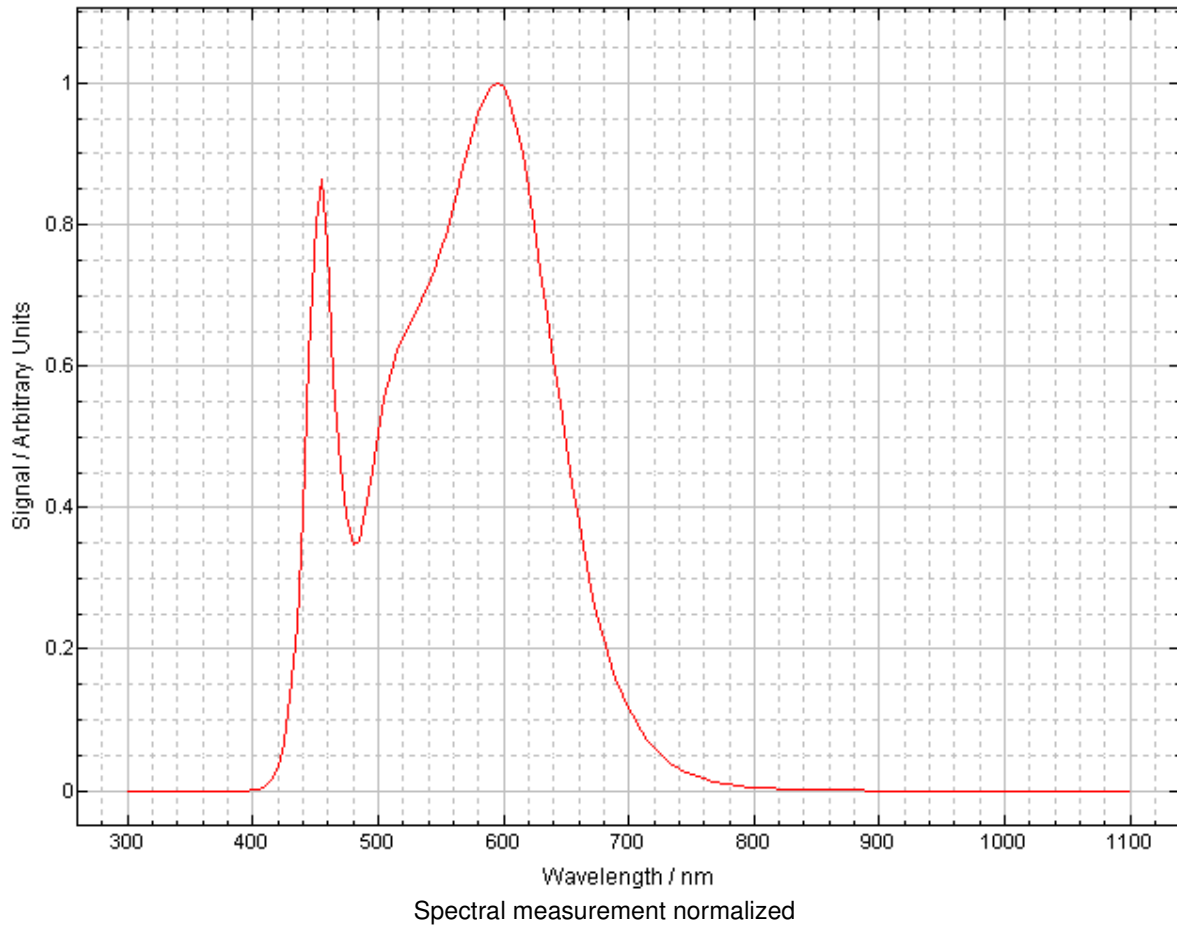
TABLE: Spectroradiometric measurement					P
Measurement performed on:		<input type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input checked="" type="checkbox"/> Luminaire			
Model number.....:		377848 "2-2 (Identified by Nemko Spa)			
Test voltage (V)		230 V			—
Test current (mA)		-			—
Test frequency (Hz).....:		50 Hz			—
Ambient, t (°C).....:		22			—
Measurement distance		<input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm			—
Source size		<input checked="" type="checkbox"/> Non-small <input type="checkbox"/> Small : mm			—
Field of view		<input type="checkbox"/> 100 mrad <input checked="" type="checkbox"/> 11 mrad <input type="checkbox"/> 1,7 mrad (for small sources)			—
Item	Symbol	Units	Result	Remark	
Correlated colour temperature	CCT	K	N/A	See component datasheet	
x/y colour coordinates			N/A	See component datasheet	
Blue light hazard radiance	LB	W/(m ² •sr)	1830	RG1	
Blue light hazard irradiance	EB	W/m ²	N/A		
Luminance	L	cd/m ²	2,4E06		
Illuminance	E	lx	N/A		
Supplementary information:					

ATTACHMENT 1: BEST MEASUREMENT UNCERTAINTY

Test	Range	Measurement Uncertainty	Note
Radiance Blue light, Retinal thermal, Retinal thermal weak visual stimulus	0 ÷ 0.1 MW/(sr·m ²) 300 ÷ 1400 nm	7.0 %	(1)
	0.1 ÷ 100 MW/(sr·m ²) 300 ÷ 1400 nm	8.0 %	(4)
Luminance	0 ÷ 0.1 Mcd/m ²	7.0 %	(1)
	0.1 ÷ 100 Mcd/m ²	8.0 %	
Irradiance Actinic UV, Near UV, Blue light small source, IR radiation, eye	0 ÷ 0.1 MW/(m ²) 200 ÷ 300 nm	9.2 %	(1) (5)
	0.1 ÷ 100 MW/(m ²) 200 ÷ 300 nm	10.0 %	
	0 ÷ 0.1 MW/(m ²) 300 ÷ 3000 nm	6.4 %	
	0.1 ÷ 100 MW/(m ²) 300 ÷ 3000 nm	7.2 %	
Illuminance	0 ÷ 20 klx	4.0 %	(1)
Spectral Radiance	0 ÷ 0.1 MW/(sr·m ² ·nm) 300 ÷ 1400 nm	6.2 %	(1)
	0.1 ÷ 1 MW/(sr·m ² ·nm) 300 ÷ 1400 nm	7.0 %	
Spectral Irradiance	0 ÷ 0.1 MW/(m ² ·nm) 200 ÷ 300 nm	8.6 %	(1)
	0.1 ÷ 1 MW/(m ² ·nm) 200 ÷ 300 nm	9.2 %	
	0-0.1 MW/(m ² ·nm) 300 ÷ 3000nm	5.4 %	
	0.1 ÷ 1 MW/(m ² ·nm) 300 ÷ 3000 nm	6.4 %	
Radiant power Laser radiation Output power	350 ÷ 400 nm 950 ÷ 3000 nm 30 uW ÷ 30 W	9.0 %	(1), (2), (3)
	400 ÷ 950 nm 50 nW ÷ 3 W	4.6 %	(1), (2), (3)
Radiant energy Laser radiation	350 ÷ 400 nm 950 ÷ 3000 nm 20 uJ ÷ 2 J	9.0 %	(1), (2)
	400 ÷ 950 nm 20 uJ ÷ 2 J	4.6 %	(1), (2)
Wavelength	200 ÷ 3000 nm	4.5 %	(1)
Length in optical measurement	0 ÷ 20 mm	0.5 mm	(1)
	20 ÷ 200 mm	2 mm	
	0.2 ÷ 200 m	0.5 %	
NOTES:			
(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which has been derived from the assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95 %			
(2) In the standard 60825-1 laser radiation can indicate radiant power or radiant energy			
(3) In the standard 60825-1 the radiant power can be called also output power			
(4) The uncertainty value expressed in W/(m ²) is the maximum value between the value measured and the limit stated in the standard (see IEC/EN62471) multiplied to the measurement uncertainty stated in the table			
(5) The uncertainty value expressed in W/(sr·m ²) is the maximum value between the value measured and the limit stated in the standard (see IEC/EN62471) multiplied to the measurement uncertainty stated in the table			

ATTACHMENT 2: CHARACTERISTICS OF LAMP

Application / Function	Manufacturer trademark	Type / Model	Technical data	Standard	Mark(s) of conformity evidence of acceptance
LED	SAMSUNG	LM301H	V _F : 2,9 V _{max} I _F : 200 mA _{max} CRI 80 4000 K	IEC 62778	Tested in appliance



ATTACHMENT 3: PHOTO DOCUMENTATION



a)



b)



d)






e)

ATTACHMENT 4: EQUIPMENT USED FOR TESTING

MEASUREMENT EQUIPMENT			
Manufacturer	Type of equipment	Type designation	Serial number
Bentham instruments	Double monochromator	IDR300	12290
	Calibration lamp for irradiance measurement	CL6-H	12094/5
	Calibration lamp for irradiance measurements (UV)	CL7	12281/3
	Calibration lamp for radiance measurements	SRS12	12283/3
	Telescope for radiance measurements	TEL309	12280/3
	Illuminance detector	DH400_vl	12284/3
	Power supply	PSU605	12236/4
	Power supply	PSU705	12295
	Diffuser	DIFF_D7	12279/3
	Source Profiler	PSL_Profiler	12698/4
Other instruments	Tape	Stanley 8 m	30-457
	Distance meter	Bosch DLE70	005558860
	Multimeter	Fluke 8846	9673012
	Power supply	Philips	003926
	Data logger	Testo 176P1+0572 6174	41002029+206 38516

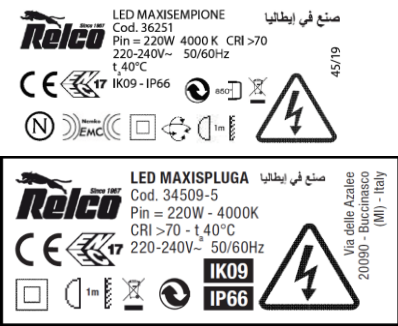
END OF TEST REPORT

TEST REPORT IEC 62262: 2002 Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)	
Report Reference No.:	381746-3TRFEnvEx
Tested by (name, function and signature):	Cristian Simone (Project Handler) 
Approved by (name, function and signature):	Roberto Giampaglia (Verifier) 
Date of issue:	2020-02-26
Testing Laboratory:	Nemko Spa.
Address:	Via del Carroccio 4 I – 20853 Biassono (MB)
Testing location/ address:	Nemko Spa., Via del Carroccio 4 I - 20853 Biassono (MB)
Applicant's name:	Relco Srl
Address:	Via delle Azalee 6/A_ 20090 Buccinasco (MI) - Italy
Test specification:	
Standard:	IEC 62262:2002
Non-standard test method:	N/A
Test Report Form No.:	TRF EN 60068-2-ENV
TRF Originator:	Nemko S.p.A.
Master TRF:	2017-03
Nemko Spa, I-20853 Biassono (MB). All rights reserved.	
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Test item description:	LED streetlight
Trade Mark:	 Relco lighting
Manufacturer:	same as Applicant
Model/Type reference:	1)LED MAXISEMPIONE Cod. 36251 2) LED MAXISPLUGA Cod.34509-5
Ratings:	210 W, 220-240 V~, 50/60 Hz, Cl.II, IP66, IK09, 4000 K, t _a 40 °C, distance from lighted objects 1 m

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The test report merely corresponds to the test sample.
The phase of sampling / collection of equipment under test is carried out by the customer.

This Test Report, when bearing the Nemko name and logo is only valid when issued by a Nemko laboratory, or by a laboratory having special agreement with Nemko.

Test Report No. : 381746-3TRFEnvEx

Short description of the EuT	Copy of marking plate
LED luminaires	
Number of tested samples: 1 Serial number: 1/3 assigned by Nemko Spa Brand: Relco lighting Manufacturer: Relco Srl Model: LED MAXISEMPIONE Cod. 36251 LED MAXISPLUGA Cod.34509-5 Manufacturer year: - Ratings: 210 W, 220-240 V~, 50/60 Hz, Cl.II, IP66, IK09, 4000 K, t _a 40 °C, distance from lighted objects 1 m Accessories and detachable parts included/ Mounted tool: The EuT is composed by a unit, accessories as supplied in the appliance (EuT tested in the configuration supplied by manufacturer). Other options included: None	
Testing Date of receipt of test sample: 2019-06-03 Testing commenced on: 2019-09-25 Testing concluded on: 2019-09-26 <p>The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.</p> <p>Throughout this report, a comma is used as the decimal separator.</p>	

Test Result according to the customer criteria of acceptance in § 4.4:	Pass
--	-------------

PROJECT HISTORY		
Report number	Modification to the report / comments	Date
381746-3TRFEnvEx	First release	2020-02-26
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REMARKS

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1 TEST PERFORMED

Tests performed to check degrees of protection provided by enclosures. The K09 tests were performed only on model LED MAXISEMPIONE Cod. 36251 because the mounted glass is the same.

2 TEST STANDARDS AND PROCEDURES

- **NEMKO WM L0177:**
General routines for using instruments at Nemko
- **NEMKO WM L1002:**
Measurement Uncertainty - Policy and Statement
- **IEC 62262:2002**
Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)

3 GENERAL REMARKS

The IK09 tests were performed in accordance with clauses 6.1 and 6.4 of IEC 62262. Acceptance criteria were as required on clause 6.5 of IEC 62262.

Note: Under customer request, the impact tests were performed on the same sample.

3.1 Environmental conditions

Unless different values are declared in the test case, following ambient conditions apply for the tests:

Ambient Temperature:	18 ÷ 33° C
Relative Humidity:	30 ÷ 70 %
Atmospheric pressure:	860 ÷ 1060 hPa

3.2 Measurement uncertainty

The measurement uncertainty was calculated for all measurements listed in this test report according to Nemko Spa Technical Procedure WM L1002 and is documented in the quality system acc. to EN 17025. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Nemko Spa laboratory is reported:

Test	Range	Measurement Uncertainty	Note
IP protection	Water flow 0.5l/min ÷ 100 l/min	5 %	(1)
	Air flow	5 %	(1)
	Force 50N, 30N, 3N, 1N	10 %	(1)
	Dimensions 50mm, 12.5mm, 2.5mm, 1mm	0.05mm	(1)
Construction verifications	Dimensions 0-200mm	0.05 mm	(1)
	Dimensions 0.2-200m	0.5%	(1)
Protection against access to live parts	Dimensions 1-1000mm	0.08 mm or 0.3%	(1)
	Force 0.2-1000N	3%	(1)
Time Measurements	10 ms ÷ 8 h	1%	(1)
Dielectric strength	AC Voltage 0.1 kV ÷ 5 kV (50Hz or 60Hz)	3.0%	(1)
	DC Voltage 0.1 kV ÷ 6 kV	3.0%	(1)
	AC/DC Current 0.1 mA ÷ 200 mA up to 1kHz	5%	(1)
Time Measurements	10 ms ÷ 8 h	1%	(1)
NOTES:			
(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which has been derived from the assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95 %			

4 EQUIPMENT UNDER TEST

4.1 Power supply system utilised

Equipment not supplied during the tests.

4.2 EuT operation mode:

For the IK09 test E.u.T. was not operating.

4.3 EuT configuration:

The EUT has been tested as provided by customer.

Note: Under customer request, the impact tests were performed on the same sample.

Glas mounted: Manufacturer : PALEARI FRATELLI, model Soda lime silicate float glass

4.4 Acceptance Criteria

The test results shall be classified in terms of loss of protection or degradation of protection of the EuT, referred to a performance level defined by the standard and the relevant degree of protection.

Required performance level based on EN 62262 §6.5: Admissible damages not able to affect the continuity of the safety and reliability of the equipment.

5 TEST CONDITIONS AND RESULTS

Mechanical impact IK09

Test equipment: Vertical hammer

Number of impacts: 5

Position of impact: front + side

IK code	Impact energy J	Equivalent mass kg	Height of fall mm	IEC 60068-2-75 Striking elements
09	10	5	200	Fig. A.3

Instruments used: see section §6.

5.1.1 Description of the test location

Test location: Nemko Spa

5.1.2 Photo documentation of the test set-up

a)



b)

Figure 1: a) and b) The head mass

5.1.3 Test result

The requirements are: **Fulfilled**

Remarks and/or Deviations: At the end of test no damages has been found on the enclosure.

5.3 Photographs of equipment after IK test




a)

General view of the EuT after IK09 test

6 TEST EQUIPMENT

Equipment	Manufacturer	Model	Serial N°
Thermohygrometer data loggers	Testo	175-H2	20012380/305
Digital barometer	MSR Electronics GmbH	MSR145B	330080
Tape measure	Stanley	8 m	30-457
Weight for impact test	ATS	0.03, gr 5000	-

- END OF TEST REPORT -

TEST REPORT Electromagnetic compatibility Requirements for general lighting purposes equipment	
Report Reference No.	377848TRFEMC
Tested by (name, function and signature)	L. Bazzi (project handler) <i>Bassi Luca</i>
Approved by (name, function and signature)	P. Barbieri (verifier) <i>Barbieri</i>
Date of issue	2019-10-17
Testing Laboratory	Nemko Spa
Address	Via del Carroccio, 4 – 20853 Biassono (MB) – Italy
Testing location	Nemko Spa
Address	Via del Carroccio, 4 – 20853 Biassono (MB) – Italy
Applicant's name	Relco Srl
Address	Via delle Azalee, 6/A -20090- Buccinasco (MI) - Italy
Test specification:	
Standard	EN 55015 (2013) + A1 (2015) – EN 61547 (2009) EN 61000-3-2 (2014) – EN 61000-3-3 (2013)
	Full application of the standards <input checked="" type="checkbox"/>
	Partial application of the standards <input type="checkbox"/>
Test procedure	Nemko WM L0077, WM L0177 and WM L1002
Test Report Form No.	55015TRFEMC
TRF Originator	Nemko Spa
Master TRF	2014-02
Nemko Spa, 20853 Biassono (MB), Italy. All rights reserved.	
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Test item description	LED Streetlight
Trade Mark	
Manufacturer	Relco Spa
Address of manufacturer	Via delle Azalee 6/A - 20090 Buccinasco (MI) - Italy
Model	LED MAXISEMPIONE
Ratings	210/160 W 220-240 V 50/60 Hz 4000 K and 3000 K

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 The test report merely corresponds to the tested sample.
 The phase of sampling / collection of equipment under test is carried out by the customer.

Test Report No. : 377848TRFEMC	2019-10-17 Date of issue
---------------------------------------	------------------------------------

Short description of the EuT	Copy of marking plate
The equipment under test is a streetlight LED for general purpose composed by 80 LEDs modules manufactured by SAMSUNG model LH508A+, with street optic lens (characteristics of LED are described to attachment 4). Equipment has been supplied by two controlgear model SIRIO 150/300-1050 BILEVEL BI manufactured by TCI	 <p>LED MAXISEMPIONE صنع في إيطاليا Cod. 36251 210W 4000K CRI >70 220-240V~ 50/60Hz t_a 40°C IK09 IP66</p>
Number of tested samples:	1
Serial number:	377848-1/1 (number assigned by Nemko Spa)
Lighting equipment type:	LED luminaire
Mounting system:	Suspended mounting with mounting bracket
Accessories and detachable parts included:	The E.U.T. is composed by one unit
Other options included:	-
Testing	
Date of receipt of test sample:	2019-10-15
Testing commenced on:	2019-10-16
Testing concluded on:	2019-10-17
Possible test case verdicts:	
test case does not apply to the test object:	N (Not applicable)
test object does meet the requirement:	P (Pass)
test object does not meet the requirement:	F (Fail)
Symbols used in this test report	
<input checked="" type="checkbox"/> The crossed square indicates that the listed condition or equipment is applicable for this report.	
<input type="checkbox"/> The empty square indicates that the listed condition or equipment is not applicable for this report.	
Throughout this report point is used as decimal separator.	
The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.	

Verdict according to the standards listed at page 5:	Pass
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PROJECT HISTORY		
Report number	Modification to the report / comments	Date
377848TRFEMC	First release	2019-10-17
--	--	--
--	--	--
--	--	--
REMARKS		

PRODUCT VARIANTS		
Variant model	Difference against the main model	Additional test performed
LED SEMPIONE	Rating: 95/120 W 220-240 V 50/60 Hz 4000 K and 3000 K	--
LED MINISEMPIONE	Rating: 50/75 W 220-240 V 50/60 Hz 4000 K and 3000 K	--
--	--	--
--	--	--
REMARKS		

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1 TEST STANDARDS

The tests were performed according to following standards and procedures.

NEMKO WM L0177: General routines for using instruments at Nemko

NEMKO WM L1002: Measurement Uncertainty - Policy and Statement

NEMKO WM L0077: General routines to perform EMC tests

EN 55015 (2013) + A1(2015)

Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment

EN 61547 (2009)

Equipment for general lighting purposes – EMC immunity requirements

EN 61000-3-2 (2014)

Electromagnetic compatibility (EMC) — Part 3-2: Limits — Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)

EN 61000-3-3 (2013)

Electromagnetic compatibility (EMC) -- Part 3-3: Limits — Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

The main standard(s) above contain(s) references to other standards, which are listed below.

EN 61000-4-2 (2009)

Electromagnetic compatibility (EMC) -- Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test

EN 61000-4-3 (2006) + A1 (2008) + IS1 (2009)

Electromagnetic compatibility (EMC) -- Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test

EN 61000-4-4 (2004)

Electromagnetic compatibility (EMC) -- Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test

EN 61000-4-5 (2006)

Electromagnetic compatibility (EMC) -- Part 4-5: Testing and measurement techniques - Surge immunity test

EN 61000-4-6 (2009)

Electromagnetic compatibility (EMC) -- Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields

EN 61000-4-8 (1993) + A1 (2001)

Electromagnetic compatibility (EMC) -- Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test

EN 61000-4-11 (2004)

Electromagnetic compatibility (EMC) -- Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests

2 SUMMARY OF TEST RESULTS

Emission		
Requirement – Test	Frequency range	Verdict
Radiated disturbance in the frequency range 30 MHz to 300 MHz	30 MHz to 300 MHz	P
Radiated disturbances in the frequency range 9 kHz to 30 MHz	9 kHz to 30 MHz	P
Disturbance voltages in the frequency range 9 kHz to 30 MHz	9 kHz to 30 MHz	P
Insertion Loss	150 kHz to 1605 kHz	N
Harmonic current emissions	0 kHz – 2 kHz	P
Voltage changes, voltage fluctuations and flicker	50 Hz	P
Immunity		
Requirement - Test	Ref standard	Verdict
Electrostatic discharges	EN 61000-4-2	P
Radio-frequency electromagnetic fields	EN 61000-4-3	P
Fast transients – Signal and control lines	EN 61000-4-4	N
Fast transients – I/O DC power ports	EN 61000-4-4	N
Fast transients – I/O AC power ports	EN 61000-4-4	P
Surges – Input AC power ports	EN 61000-4-5	P
Injected currents – Signal and control lines	EN 61000-4-6	N
Injected currents – I/O DC power ports	EN 61000-4-6	N
Injected currents – I/O AC power ports	EN 61000-4-6	P
Power frequency magnetic fields	EN 61000-4-8	P
Voltage dips – Input AC power ports	EN 61000-4-11	P
Voltage interruptions – Input AC power ports	EN 61000-4-11	P
GENERAL REMARKS		

3 EQUIPMENT UNDER TEST

3.1 Power supply system utilised

Power supply voltage:	<input checked="" type="checkbox"/>	230V/50 Hz / 1 ϕ	<input type="checkbox"/>	115V/60Hz / 1 ϕ
	<input type="checkbox"/>	400V/50 Hz 3PE	<input type="checkbox"/>	400V/50 Hz 3NPE
	<input type="checkbox"/>	12 VDC	<input type="checkbox"/>	24 VDC

3.2 EuT operation modes

Mode	Description
1	Normal working

3.3 EuT configuration modes

Emission: the EuT was configured to measure its highest possible radiation level. The test modes selected are according to EuT instruction manual.

Immunity: the EuT was configured to have its highest possible susceptibility against tested phenomena. The test modes selected are according to EuT instruction manual.

Mode	Description
1	The EUT has been tested connected to the mains

3.4 Input/Output Ports

Port	Name	Type*	Cable Max. >3m	Cable Shielded	Description
0	Enclosure	N/E	—	—	—
1	Mains	AC	<input type="checkbox"/>	<input type="checkbox"/>	Two wires cable

*Note:
 AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
 I/O = Signal/Control Input or Output Port TP = Telecommunication Ports

3.5 Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
—	—	—	—	—
Note: * Use EUT - Equipment Under Test AE - Auxiliary/Associated Equipment (Not Subjected to Test) SIM - Simulator (Not Subjected to Test)				

3.6 Performance level

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance level defined by its manufacturer or the requestor of the test, or agreed between the manufacturer and the purchaser of the product.

Definition related to the performance level:

<input checked="" type="checkbox"/>	based on the used product standard
<input type="checkbox"/>	based on the declaration of the manufacturer, requestor or purchaser

Performance criterion A

During the test, no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.

Representative parameter	Acceptable level of performance
A change of luminous intensity	Checked by visual observation

Performance criterion B

During the test, the luminous intensity may change to any value. After the test, the luminous intensity shall be restored to its initial value within 1 min. Regulating controls need not function during the test, but after the test, the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.

Representative parameter	Acceptable level of performance
A change of luminous intensity	Checked by visual observation

Performance criterion C

During and after the test, any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal, if necessary by temporary interruption of the mains supply and/or operating the regulating control. Additional requirement for lighting equipment incorporating a starting device: After the test, the lighting equipment is switched off. After half an hour, it is switched on again. The lighting equipment shall start and operate as intended.

Representative parameter	Acceptable level of performance
A change of luminous intensity	Checked by visual observation

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

Nemko Spa
Via del Carroccio, 4
20853 Biassono (MB) - Italy

Tests site/benches are in accordance with applicable standard/s, and have been utilized by Nemko Spa testing engineer(s).

4.2 Environmental conditions

Unless different values are declared in the test case, following ambient conditions apply for the tests:

Ambient temperature:	<u>18÷33 °C</u>
Relative Humidity:	<u>30÷60 %</u>
Atmospheric pressure:	<u>980÷1060 hPa</u>

4.3 Test equipment used for the monitoring of the environmental conditions

Equipment	Manufacturer	Model	Serial N°
Thermohygrometer data loggers	Testo	175-H2	20012380/305
Thermohygrometer data loggers	Testo	175-H2	38203337/703
Barometer	MSR	MSR145B	330080

4.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements" and is documented in the Nemko Spa Technical Procedure WML1002. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device. Hereafter the best measurement capability for Nemko Spa laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Disturbance 3m, 10m Chamber	Antenna distance 1m, 3m, 10m (30÷200) MHz	5.0 dB	(1)
	Antenna distance 1m, 3m, 10m (0.2÷6) GHz	5.2 dB	(1)
	Antenna distance 1m, 3m (6÷18) GHz	5.8 dB	(1)
	Antenna distance 1m, 3m (18÷40) GHz	7.2 dB	(1)

Test	Range	Measurement Uncertainty	Notes
Conducted Disturbance	9 kHz ÷ 150 kHz with AMN	3.8 dB	(1)
	150 kHz ÷ 30 MHz with AMN	3.4 dB	(1)
	150 kHz ÷ 30 MHz with AAN	4.6 dB	(1)
	9 kHz ÷ 30 MHz with voltage probe	2.9 dB	(1)
	9 kHz ÷ 30 MHz with current probe	2.9 dB	(1)
Clicks	9 kHz ÷ 150 kHz	3.8 dB	(1)
	150 kHz ÷ 30 MHz	3.4 dB	(1)
Disturbance Power	30 MHz ÷ 300 MHz	4.5 dB	(1)
Frequency	10 Hz ÷ 1 kHz	0.2%	(1)
	1kHz ÷ 40GHz	10-6	(1)
Harmonic Current Emission	50 Hz ÷ 2 kHz	2%	(1)
Voltage Fluctuation Emission	--	2%	(1)
Radiated Immunity 10m, 3m chambers	20 MHz ÷ 6 GHz	3.4 dB	(1)
Radiated Immunity TEM Cell	(0.01÷200) MHz	3.0 dB	(1)
Bulk Current	(1÷200) MHz	3.0 dB	(1)
Conducted RF Immunity	9 kHz ÷ 230 MHz	3.0 dB	(1)
ESD Immunity	Voltage, Current, Rise time, Duration	(2)	(1)
Burst Immunity	Voltage, frequency, burst period and duration, rise time and pulse width	(2)	(1)
Surge Immunity	Voltage, Current, Rise time, Duration	(2)	(1)
Dips Immunity	Amplitude	5%	(1)
	Duration	5%	
Magnetic Field Immunity	50 Hz	2.0dB	(1)
Damped Magnetic Field Immunity	100 kHz, 1 MHz	3 dB ampl. 10% freq.	(1)
Oscillatory Wave Immunity	Voltage, front time, frequency 100 kHz, 1 MHz	(2)	(1)
Low Frequency Immunity	15 Hz ÷ 150 kHz	2.2 dB	(1)
Automotive transients Immunity	Voltage, rise time, duration time Impulses 1, 2a, 2b, 3a, 3b and 4	(2)	(1)
Automotive transients Emission	Amplitude	10%	(1)
	Time	10%	
EMF	Lighting Equipment	26%	(1)
	Other Equipment	20%	

NOTES:

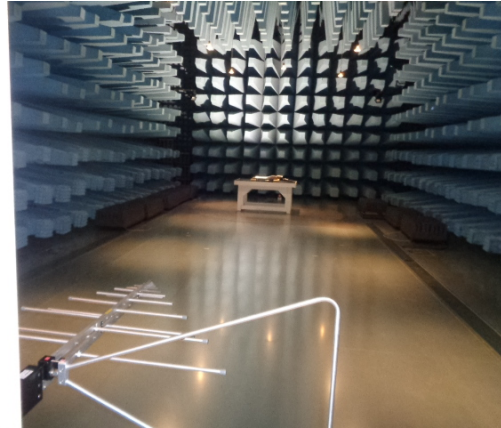
(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which has been derived from the assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95 %;

(2) The instruments used for this immunity test is according to the tolerances requested by the applicable standard

5 TEST CONDITIONS AND RESULTS

5.1 Radiated disturbance in the frequency range 30 MHz to 300 MHz

5.1.1 Photo documentation of the test set-up



5.1.2 Test method

Measurements were made on a semi anechoic chamber. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10 meters with the receiving antenna located at a fixed height (from 1 to 4 meter) in both horizontal and vertical polarities. Final measurements (quasi-peak) were then performed by rotating the EUT 360° and adjusting the receiving antenna height from 1 to 4 meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

5.1.3 Limits

Frequency (MHz)	Limit (dB μ V/m) - Quasi-Peak
30 TO 230	30
230 TO 300	37

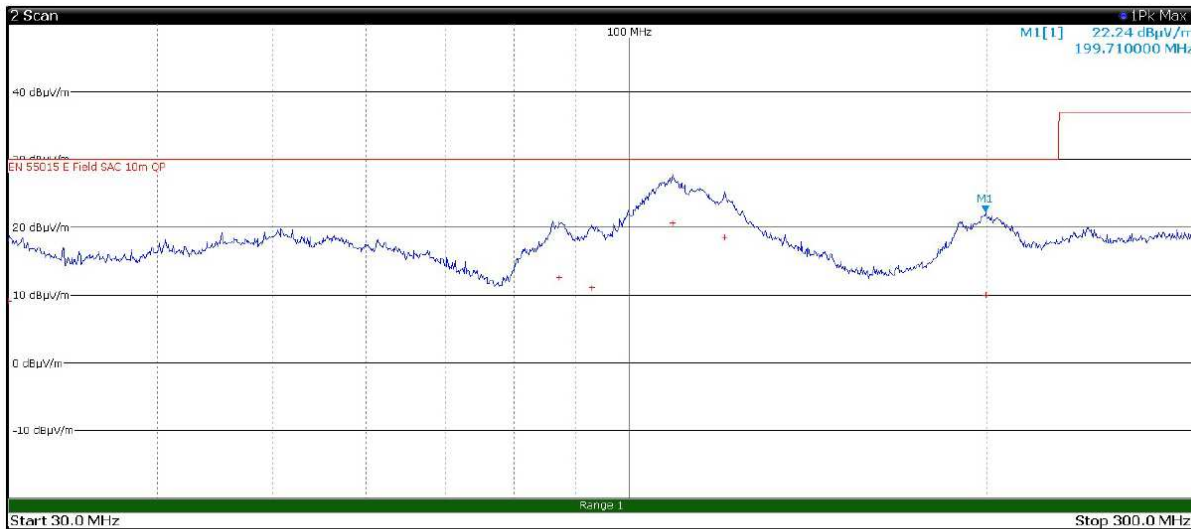
5.1.4 Test result

Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Frequency range:	30 MHz – 300 MHz
Kind of test site:	Semi anechoic chamber
Measurement distance:	10 m
Remarks:	

5.1.5 Test protocol

Antenna polarization: Horizontal
 Operation mode: 1
 Configuration mode: 1
 Remarks: -

Verdict: Pass



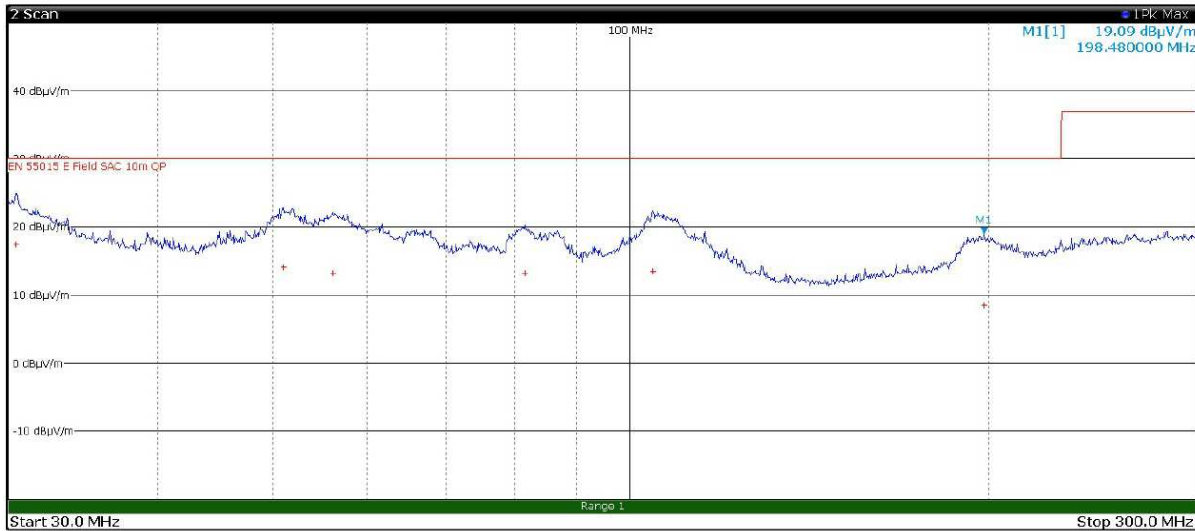
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Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.0000	9.2	30.0	-20.8	QP
87.3600	12.6	30.0	-17.4	QP
93.0000	11.1	30.0	-18.9	QP
108.6900	20.7	30.0	-9.3	QP
120.4200	18.6	30.0	-11.4	QP
199.8000	10.0	30.0	-20.0	QP

Antenna polarization: Vertical
 Operation mode: 1
 Configuration mode: 1
 Remarks: -

Verdict: Pass



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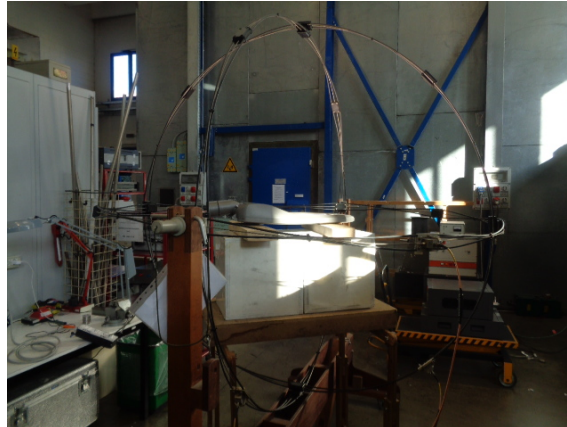
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.4500	17.4	30.0	-12.6	QP
51.0600	14.2	30.0	-15.8	QP
56.2200	13.2	30.0	-16.8	QP
81.5400	13.3	30.0	-16.7	QP
104.4900	13.6	30.0	-16.4	QP
198.4800	8.5	30.0	-21.5	QP

5.1.6 Test equipment used

Equipment	Manufacturer	Model	Serial No.
Trilog Broadband Antenna (25 ÷ 8000 MHz)	Schwarzbeck	VULB 9162	9162-025
EMI receiver (20 Hz ÷ 8 GHz)	R&S	ESU8	100202
Turntable 4,5t	Maturo	TT4.0-5T	2.527
Tilt antenna mast	Maturo	TAM4.0-E	10042
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530
Shielded room	Siemens	10m control room	1947

5.2 Radiated disturbance in the frequency range 9 kHz to 30 MHz

5.2.1 Photo documentation of the test set-up



5.2.2 Test method

The quasi-peak limits of the magnetic component of the radiated disturbance field strength in the frequency range 9 kHz to 30 MHz, measured as a current in 2 m, 3 m or 4 m loop antennas around the lighting equipment.

5.2.3 Limits

Frequency (MHz)	Limit (dB μ A) - Quasi-Peak		
	2 m	3 m	4 m
0.009 TO 0.07	88	81	75
0.07 TO 0.15	88 TO 58*	81 TO 51*	75 TO 45*
0.15 TO 3.0	58 TO 22*	51 TO 15*	45 TO 9*
3.0 TO 30	22	15 TO 16**	9 TO 12**

*The limits decrease linearly with the logarithm of the frequency

**The limits increase linearly with the logarithm of the frequency

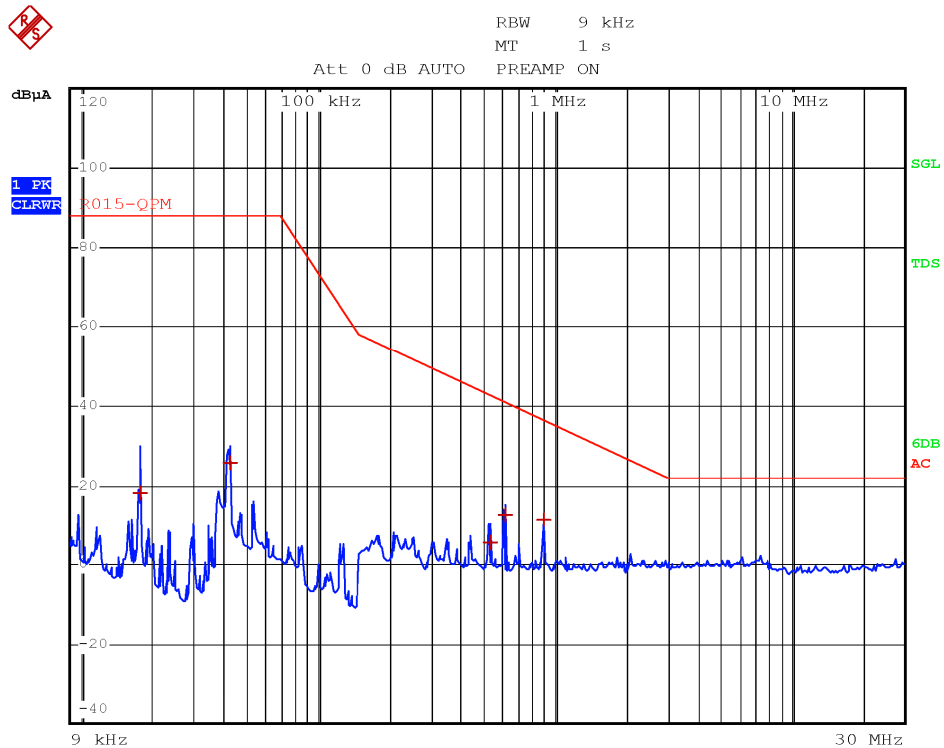
5.2.4 Test result

Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Frequency range:	0.009 MHz – 30 MHz
Kind of test site:	Laboratory
Remarks:	

5.2.5 Test protocol

Antenna polarization: Axis 1
 Operation mode: 1
 Configuration mode: 1
 Remarks: -

Verdict: Pass

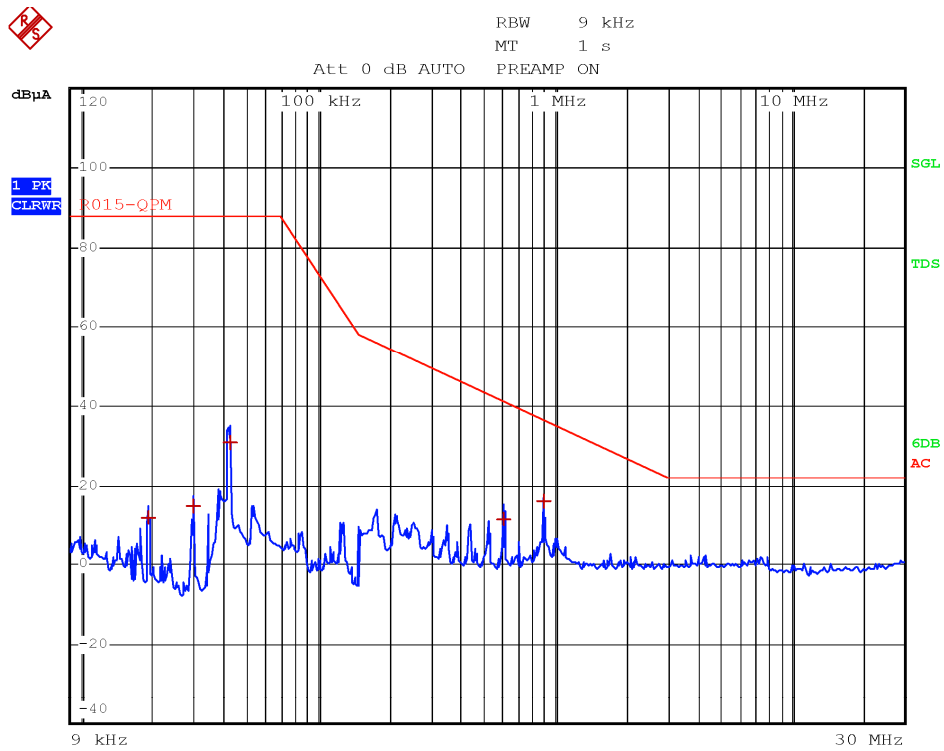


Date: 16.OCT.2019 10:11:18

Frequency (MHz)	Level (dBµA/m)	Limit (dBµA/m)	Margin (dB)	Detector
0.0177	18.3	88.0	-69.7	QP
0.0428	25.9	88.0	-62.1	QP
0.5300	5.6	42.8	-37.3	QP
0.6140	12.7	41.1	-28.3	QP
0.9020	11.4	36.4	-25.1	QP

Antenna polarization: Axis 2
 Operation mode: 1
 Configuration mode: 1
 Remarks: -

Verdict: Pass

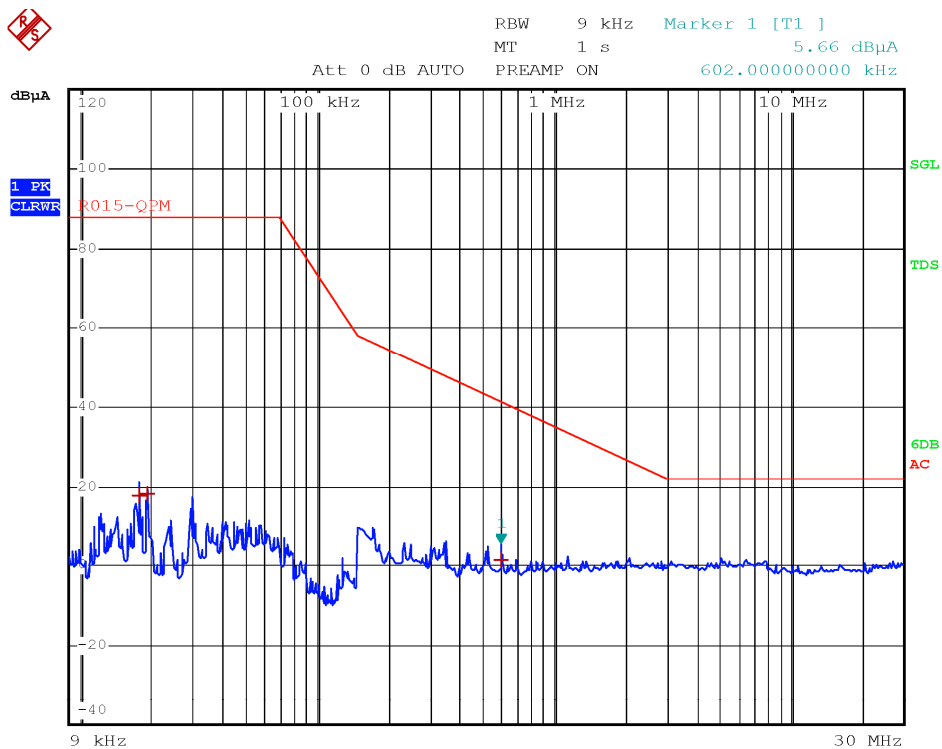


Date: 16.OCT.2019 10:16:56

Frequency (MHz)	Level (dBµA/m)	Limit (dBµA/m)	Margin (dB)	Detector
0.0192	12.0	88.0	-76.0	QP
0.0299	14.8	88.0	-73.2	QP
0.0428	30.7	88.0	-57.3	QP
0.6100	11.4	41.1	-29.7	QP
0.9020	16.1	36.4	-20.4	QP

Antenna polarization: Axis 3
 Operation mode: 1
 Configuration mode: 1
 Remarks: -

Verdict: Pass



Date: 16.OCT.2019 10:30:54

Frequency (MHz)	Level (dBµA/m)	Limit (dBµA/m)	Margin (dB)	Detector
0.0177	18.0	88.0	-70.0	QP
0.0192	18.4	88.0	-69.6	QP
0.6020	1.5	41.3	-39.8	QP

5.2.6 Test equipment used

Equipment	Manufacturer	Model	Serial No.
Triple loop antenna	R&S	HM020	836 950/006
EMI receiver 20 Hz ÷ 8 GHz	R&S	ESU8	100202
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530
Shielded room	Siemens	10m control room	1947

5.3 Terminal disturbance voltages in the frequency range 9 kHz to 30 MHz

5.3.1 Photo documentation of the test set-up



5.3.2 Test method

Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. All power was connected to the system through Line Impedance Stabilization Networks (LISN). Conducted voltage measurements on mains lines were made at the output of the LISN. Conducted voltage on load terminals were made by using a 1500 Ω probe. Measurement at control terminals shall be carried out by means of an impedance stabilization network as described in EN 55022. The ISN shall be bounded to ground.

5.3.3 Limits for mains terminals

Frequency (MHz)	Limit (dB μ V)	
	Quasi-Peak	Average
0.009 TO 0.05	110	-
0.05 TO 0.15	90 to 80*	-
0.15 TO 0.50	66 to 56*	56 to 46*
0.50 TO 5	56	46
5 TO 30	60	50

*The limits decrease linearly with the logarithm of the frequency

5.3.4 Limits for load terminals

Frequency (MHz)	Limit (dB μ V)	
	Quasi-Peak	Average
0.15 TO 0.50	80	70
0.50 TO 30	74	64

5.3.5 Limits for control terminals

Frequency (MHz)	Limit (dB μ V)	
	Quasi-Peak	Average
0.15 TO 0.50	84 to 74*	74 to 64*
0.50 TO 30	74	64

*The limits decrease linearly with the logarithm of the frequency

5.3.6 Test result

Verdict for mains terminals:	<input checked="" type="checkbox"/> P	<input type="checkbox"/> F	<input type="checkbox"/> N
Verdict for load terminals:	<input type="checkbox"/> P	<input type="checkbox"/> F	<input checked="" type="checkbox"/> N
Verdict for control terminals:	<input type="checkbox"/> P	<input type="checkbox"/> F	<input checked="" type="checkbox"/> N
Frequency range:	0.009 MHz – 30 MHz		
Kind of test site:	Shielded room		
Remarks:			

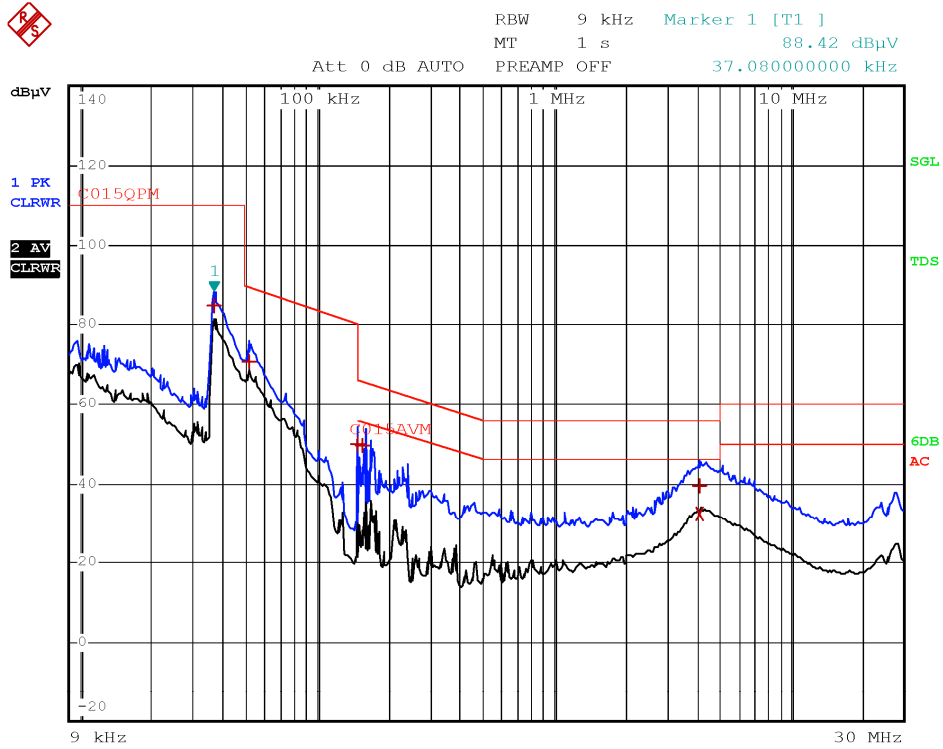
5.3.7 Test equipment used

Equipment	Manufacturer	Model	Serial N°
LISN 9 kHz ÷ 30 MHz	R&S	ESH2-Z5	872 460/041
EMI receiver 20 Hz ÷ 8 GHz	R&S	ESU8	100202
Shielded room	Siemens	Conducted emission test room	1862

5.3.8 Test protocol

Test point: Phase line
 Operation mode: 1
 Configuration mode: 1
 Remarks: -

Verdict: Pass

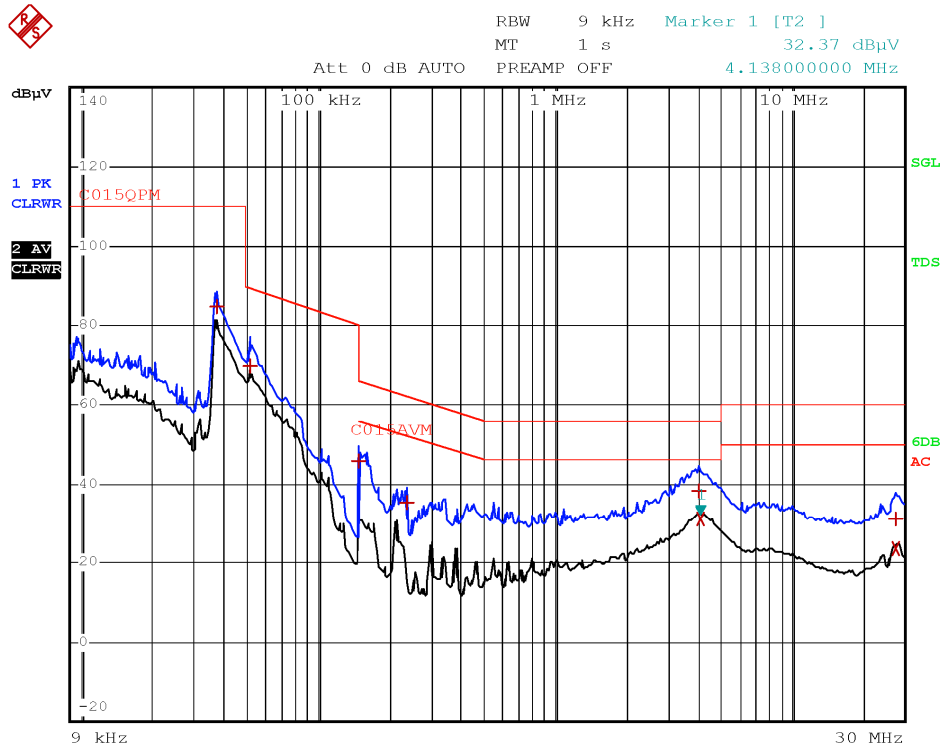


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Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.0371	84.8	110.0	-25.2	QP
0.0522	70.5	89.6	-19.1	QP
0.1500	50.1	80.0	-29.9	QP
0.1580	49.5	65.6	-16.0	QP
4.1540	32.3	46.0	-13.7	Av
4.1580	39.6	56.0	-16.4	QP

Test point: Neutral line
 Operation mode: 1
 Configuration mode: 1
 Remarks: -

Verdict: Pass



Date: 16.OCT.2019 09:08:04

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.0372	84.8	110.0	-25.2	QP
0.0519	69.5	89.7	-20.2	QP
0.1500	45.8	80.0	-34.2	QP
0.2340	35.4	62.3	-26.9	QP
4.0660	38.2	56.0	-17.8	QP
4.1380	31.1	46.0	-14.9	Av
27.5260	31.2	60.0	-28.8	QP
27.8060	23.5	50.0	-26.5	Av

5.4 Harmonics of current

5.4.1 Photo documentation of the test set-up



5.4.2 Test method according to EN 61000-3-2

This test consists on the measurement of harmonics components of the input current which may be produced by equipment having an input current up to and including 16 A per phase, and intended to be connected to public low-voltage distribution systems. The equipment is tested under specified conditions of operation.

5.4.3 Limits for Class C equipment with an active input power > 25 W

For lighting equipment having an active input power greater than 25 W, the harmonic currents shall not exceed the relative limits given in the following table:

Harmonic order (n)	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency %
2	2
3	$30 \lambda^*$
5	10
7	7
9	5
$11 \leq n \leq 39$	3
* λ is the circuit power factor	

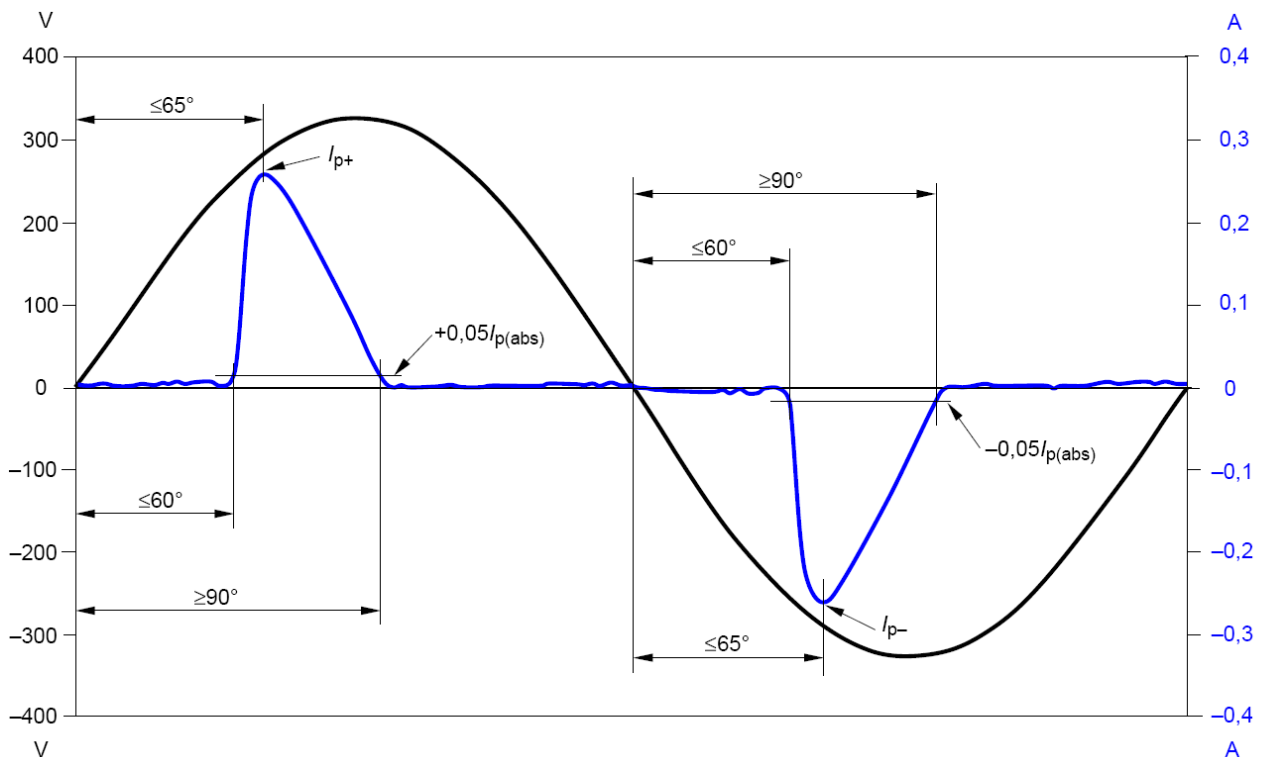
5.4.4 Limits for Class C equipment with an active input power < 25 W

Discharge lighting equipment having an active input power smaller than or equal to 25 W shall comply with one of the following two sets of requirements.

1) The harmonic currents shall not exceed the power-related limits of the following table:

Harmonic order (n)	Maximum permissible harmonic current per watt mA/W
3	3.4
5	1.9
7	1.0
9	0.5
11	0.35
$13 \leq n \leq 39$	$3.85/n$

2) The third harmonic current, expressed as a percentage of the fundamental current, shall not exceed 86 % and the fifth harmonic current shall not exceed 61 %. Also, the waveform of the input current shall be such that it reaches the 5 % current threshold before or at 60° , has its peak value before or at 65° and does not fall below the 5 % current threshold before or at 90° , referenced to any zero crossing of the fundamental supply voltage. The current threshold is 5 % of the highest absolute peak value that occurs in the measurement window, and the phase angle measurements are made on the cycle that includes this absolute peak value.



5.4.5 Test result

Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Frequency range:	0 kHz – 2 kHz
Kind of test site:	Laboratory
Class:	C
Remarks:	

5.4.6 Test protocol

Operation mode: 1
 Configuration mode: 1
 Remarks: -

Verdict: Pass

Measured values			
<i>Fundamental Current</i>			
Line 1:	0.97 A		
<i>Active input Power</i>			
Line 1:	220.272 W *		
<i>Circuit power factor</i>			
Line 1:	0.977 *		

* Absolute value.

Current Test Result

Average and Maximum harmonic current results									
Hn	Average (100% / 150% *)				Maximum (150%)				Harmonic Result
	I _{eff} [%]	of Limit [%]	Limit [%]	Result	I _{eff} [%]	of Limit [%]	Limit [%]	Result	
1	100.000				100.000				
2	0.072	3.623	2.000	n/a	0.102	3.410	3.000	n/a	n/a
3	9.513	32.463	29.305	PASS	9.577	21.788	43.957	PASS	PASS
4	0.082				0.113				
5	5.689	56.886	10.000	PASS	5.715	38.098	15.000	PASS	PASS
6	0.078				0.109				
7	3.686	52.663	7.000	PASS	3.699	35.227	10.500	PASS	PASS
8	0.074				0.109				
9	2.113	42.260	5.000	PASS	2.131	28.414	7.500	PASS	PASS
10	0.070				0.107				
11	1.116	37.191	3.000	PASS	1.132	25.164	4.500	PASS	PASS
12	0.070				0.104				
13	0.430	14.347	3.000	n/a	0.450	10.001	4.500	n/a	n/a
14	0.072				0.103				
15	0.100	3.340	3.000	n/a	0.132	2.938	4.500	n/a	n/a
16	0.074				0.104				

17	0.136	4.547	3.000	n/a	0.165	3.672	4.500	n/a	n/a
18	0.072				0.103				
19	0.193	6.448	3.000	n/a	0.229	5.089	4.500	n/a	n/a
20	0.075				0.106				
21	0.248	5.502	4.500	n/a	0.275	6.113	4.500	n/a	n/a
22	0.077				0.109				
23	0.176	3.920	4.500	n/a	0.202	4.482	4.500	n/a	n/a
24	0.120				0.152				
25	0.190	4.225	4.500	n/a	0.217	4.821	4.500	n/a	n/a
26	0.086				0.119				
27	0.307	6.823	4.500	n/a	0.374	8.317	4.500	n/a	n/a
28	0.080				0.112				
29	0.084	1.865	4.500	n/a	0.117	2.600	4.500	n/a	n/a
30	0.112				0.140				
31	0.155	3.455	4.500	n/a	0.183	4.070	4.500	n/a	n/a
32	0.072				0.103				
33	0.105	2.331	4.500	n/a	0.137	3.048	4.500	n/a	n/a
34	0.070				0.102				
35	0.197	4.374	4.500	n/a	0.220	4.884	4.500	n/a	n/a
36	0.072				0.106				
37	0.076	1.691	4.500	n/a	0.109	2.431	4.500	n/a	n/a
38	0.075				0.108				
39	0.178	3.947	4.500	n/a	0.205	4.556	4.500	n/a	n/a
40	0.077				0.107				

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

* Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.

5.4.7 Test equipment used

Equipment	Manufacturer	Model	Serial N°
Mains analyzer	EMTEST	DPA 500N	P1735202736
Power source	Elettrotest	TPS/M/6000	358 04/18

5.5 Voltage changes, voltage fluctuations and flicker

5.5.1 Photo documentation of the test set-up



5.5.2 Test method according to EN 61000-3-3

This test consists on the measurement of voltage changes, voltage fluctuations and flicker which may be produced by equipment having an input current ≤ 16 A per phase, and intended to be connected to public low-voltage distribution systems. The equipment is tested under specified conditions of operation.

5.5.3 Limits for low voltage AC mains port

The value of Pst shall be not greater than 1.0.

The value of Plt shall be not greater than 0.65.

The value of $d(t)$ during a voltage change shall not exceed 3.3 % for more than 500 ms.

The relative steady-state voltage change, dc shall not exceed 3.3 %.

The maximum relative voltage change d_{max} shall not exceed:

- a) 4 % without additional conditions
- b) 6 % for equipment which is switched manually, or switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption
- c) 7 % for equipment which is attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as mowers, portable tools such as electric drills), or switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

5.5.4 Test result

Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Frequency:	50 Hz
Kind of test site:	Laboratory
Remarks:	

5.5.5 Test protocol

Operation mode: 1
 Configuration mode: 1
 Remarks: -

Verdict: Pass

Flicker Measurements Settings		
Main line:	230V, 50Hz	
Flicker Meter:	230V / 50Hz	
Flicker Impedance:	Zref	
Observation Time:	1 × 10 min	
Measurements performed:	1	

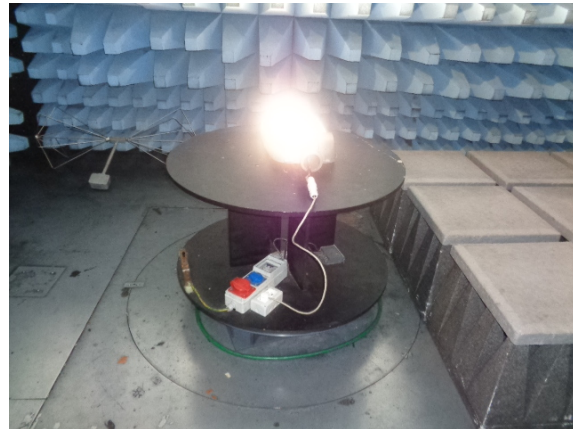
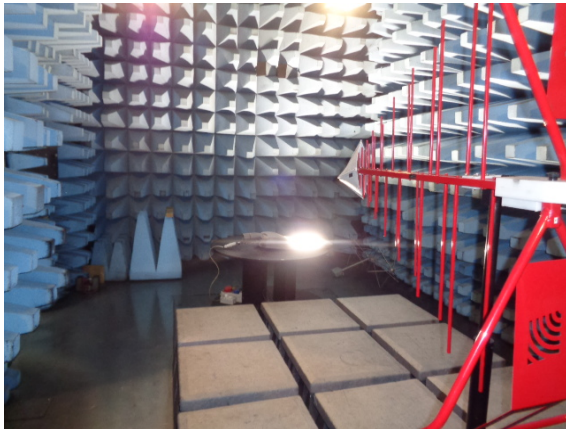
Flicker Measurements					
	P _{it}	Max P _{st}	Max D _c	Max D _{max}	Max T _{max}
Line 1:	0.012	0.028	0	< 0.2	0
Limits:	0.65	1	3.3	4	0.5
Results:	PASS	PASS	PASS	PASS	PASS

5.5.6 Test equipment used

Equipment	Manufacturer	Model	Serial N°
Mains analyzer	EMTEST	DPA 500N	P1735202736
Power source	Elettrotest	TPS/M/6000	358 04/18

5.6 Immunity to radio-frequency electromagnetic fields

5.6.1 Photo documentation of the test set-up



5.6.2 Test method according to EN 61000-4-3

The test allows estimating of the radiated immunity of electrical and electronic equipment to electromagnetic disturbances coming from intended radio-frequency (RF) transmitters in the frequency range 80 MHz to 1000 MHz. The interference is applied on the enclosure of the equipment by using transmitting antennas. Measurements are made in a fully anechoic chamber and the indicated field strength is pre-calibrated prior to placement of the system under test.

5.6.3 Test specification

Frequency range:	80 to 1000 MHz			
Field strength:	3 V/m			
EuT - antenna separation:	2.2 m			
Modulation:	AM with 80 % in depth and 1 kHz sine wave			
Frequency step:	1 % with 3 s dwell time			
Antenna polarisation:	horizontal		vertical	
Antenna position:	front	rear	left	right

5.6.4 Test result

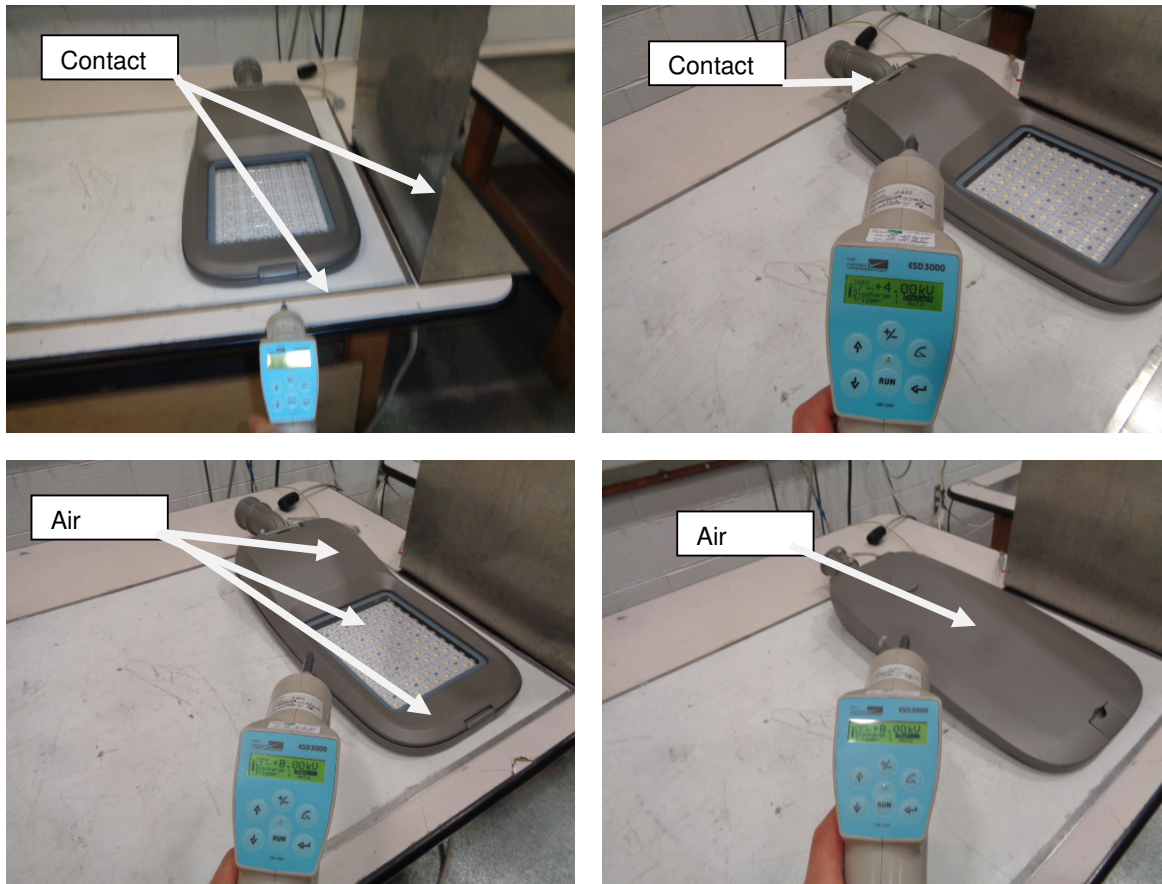
Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Performance Criterion:	A
Operation mode:	1
Configuration mode:	1
Kind of test site:	Anechoic chamber
Remarks:	

5.6.5 Test equipment used

Equipment	Manufacturer	Model	Serial N°
Biconilog antenna (20 ÷ 6000 MHz)	ETS Lindgren	3142E	00213197
RF generator (10 ÷ 20000 MHz)	R&S	SMP22	839 762/107
Broadband amplifier (80 ÷ 1000 MHz)	R&S	BBA100	101163
Power sensor	R&S	NRP18AN	100987
Semi-anechoic chamber	Nemko	3m semi-anechoic chamber	70
Shielded room	Siemens	3m control room	3

5.7 Immunity to electrostatic discharges

5.7.1 Photo documentation of the test set-up



5.7.2 Test method according to EN 61000-4-2

The test is intended to demonstrate the immunity of equipment subjected to static electricity discharges from operators directly and to adjacent objects. The table-top equipment under test is placed on a wooden table, 0.8 m high, standing on the ground reference plane. A horizontal coupling plane (HCP) is placed on the table. The EUT and the cables are isolated from the coupling plane by an insulating support 0.5 mm thick. The floor standing equipment is isolated from the ground reference plane by an insulating support about 0.1 m thick. The vertical coupling plane (VCP) of dimensions 0.5 m x 0.5 m is placed parallel to, and positioned at a distance of 0.1 m from, the EUT. Air discharges are applied to non-metallic parts of the system. Contact discharges are applied to all accessible metallic parts. Discharges are also applied to the Horizontal and Vertical Coupling Planes.

5.7.3 Test specification

Contact discharge voltage:	4kV	
Air discharge voltage:	8kV	
Discharge impedance:	330 Ω / 150 pF	
Time between successive discharges:	≥ 1 s	
Number of discharges:	≥ 10	
Type of direct discharge:	air discharge	contact discharge
Type of indirect discharge:	contact discharge	
Polarity:	positive	negative

5.7.4 Test result

Discharge location	Type of discharge
Horizontal coupling plane (HCP)	Contact
Vertical coupling plane (VCP)	Contact
Accessible conductive parts of enclosure	Contact
Accessible Screws	Contact
Accessible non-conductive parts of enclosure	Air
Connector	Air
Transparent led protection	Air

Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Performance Criterion:	B
Operation mode:	1
Configuration mode:	1
Kind of test site:	Laboratory
Remarks:	

5.7.5 Test equipment used

Equipment	Manufacturer	Model	Serial N°
ESD Test system	EMC Partner	ESD3000	252

5.8 Immunity to injected currents (radio-frequency common mode)

5.8.1 Photo documentation of the test set-up



5.8.2 Test method according to EN 61000-4-6

The test allows estimating of the conducted immunity of electrical and electronic equipment to electromagnetic disturbances coming from intended radio-frequency (RF) transmitters in the frequency range 150 kHz to 80 MHz. The interference is applied on mains supply, signal line and earth connection ports by using coupling decoupling networks or a clamp. Measurements are made on a ground plane. The EUT was located 10cm above the reference ground plane and any associated I/O cables attached to the EUT are located between 30mm and 50mm above the ground plane. The indicated field is pre-calibrated prior to placement of the system under test.

5.8.3 Test specification

Frequency range:	0.15 MHz to 80 MHz
Test voltage:	3 V
Modulation:	AM with 80 % in depth and 1 KHz sine wave
Frequency step:	1 % with 3 s dwell time

5.8.4 Test result

Coupling point	Coupling and decoupling devices	Verdict
AC Mains	M2	P

Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Performance Criterion:	A
Operation mode:	1
Configuration mode:	1
Kind of test site:	Laboratory
Remarks:	

5.8.5 Test equipment used

Equipment	Manufacturer	Model	Serial N°
Coupling/decoupling network	EM Test	CDN M2 / M3	0307-16
RF Conducted immunity test equipment	EM Test	CWS500 CSI	V0710102305
Attenuator 6dB	EM Test	ATT6/75	0206-18
Shielded room	Siemens	Conducted immunity test room	68

5.9 Immunity to fast transients

5.9.1 Photo documentation of the test set-up



5.9.2 Test method according to EN 61000-4-4

The test is intended to demonstrate the immunity of equipment subjected to types of transient disturbances such as those originating from switching transients (interruption of inductive loads, relay contact bounce....). The bursts are applied on the mains supply port by using a coupling decoupling network and on signal and control lines ports by using a capacitive clamp. Measurements are made on a ground plane.

5.9.3 Test specification

AC power port	1 kV	
DC power port	0.5 kV	
Signal and control lines	0.5 kV	
Rise time/hold time	5/50 ns	
Burst frequency:	5.0 kHz	
Coupling duration:	≥ 120 s	
Polarity:	positive	negative

5.9.4 Test result

Coupling point	Level	Coupling devices	Verdict
AC Mains	1 kV	Network	P

Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Performance Criterion:	B
Operation mode:	1
Configuration mode:	1
Kind of test site:	Laboratory
Remarks:	

5.9.5 Test equipment used

Equipment	Manufacturer	Model	Serial N°
Multifunction generator	EMC partner	IMU 3000	F5-S-D-V-1505

5.10 Immunity to surges

5.10.1 Photo documentation of the test set-up



5.10.2 Test method according to EN 61000-4-5

The test allows estimating of the conducted immunity of electrical and electronic equipment to unidirectional surges caused by over voltages from switching and lighting transients. The interference is applied on symmetrical and unsymmetrical modes on mains supply port by using coupling decoupling network. Pulses shall be applied to the a.c. voltage wave as follows; five positive polarity pulses at the 90° phase angle, five negative polarity pulses at the 270° phase angle. Two test levels are given for different types of lighting equipment. Each surge was applied 60 seconds after the previous surge.

5.10.3 Test specification for AC power ports

Characteristics	Test levels		
	Self-ballasted lamps and semi-luminaires	Device	
		Luminaires and independent auxiliaries	
		Input power	
		≤25W	>25W
Wave-shape data	1.2/50 μs	1.2/50 μs	1.2/50 μs
Test level for line to line surge	±0.5 kV	±0.5 kV	±1.0 kV
Test level for line to ground surge	±1.0 kV	±1.0 kV	±2.0 kV

Number of surges:	5 Surges/Phase angle	
Source impedance	2 Ω + 18 μ F (line to line) and 12 Ω + 9 μ F (line to ground)	
Phase angle:	90°	270°
Repetition rate:	60 s	
Rise time:	1.2 μ s	
Time to half value:	50 μ s	
Polarity:	positive	negative

5.10.4 Test result

Coupling point	Level	Coupling network	Verdict
AC power port – line to line	0.5, 1 kV	2 Ω + 18 μ F	P
AC power port – line to ground	0.5, 1 kV and 2 kV	12 Ω + 9 μ F	P

Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Performance Criterion:	C (B for Luminaire for emergency lighting)
Operation mode:	1
Configuration mode:	1
Kind of test site:	Laboratory
Remarks:	

5.10.5 Test equipment used

Equipment	Manufacturer	Model	Serial N°
Multifunction generator	EMC partner	IMU 3000	F5-S-D-V-1505

5.11 Immunity to Power frequency magnetic fields

5.11.1 Photo documentation of the test set-up



5.11.2 Test method according to EN 61000-4-8

This test is intended to demonstrate the immunity of equipment when subjected to power frequency magnetic fields. The test magnetic field is obtained by a current flowing in an induction coil; the application of the test field to the EUT is by the immersion method.

5.11.3 Test specification

Test frequency:	50 Hz		
Continuous field intensity:	3 A/m		
Duration (Continuous field):	60 s each Axis		
Axis:	x-axis	y-axis	z-axis

5.11.4 Test result

Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Performance Criterion:	A
Operation mode:	1
Configuration mode:	1
Kind of test site:	Helmholtz coils
Remarks:	

5.11.5 Test equipment used

Equipment	Manufacturer	Model	Serial N°
Field strength meter Vac	Holaday	HI-3604	86265
Transformer 240/24 V 2.5 KVA	Eletras	220/24	2.459
Variac	RS	WCV 8E-1	3/122017
Helmholtz induction coil antenna	G.I.E.	IEC 1000-4-8	111962

5.12 Immunity to voltage dips and short interruptions

5.12.1 Photo documentation of the test set-up



5.12.2 Test method according to EN 61000-4-11

The test allows estimating of the conducted immunity of electrical and electronic equipment connected to low-voltage power supply networks for voltage dips and short interruptions. Testing is performed with the product connected directly to a generator capable of simulating the voltage drops and interrupts as described.

5.12.3 Test specification

Nominal Mains Voltage	230 Vac	
Rated frequency	50 Hz	
Number of voltage dips and interruptions	3	
Sync Angle	0°	
Test voltage level	70 %	0 %
Number of periods	10	0.5

5.12.4 Test result

	Level of reduction	Residual voltage	Duration	Performance criterion	Verdict
1	100%	0%	0.5 period	C	P
2	30%	70%	10 periods	B	P

Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Performance Criterion:	B and C
Operation mode:	1
Configuration mode:	1
Kind of test site:	Laboratory
Remarks:	

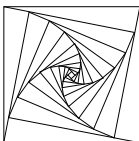
5.12.5 Test equipment used

Equipment	Manufacturer	Model	Serial N°
Multifunction generator	EMC partner	IMU 3000	F5-S-D-V-1505

6 EUT PHOTOS



End of report

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	Document: VR1967902REMS.docx	Issue: 0

Masate, February 10th, 2020

COVER PAGE

Elaborated for: RELCO Srl

Address: Via delle Azalee 6/A
20090 BUCCINASCO (MI)

Test begun on: February 10th, 2020

At presence of: Mr. Paolo PRESTIFILIPPO RELCO Srl

Performed by: Ing. Andrea PECCHIO

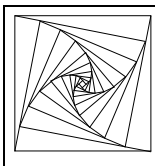
Elaborated by: Ing. Andrea PECCHIO

Approved by: Ing. Ermes TARALLO

Test performed in: Centrotecnica S.r.l.
Via F. Confalonieri, 23
20060
Masate (MI)

This document is distributed to:
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Notes

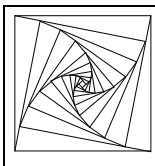
EUT = Equipment Under Test

TP = Test Point

Date format = (dd/mm/yyyy)

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2. HARDWARE DESCRIPTION

2.1 ITEMS

The object to be tested in these tests is described in the following:

LED SEMPIONE
Part N.: 36200

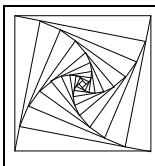
Overall dimensions of unit:

Length: 613 mm
Width: 299 mm
Weight: 6 kg

Centrotecnica Code: P33119

The sampling has been performed at Client responsibility

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2.2 FIXTURES

To interface the unit to be tested to the test machine, the following fixtures have been used:

Fixture N.: LAB157 - 1001

Type: Plate
Material: Aluminium
Dimensions:
Length: 335 mm
Width: 600 mm
Height: 20 mm
Mass: 11 kg
Mounting: M8 screws

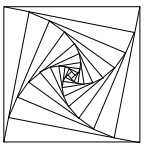
Fixture N.: LAC68 - 1006

Type: Fixture per lampada
Material: Inox
Dimensions:
Height: 130 mm
Mass: 2.8 kg
Mounting: 4 M8 screws

Fixture N.: LAB102 - 1000

Type: Expander
Material: Magnesium
Dimensions:
Length: 600 mm
Width: 600 mm
Height: 192 mm
Mass: 50 kg
Mounting: 20 M8 screws

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3. TEST METHOD

According to Customer's Test Plan, the following specifications and test sequence have been applied:

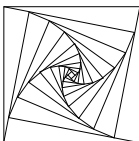
3.1 STANDARD

These tests are aimed to impose to the item the following test levels:

REFERENCE STANDARD:	IEC 60598-1:2014
TEST LEVEL:	§4.20 ROUGH SERVICE LUMINAIRE
REFERENCE PROCEDURE	IEC 60068-2-6:2007
PROFILE:	S) SINE VIBRATION TEST

Reference laboratory test procedure: PT0901 issue 6

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3.1.1 TESTS PROFILES

S) SINE VIBRATION TEST

Test Parameters

Signal Plot Points: 256	Control Strategy: Single Channel
Linear average number: 30	Initial drive (V): 0.005
Drive limit (V Pk): 2	Sweep Type: Logarithmic
Measurement Strategy: Filter	Filter Type: Proportional Filter
Bandwidth (%): 25	Abort sensitivity: 0.44
Compression Rate: Fast	Ramp Rate: Slow
Sweeping Rate: 1 Oct/Min	

Testing Profile

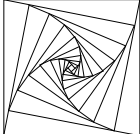
Frequency	Acceleration	Velocity	Displacement	Segment Type	High Abort	High Alarm	Low Alarm	Low Abort
10 Hz	0.140899 g	0.0219911 m/s	0.7 mm		6 dB	3 dB	-3 dB	-6 dB
				Const. Ampl.				
55 Hz	4.26219 g	0.120951 m/s	0.7 mm		6 dB	3 dB	-3 dB	-6 dB

Physical Quantity	Max. Profile Value
Acceleration (g)	4.2622 (Peak)
Pk Velocity (m/s)	0.12095
Peak-Peak Displacement (mm)	0.7

Run Schedule

12.19793 Sweeps; Start: 10Hz; Range: 10Hz to 55Hz; Level: 0.00dB;
Duration: 00:30:00 Sweeping Rate: 1 Oct/Min
Save signals to PC (Save results to PC)
My Report (Create Report(My Report))

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3.2 TEST SEQUENCE

Test Profile	Unit Axis*
S) SINE VIBRATION TEST	Z

* See following paragraph 4.4 for the reference test axes.

4. TEST DESCRIPTION

4.1 HARDWARE PREPARATION

For the test along vertical axis "pole" fixture LAC068-1006 has been used to keep the EUT in the natural mounting position.
EUT has been mounted on fixture LAC068-1006 and fixed with the two M8 screws present on the mounting body.
Fixture LAC068-1006 has then been fixed on the plate LAB 157 for the the test on the V864 slip table for the test in the longitudinal X axis and transversal Y axis .

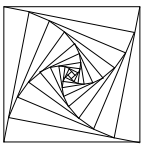
Environmental Condition measured at the beginning of Test:

Temperature: 19.7 °C +/- 1°C
Relative Humidity : 36.2 % +/- 5%

4.2 ACCELEROMETERS MOUNTING

The accelerometers property of Centrotecnica have been mounted by way of dedicated biadhesive labels or cyanoacrylic glue or screw.
Accelerometers mounting procedure is in agreement with UNI ISO 5348 "Montaggio meccanico degli accelerometri" in the last edition.

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4.3 GENERAL CONTROL AND MEASUREMENT STRATEGIES. CHANNELS AND TEST POINTS (T.P.) DESCRIPTION.

One control accelerometer has been used to keep control of the test level imposed by the shaker.

One mono-axial accelerometer has been used to acquire the EUT response during the tests.

Pictures at para 4.4 and following table make clear the disposition of the Tests Points.

TEST POINT	POSITION	USED TO
TP1	Fixture Plate LAB1571001	Control the vibration level
TP2	EUT CoG	Measure the vibration level

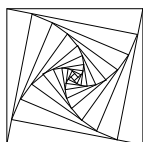
The following table summarizes the measure channels features (see following paragraph 7 for the features of used accelerometers):

Input Channel Table vibration Controller setup

Location ID	Measurement Quantity	Unit	Sensitivity	Input Mode	High-Pass Filter Fc	Sensor S/N
TP1-CONTR-FIX	Acceleration	g	92.4767095 (mV/g)	IEPE	2.00 Hz	CPA 75
TP2-EUT-MEAS	Acceleration	g	10.46369555 (mV/g)	IEPE	2.00 Hz	CPA 151

Location ID	Channel Type	Max Sensor Range (V)	Input Range	Control Weighting	Integration / Differentiation
TP1-CONTR-FIX	Control	20.0000 (V)	Auto	N/A	No Integration
TP2-EUT-MEAS	Monitor	20.0000 (V)	Auto	N/A	No Integration

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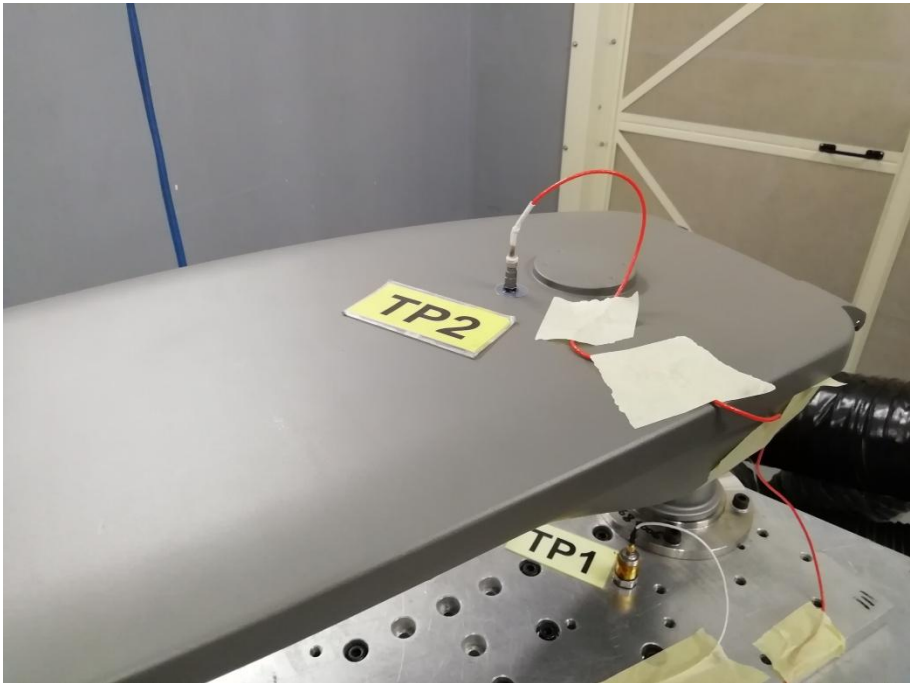
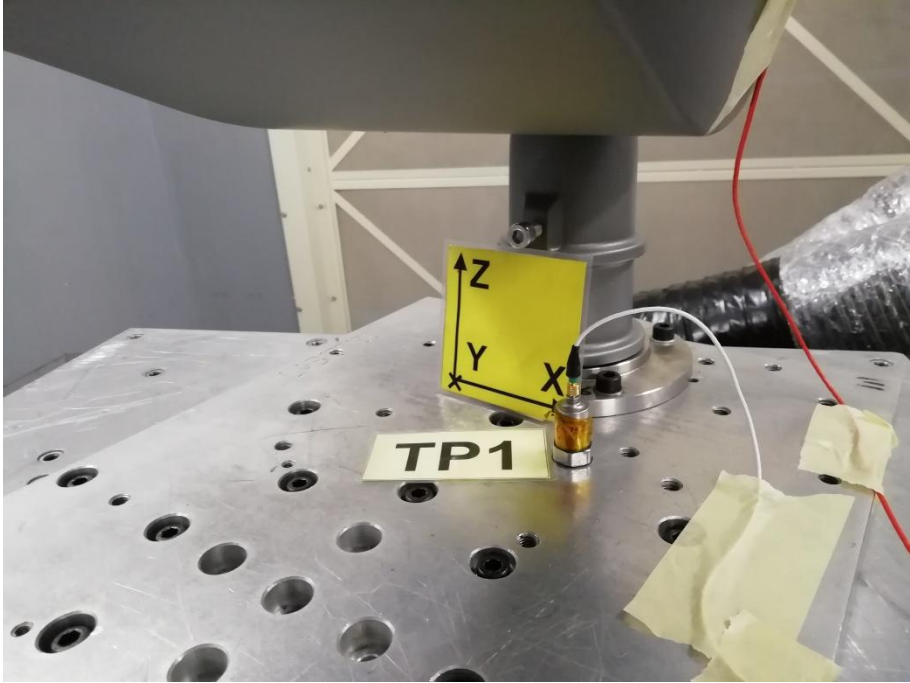
4.4 TEST PICTURES

4.4.1 Z AXIS SETUP



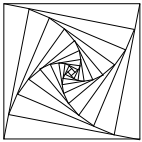
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4.4.2 ACCELEROMETERS DETAIL



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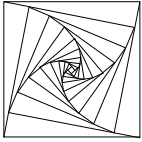
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4.4.3 EUT AT TEST END



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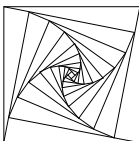
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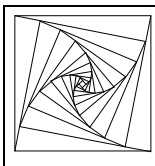
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5. TEST HISTORY

DATE	HOUR	RUN	AXIS	TEST PROFILE	NOTE
Feb. 10 th '20	08.50				Customer with EUT arrival
					LDS 864 shaker rotating in vertical position
					Expander n.102 mounting on armature
					Fixture plate n. LAB 157 mounting on expander
					Fixture "pole" n. LAC 068-1006 mounting on LAB157 plate
					LAB 157 mounting on V824LS slip table
					EUT initial visual check
					EUT mounting on LAC 068-1006
					Accelerometers setting in TP1 and TP2
					Controller programming
	10.02	1	Z	S	Start of Sine vibration test
	10.32				End of Sine vibration test
					EUT visual check
					Accelerometers removing
					EUT removing
					EUT final visual check: no loosened parts found
					Fixtures removing
	12.20				End of test

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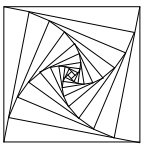
6. CONCLUSION

After having been subjected to vibration tests as described in this document a visual inspection, performed as per VD19679021REMS_CONFERMA TECNICA dated 04/02/2020 doesn't show any mechanical damage or loosened parts on item

*LED SEMPIONE
Part N.: 36200*

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7. USED FACILITIES AND CALIBRATION

Shaker

LDS Mod. V864-640/440 DPA20K S/N 14936

Control Instrumentation

CRYSTAL Mod. SPIDER 80X 8 CH S/N 2600960

LAST CALIBRATION : 04/03/2019
CAL. DUE DATE : 04/03/2020
CALIBRATED BY : CENTROTECNICA
CERTIFICATE N. : CT-RR-2019-002

Torque wrench

BETA Mod. 606/6 S/N 18602766

LAST CALIBRATION : 20/08/2019
CAL. DUE DATE : 20/08/2022
CALIBRATED BY : LAT 172
CERTIFICATE N. : C0119/19

Accelerometer

LABEL	MADE BY	MODEL	SERIAL NUM.	CALIB. DATE	CAL. DUE DATE	CERTIF. NUM.	SENSITIVITY	MASS
CPA151	PCB	353B18	LW211176	27/12/2019	27/12/2020	35830	1.067 mV/(m/s ²)	
CPA075	Wilcoxon Reseach	726T	5637	27/12/2019	27/12/2020	35838	9.43 mV/(m/s ²)	34 g

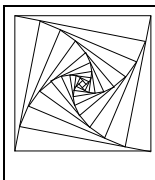
All accelerometers are calibrated by: **CENTROTECNICA S.r.l.**
CENTRO LAT N. 111

Thermoigrometer

PCE Mod. PCE - THB 40 S/N R061887

LAST CALIBRATION : 18/07/2018
CAL. DUE DATE : 18/07/2021
CALIBRATED BY : lat 123
CERTIFICATE N. : 18-SU-0865 18-SU-0869

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Vibration amplitude uncertainty

The measurement uncertainties stated in this document have been determined according to the ISO/IEC Guide 98 and to EA-4/02.

They have been estimated as expanded uncertainty obtained multiplying in the standard uncertainty by the coverage factor $k=2$ corresponding to a confidence level of about 95%.

The calculated uncertainty for acceleration is 10%.

Cross axis motion

The cross axis motion of the shaker has been measured and comply with test requirement of IEC 60068-2-6: 2007 par 4.1.2.1, IEC 60068-2-64:2008 par 4.3 and IEC 60068-2-27:2008 hereafter specified:

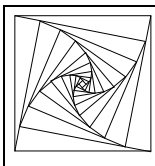
sine vibration – not exceed 50% up to 500Hz and 100% up to 2000 Hz

random vibration – not exceed -3db up to 500 Hz and 0 db up to 2000 Hz
rms value not exceed 50%

shock test - not exceed 30%

In case of large items the above values can be verified during test.

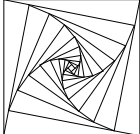
The results described in the this test report attain exclusively to the items described in 2.1

	CENTROTECNICA SRL Via F. Confalonieri, 23 20060 Masate (MI) Tel. +39 02 55305888 E-mail info@ctecnica.it www.ctecnica.it VAT IT04703330961	LED SEMPIONE VIBRATION TESTS REPORT Elaborated for: RELCO SRL	
Document: VR1967902REMS.docx	Issue: 0	Page. 17 of 21	

ANNEXES

1.1 - Z AXIS - SINE VIBRATION TEST

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ANNEX 1.1

LED SEMPIONE

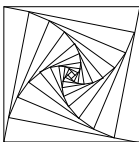
AXIS : Z

SINE VIBRATION TEST

(2 PLOTS)

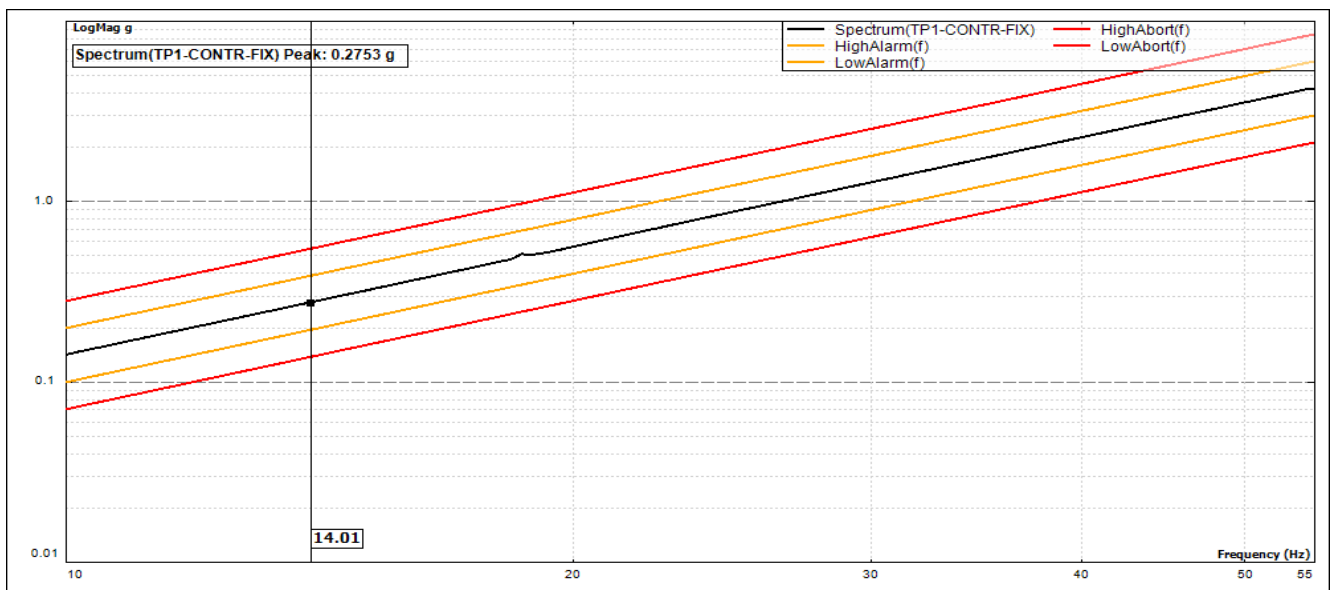
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	Document: VR1967902REMS.docx	Issue: 0

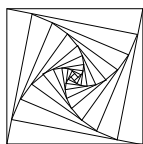
Report time: Feb-10-2020, 10:32:42 **Data measured at:** Feb-10-2020, 10:32:42
Test name: Z-SINE-TEST **Test type:** VCS (Swept Sine)
Test status: Test Running **Run folder:** 1.1_SINE_Z_1 Feb 10, 2020 10-02-16

(Spectrum(TP1-CONTR-FIX),HighAbort(f),HighAlarm(f),LowAbort(f), etc.[5])



Level: 0.0 dB **Control Pk:** 0.275 g **Target Pk:** 0.277 g
Remaining: 00:00:00 **Total elapsed:** 00:30:07 **Full level elapsed:** 00:30:00
Control Strategy: Single Channel **Sweeping Rate:** 1 Oct/Min **Sweep Number:** 13
Current Frequency: 14.01 Hz **Signal Plot Points:** 256 **Sweep Type:** Logarithmic
Run Start Time: Feb-10-2020, 10:02:33

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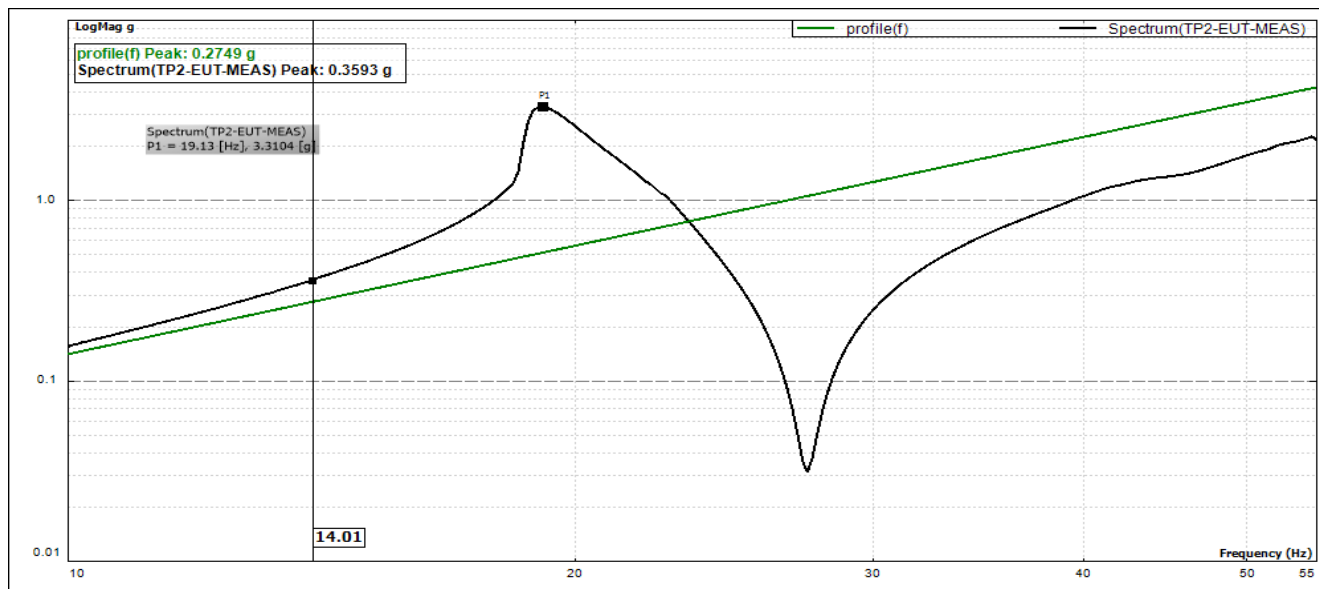
LED SEMPIONE
VIBRATION TESTS REPORT
Elaborated for: RELCO SRL

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Issue: 0

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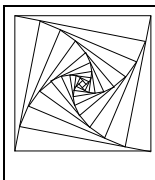
(profile(f),Spectrum(TP2-EUT-MEAS))



Level: 0.0 dB **Control Pk:** 0.275 g **Target Pk:** 0.277 g
Remaining: 00:00:00 **Total elapsed:** 00:30:07 **Full level elapsed:** 00:30:00
Control Strategy: Single Channel **Sweeping Rate:** 1 Oct/Min **Sweep Number:** 13
Current Frequency: 14.01 Hz **Signal Plot Points:** 256 **Sweep Type:** Logarithmic
Run Start Time: Feb-10-2020, 10:02:33

The results described in the this test report attain exclusively to the items described in 2.1

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REPORT END

The results described in the this test report attain exclusively to the items described in 2.1

LUXEON 3030 HE Plus

Industry leading efficacy, 3V 3030 package

LUXEON 3030 HE Plus is a superior, high efficacy, mid power package built on the legacy of the LUXEON 3030 product line. It serves as a go-to solution for various indoor and outdoor fixture applications that require top notch lm/W performance and long lifetime. LUXEON 3030 HE Plus adopts quadrant bin structure within 3 SDCM, which enables 2 SDCM by kitting.



FEATURES AND BENEFITS

Superior high efficacy at rated current enables outstanding lm/W at system level

Reliable package design from a proven product line affirms application long lifetime

Quadrant bin structure within 3 SDCM enables 2 SDCM by kitting

Industry standard package allows drop-in replacement for existing 3030 packages

PRIMARY APPLICATIONS

Panel / Soft Lights

Spotlights

Linear

Troffers

Downlights

Wall Pack

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General Product Information

Product Test Conditions

LUXEON 3030 HE Plus LEDs are tested and binned with a 20ms monopulse of 65mA at a junction temperature, T_j , of 25°C.

Part Number Nomenclature

Part numbers for LUXEON 3030 HE Plus follow the convention below:

L 1 3 0 – **A A B B** H A 3 0 0 0 0 1

Where:

- A A** – designates nominal CCT (27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K, 57=5700K, 65=6500K)
- B B** – designates minimum CRI (80=80CRI)

Therefore, the following part number is used for a LUXEON 3030 HE Plus, 3000K 80CRI LED:

L 1 3 0 – **3 0 8 0** H A 3 0 0 0 0 1

Lumen Maintenance

Please contact your local Sales Representative or Lumileds Technical Solutions Manager for more information about the long-term performance of this product.

Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON 3030 HE Plus is compliant to the European Union directives on the restriction of hazardous substances in electronic equipment, namely the RoHS Directive 2011/65/EU and REACH Regulation (EC) 1907/2006. Lumileds LLC will not intentionally add the following restricted materials to its products: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

Performance Characteristics

Product Selection Guide

Table 1. Product performance of LUXEON 3030 HE Plus at 65mA, $T_j = 25^\circ\text{C}$.

NOMINAL CCT ^[1]	MINIMUM CRI ^[1, 2]	LUMINOUS FLUX ^[1, 2] (lm)		TYPICAL LUMINOUS EFFICACY (lm/W)	PART NUMBER
		MINIMUM	TYPICAL		
		65mA			
2700K	80	30.0	33.5	190	L130-2780HA3000001
3000K	80	32.0	35.0	199	L130-3080HA3000001
3500K	80	33.0	36.0	204	L130-3580HA3000001
4000K	80	34.0	37.0	210	L130-4080HA3000001
5000K	80	34.0	37.0	210	L130-5080HA3000001
5700K	80	33.5	36.5	207	L130-5780HA3000001
6500K	80	33.0	36.0	204	L130-6580HA3000001

Notes for Table 1:

- Luminous flux, CCT, and CRI are specified at $T_j=25^\circ\text{C}$. Typical CRI is approximately 2 points higher than the minimum CRI specified, but this is not guaranteed.
- Lumileds maintains a tolerance of ± 2 on CRI and $\pm 7.5\%$ on luminous flux measurements.

Optical Characteristics

Table 2. Optical characteristics for LUXEON 3030 HE Plus at 65mA, $T_j = 25^\circ\text{C}$.

PART NUMBER	TYPICAL TOTAL INCLUDED ANGLE ^[1]	TYPICAL VIEWING ANGLE ^[2]
L130-xxxxHA3000001	160°	110°

Notes for Table 2:

- Total angle at which 90% of total luminous flux is captured.
- Viewing angle is the off axis angle from the LED centerline where the luminous intensity is $\frac{1}{2}$ of the peak value.

Electrical and Thermal Characteristics

Table 3. Electrical and thermal characteristics for LUXEON 3030 HE Plus at 65mA, $T_j = 25^\circ\text{C}$.

PART NUMBER	FORWARD VOLTAGE ^[1] (V_f)			TYPICAL TEMPERATURE COEFFICIENT OF FORWARD VOLTAGE ^[2] (mV/°C)	TYPICAL THERMAL RESISTANCE—JUNCTION TO SOLDER PAD (°C/W)
	MINIMUM	TYPICAL	MAXIMUM		
L130-xxxxHA3000001	2.62	2.71	2.86	-1.0 to -2.0	10.0

Notes for Table 3:

- Lumileds maintains a tolerance of $\pm 0.1\text{V}$ on forward voltage measurements.
- Measured between 25°C and 85°C .

Absolute Maximum Ratings

Table 4. Absolute maximum ratings for LUXEON 3030 HE Plus.

PARAMETER	MAXIMUM PERFORMANCE
DC Forward Current ^[1]	480mA
Peak Pulsed Forward Current ^[2]	700mA
ESD Sensitivity (ANSI/ESDA/JEDEC JS-001-2012)	Class 2
LED Junction Temperature (DC & Pulse)	125°C
Operating Case Temperature	-40°C to 105°C
LED Storage Temperature	-40°C to 105°C
Soldering Temperature	JEDEC 020D 260°C
Allowable Reflow Cycles	3
Reverse Voltage ($V_{reverse}$) ^[3]	-5V

Notes for Table 4:

1. Residual periodic variations due to power conversion from alternating current (AC) to direct current (DC), also called "ripple", are acceptable if the following conditions are met:
 - The frequency of the ripple current is 100Hz or higher
 - The average current for each cycle does not exceed the maximum allowable DC forward current
 - The maximum amplitude of the ripple does not exceed 25% of the maximum allowable DC forward current
2. Pulse operation with the maximum peak pulse forward current is acceptable if the pulse on time is $\leq 5ms$ per cycle and the duty cycle is $\leq 50\%$
3. At a maximum reverse current of 10 μA . LUXEON 3030 2D LEDs are not designed to be driven in reverse bias.

Characteristics Curves

Spectral Power Distribution Characteristics

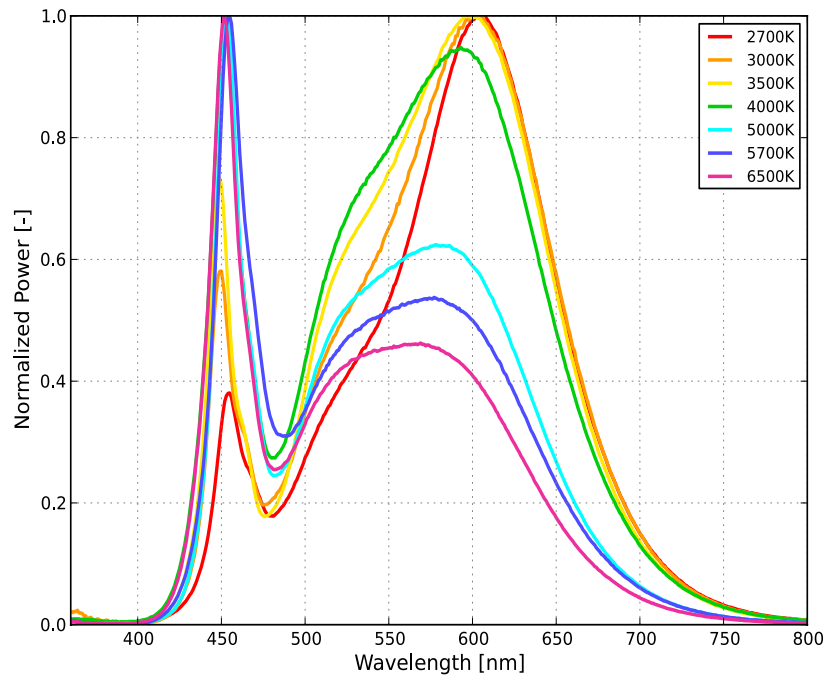


Figure 1. Typical normalized power vs. wavelength for L130-xxxxHA3000001 at 65mA, $T_j=25^{\circ}\text{C}$.

Light Output Characteristics

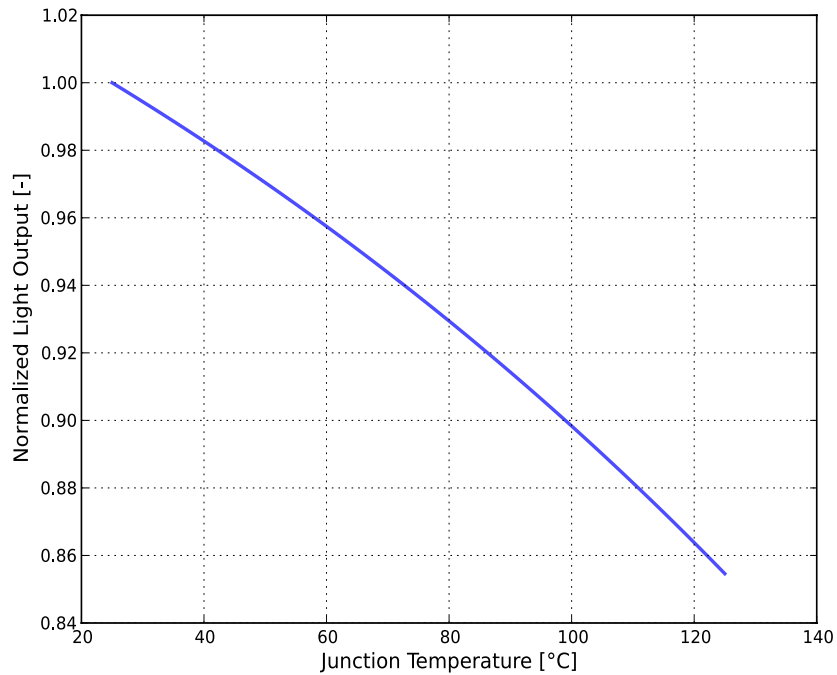
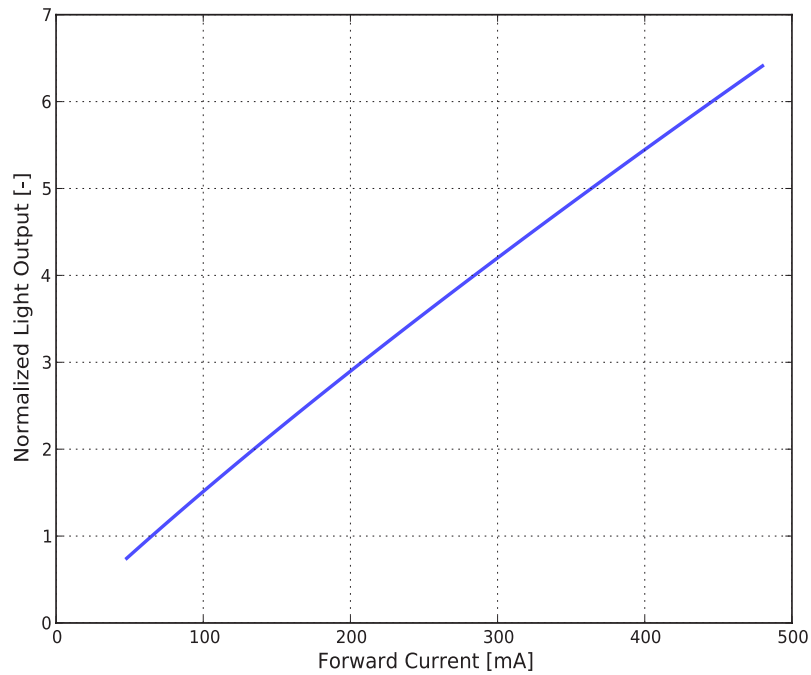


Figure 2. Typical normalized light output vs. junction temperature for L130-xxxxHA3000001 at 65mA.



ESTIMATED TYPICAL RATIO COMPARED TO FLUX AT RATED CONDITION 65mA, $T_j=25^{\circ}\text{C}$.

60mA	65mA	120mA	150mA	480mA
93%	100%	180%	222%	641%

Figure 3. Typical normalized light output vs. forward current for L130-xxxxHA3000001 at $T_j=25^{\circ}\text{C}$.

Forward Current Characteristics

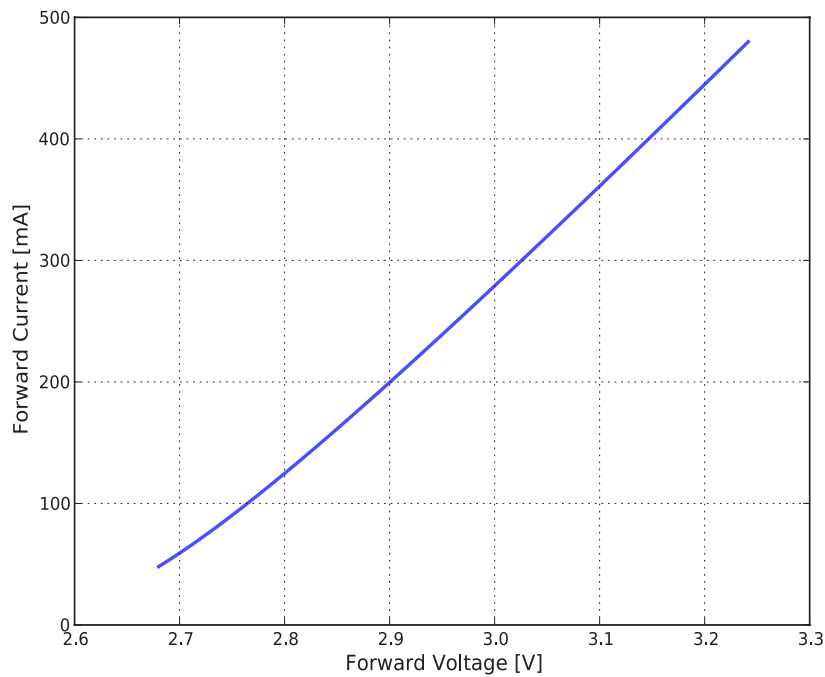


Figure 4. Typical forward current vs. forward voltage for L130-xxxxHA3000001 at $T_j=25^{\circ}\text{C}$.

Radiation Pattern Characteristics

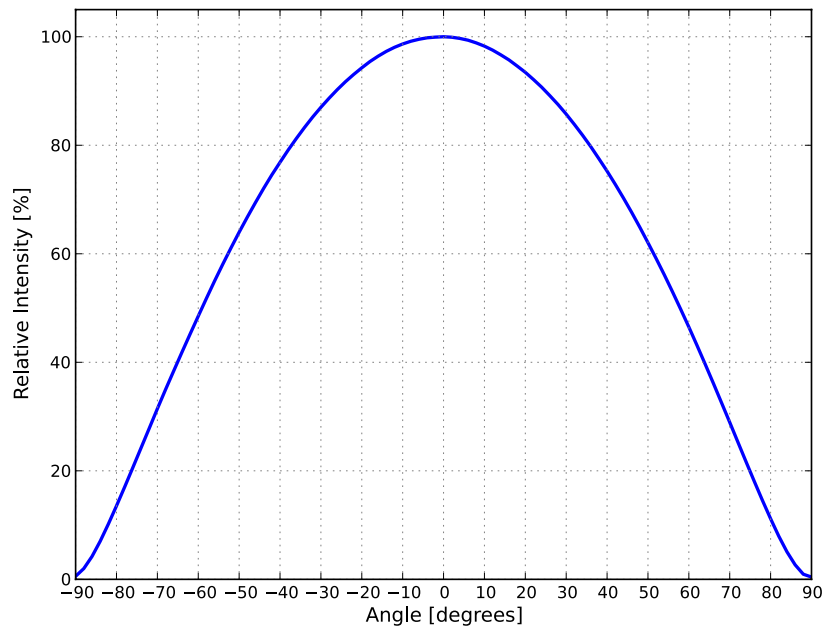


Figure 5. Typical radiation pattern for L130-xxxxHA3000001 at 65mA, $T_j=25^\circ\text{C}$.

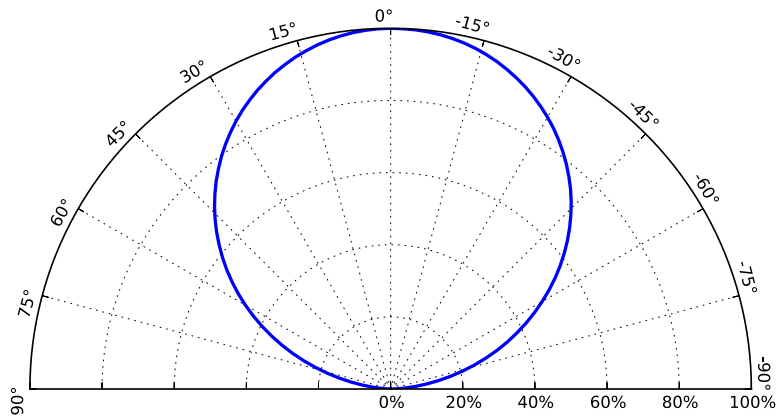


Figure 6. Typical polar radiation pattern for L130-xxxxHA3000001 at 65mA, $T_j=25^\circ\text{C}$.

Product Bin and Labeling Definitions

Decoding Product Bin Labeling

In the manufacturing of semiconductor products, there are variations in performance around the average values given in the technical datasheet. For this reason, Lumileds bins LED components for luminous flux or radiometric power, color point, peak or dominant wavelength and forward voltage.

LUXEON 3030 HE Plus LEDs are labeled using a 4- or 5-digit alphanumeric CAT code following the format below.

A B C D or A x B C D

- A** – designates luminous flux bin (example: F=35.5 to 37.0 lm, G=37.0 to 38.5 lm)
- x** – designates Lumileds internal code
- B C** – designates color bin (example: 5E, 5H, 5F, 5G for 4000K parts)
- D** – designates forward voltage bin (example: B=2.62 to 2.70V, C=2.70 to 2.78V)

Therefore, a LUXEON 3030 HE Plus with a lumen range of 35.5 to 37.0 lm, color bin of 5E, and a forward voltage range of 2.70 to 2.78V has the following CAT code:

F 5 E C

Luminous Flux Bins

Table 5 lists the standard luminous flux bins for LUXEON 3030 HE Plus emitters. Although several bins are outlined, product availability in a particular bin varies by production run and by product performance. Not all bins are available in all CCTs.

Table 5. Luminous flux bin definitions for LUXEON 3030 HE Plus at 65mA, $T_j=25^\circ\text{C}$.

BIN	LUMINOUS FLUX ⁽¹⁾ (lm)	
	MINIMUM	MAXIMUM
A	28.0	29.5
B	29.5	31.0
C	31.0	32.5
D	32.5	34.0
E	34.0	35.5
F	35.5	37.0
G	37.0	38.5
H	38.5	40.0
J	40.0	41.5

Notes for Table 5:

1. Lumileds maintains a tolerance of $\pm 7.5\%$ on luminous flux measurements.

Color Bin Definitions

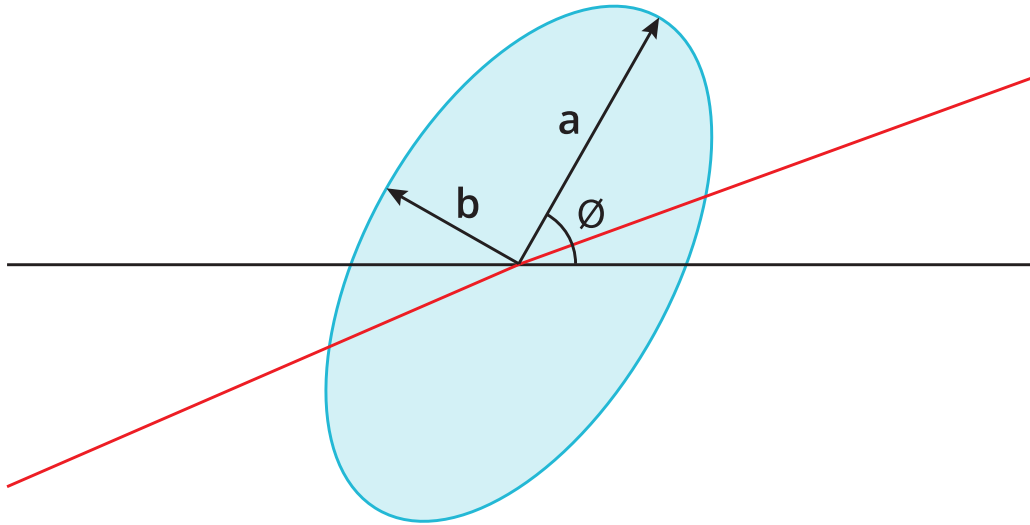


Figure 7.3- and 5-step MacAdam ellipse illustration for Tables 6a-6g.

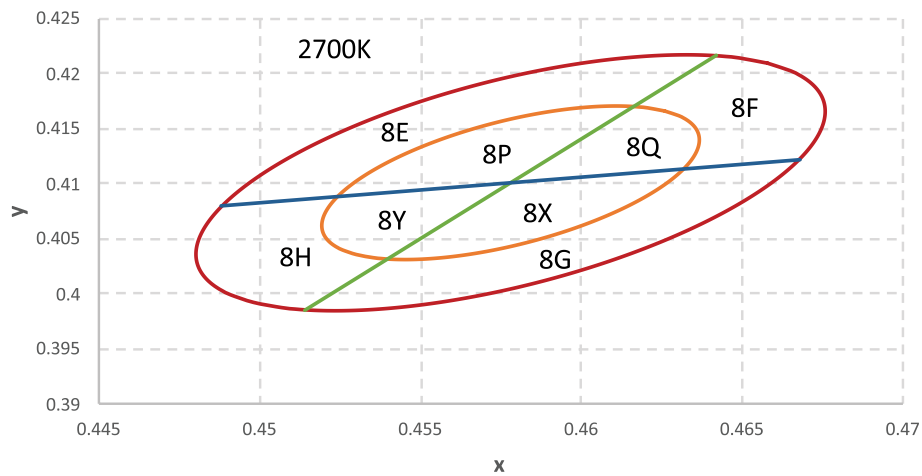


Figure 8a. 1/8th color bin structure for LUXEON 3030 HE Plus 2700K, at 65mA, $T_j=25^\circ\text{C}$.

Table 6a. 3- and 5-step MacAdam ellipse color bin definitions for LUXEON 3030 HE Plus 2700K, at 65mA, $T_j=25^\circ\text{C}$.

NOMINAL CCT	COLOR SPACE	CENTER POINT ⁽¹⁾ (cx, cy)	MAJOR AXIS, a	MINOR AXIS, b	ELLIPSE ROTATION ANGLE, θ
2700K	Single 3-Step MacAdam ellipse	(0.4578, 0.4101)	0.00810	0.00420	53.70°
2700K	Single 5-Step MacAdam ellipse	(0.4578, 0.4101)	0.01350	0.00700	53.70°

Notes for Table 6a:

1. Lumileds maintains a tolerance of ± 0.007 on x and y color coordinates in the CIE 1931 color space.

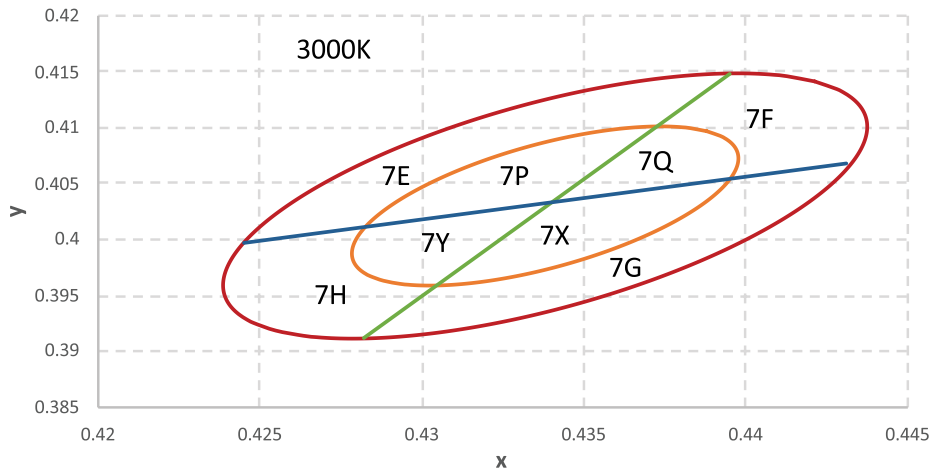


Figure 8b. 1/8th color bin structure for LUXEON 3030 HE Plus 3000K, at 65mA, $T_j=25^\circ\text{C}$.

Table 6b. 3- and 5-step MacAdam ellipse color bin definitions for LUXEON 3030 HE Plus 3000K, at 65mA, $T_j=25^\circ\text{C}$.

NOMINAL CCT	COLOR SPACE	CENTER POINT ^[1] (cx, cy)	MAJOR AXIS, a	MINOR AXIS, b	ELLIPSE ROTATION ANGLE, θ
3000K	Single 3-Step MacAdam ellipse	(0.4338, 0.4030)	0.00834	0.00408	53.22°
3000K	Single 5-Step MacAdam ellipse	(0.4338, 0.4030)	0.01390	0.00680	53.22°

Notes for Table 6b:

1. Lumileds maintains a tolerance of ± 0.007 on x and y color coordinates in the CIE 1931 color space.

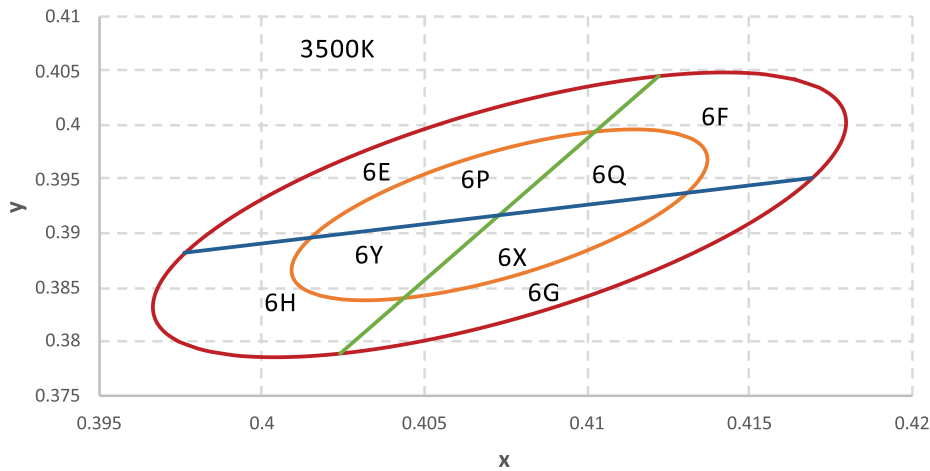


Figure 8c. 1/8th color bin structure for LUXEON 3030 HE Plus 3500K, at 65mA, $T_j=25^\circ\text{C}$.

Table 6c. 3- and 5-step MacAdam ellipse color bin definitions for LUXEON 3030 HE Plus 3500K, at 65mA, $T_j=25^\circ\text{C}$.

NOMINAL CCT	COLOR SPACE	CENTER POINT ^[1] (cx, cy)	MAJOR AXIS, a	MINOR AXIS, b	ELLIPSE ROTATION ANGLE, θ
3500K	Single 3-Step MacAdam ellipse	(0.4073, 0.3917)	0.00927	0.00414	54.00°
3500K	Single 5-Step MacAdam ellipse	(0.4073, 0.3917)	0.01545	0.00690	54.00°

Notes for Table 6c:

1. Lumileds maintains a tolerance of ± 0.007 on x and y color coordinates in the CIE 1931 color space.

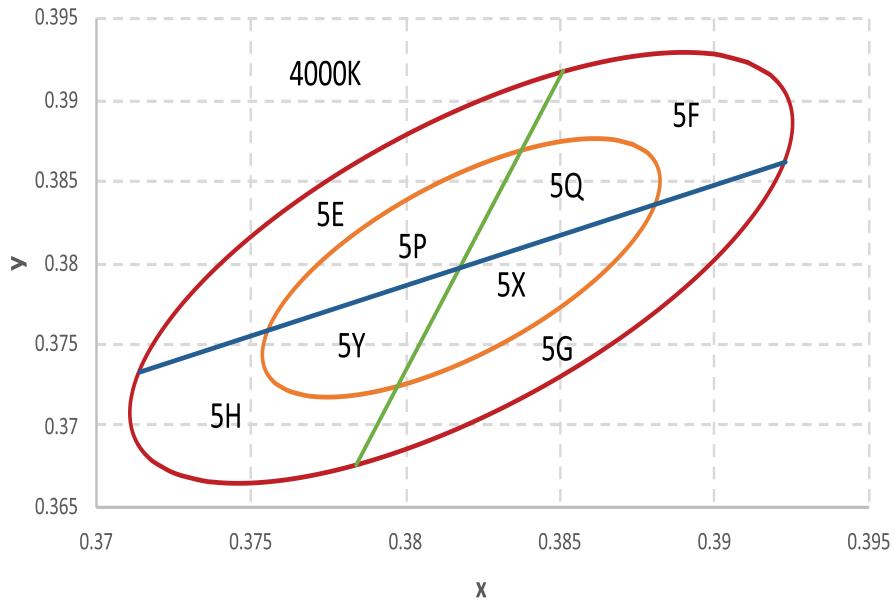


Figure 8d. 1/8th color bin structure for LUXEON 3030 HE Plus 4000K, at 65mA, T_j=25°C.

Table 6d. 3- and 5-step MacAdam ellipse color bin definitions for LUXEON 3030 HE Plus 4000K, at 65mA, T_j=25°C.

NOMINAL CCT	COLOR SPACE	CENTER POINT ^[1] (cx, cy)	MAJOR AXIS, a	MINOR AXIS, b	ELLIPSE ROTATION ANGLE, θ
4000K	Single 3-Step MacAdam ellipse	(0.3818, 0.3797)	0.00939	0.00402	53.72°
4000K	Single 5-Step MacAdam ellipse	(0.3818, 0.3797)	0.01565	0.00670	53.72°

Notes for Table 6d:

1. Lumileds maintains a tolerance of ± 0.007 on x and y color coordinates in the CIE 1931 color space.

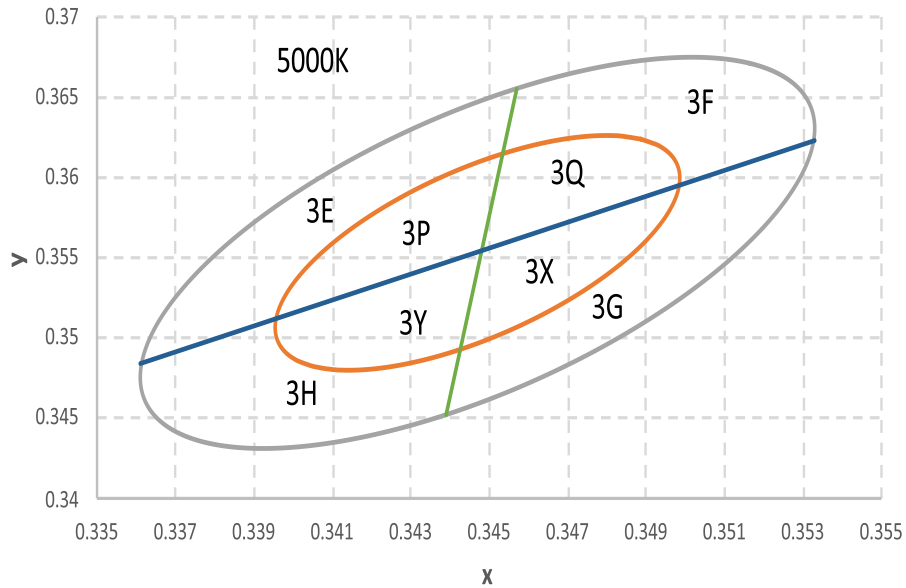


Figure 8e. 1/8th color bin structure for LUXEON 3030 HE Plus 5000K, at 65mA, T_j=25°C.

Table 6e. 3- and 5-step MacAdam ellipse color bin definitions for LUXEON 3030 HE Plus 5000K, at 65mA, T_j=25°C.

NOMINAL CCT	COLOR SPACE	CENTER POINT ^[1] (cx, cy)	MAJOR AXIS, a	MINOR AXIS, b	ELLIPSE ROTATION ANGLE, θ
5000K	Single 3-Step MacAdam ellipse	(0.3447, 0.3553)	0.00822	0.00354	59.62°
5000K	Single 5-Step MacAdam ellipse	(0.3447, 0.3553)	0.01370	0.00590	59.62°

Notes for Table 6e:

1. Lumileds maintains a tolerance of ± 0.007 on x and y color coordinates in the CIE 1931 color space.

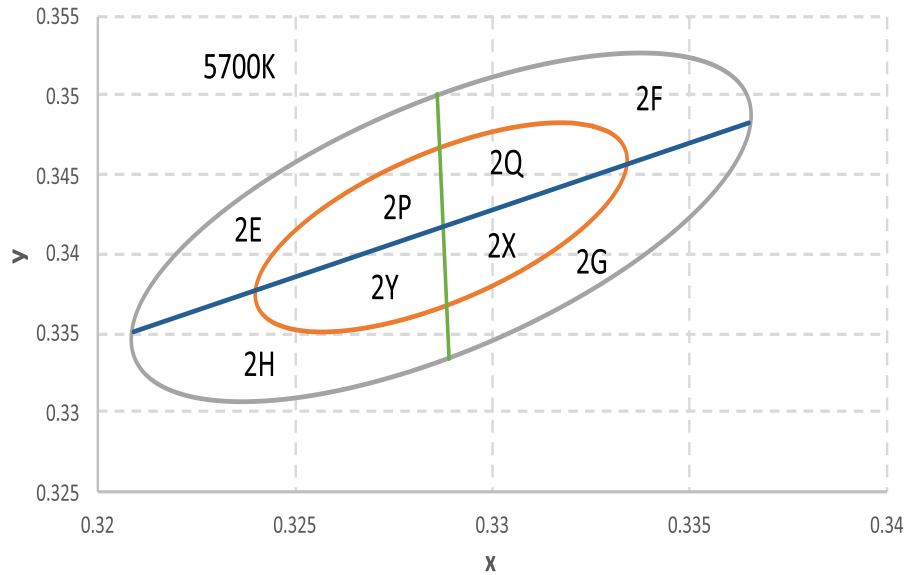


Figure 8f. 1/8th color bin structure for LUXEON 3030 HE Plus 5700K, at 65mA, $T_j=25^\circ\text{C}$.

Table 6f. 3- and 5-step MacAdam ellipse color bin definitions for LUXEON 3030 HE Plus 5700K, at 65mA, $T_j=25^\circ\text{C}$.

NOMINAL CCT	COLOR SPACE	CENTER POINT ⁽¹⁾ (cx, cy)	MAJOR AXIS, a	MINOR AXIS, b	ELLIPSE ROTATION ANGLE, θ
5700K	Single 3-Step MacAdam ellipse	(0.3287, 0.3417)	0.00746	0.00320	59.09°
5700K	Single 5-Step MacAdam ellipse	(0.3287, 0.3417)	0.01243	0.00533	59.09°

Notes for Table 6f:

1. Lumileds maintains a tolerance of ± 0.007 on x and y color coordinates in the CIE 1931 color space.

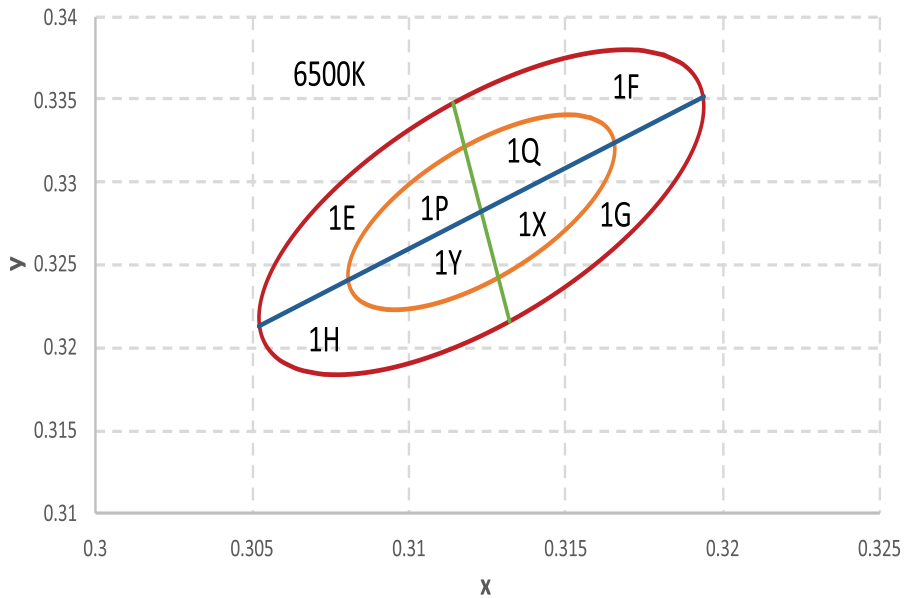


Figure 8g. 1/8th color bin structure for LUXEON 3030 HE Plus 6500K, at 65mA, $T_j=25^\circ\text{C}$.

Table 6g. 3- and 5-step MacAdam ellipse color bin definitions for LUXEON 3030 HE Plus 6500K, at 65mA, $T_j=25^\circ\text{C}$.

NOMINAL CCT	COLOR SPACE	CENTER POINT ⁽¹⁾ (cx, cy)	MAJOR AXIS, a	MINOR AXIS, b	ELLIPSE ROTATION ANGLE, θ
6500K	Single 3-Step MacAdam ellipse	(0.3123, 0.3282)	0.00669	0.00285	58.57°
6500K	Single 5-Step MacAdam ellipse	(0.3123, 0.3282)	0.01115	0.00475	58.57°

Notes for Table 6g:

1. Lumileds maintains a tolerance of ± 0.007 on x and y color coordinates in the CIE 1931 color space.

Forward Voltage Bins

Table 7. Forward voltage bin definitions for LUXEON 3030 HE Plus, $T_j=25^\circ\text{C}$.

BIN	FORWARD VOLTAGE ^[1] (V _f)	
	MINIMUM	MAXIMUM
B	2.62	2.70
C	2.70	2.78
D	2.78	2.86

Notes for Table 7:

1. Lumileds maintains a tolerance of $\pm 0.1\text{V}$ on forward voltage measurements.

Mechanical Dimensions

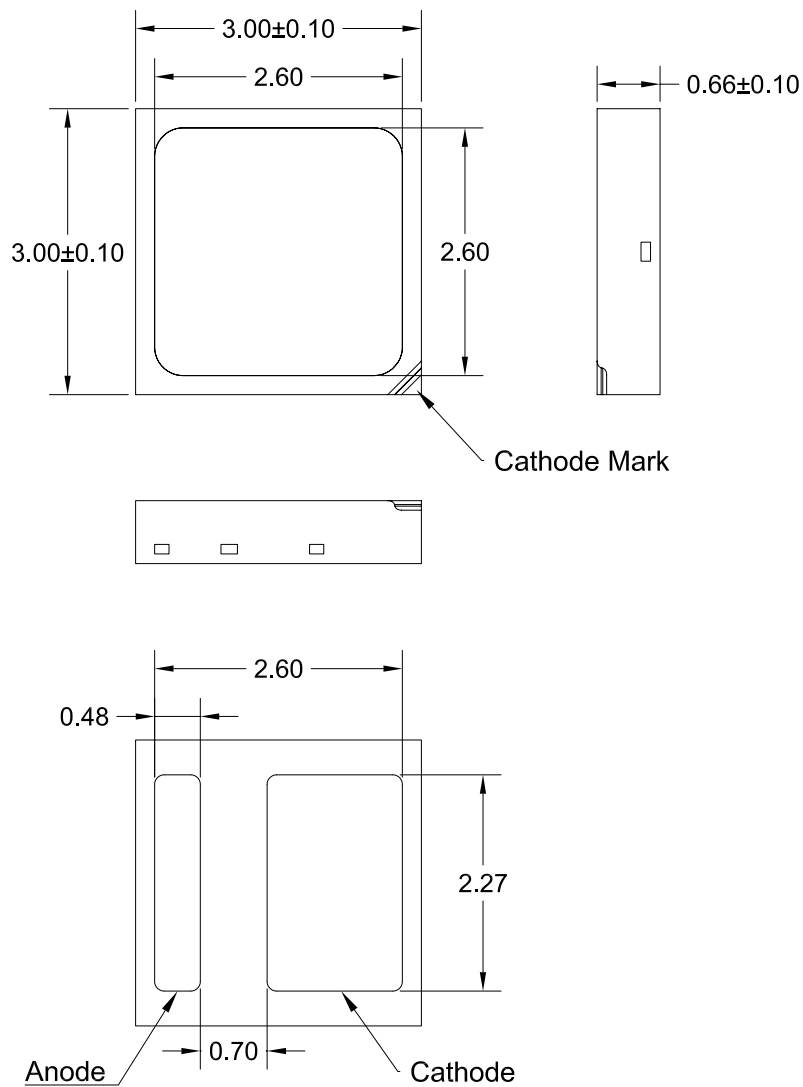


Figure 9. Mechanical dimensions for LUXEON 3030 HE Plus.

Notes for Figure 9:

1. Drawings are not to scale.
2. All dimensions are in millimeters.
3. Tolerance: $\pm 0.10\text{mm}$.

Reflow Soldering Guidelines

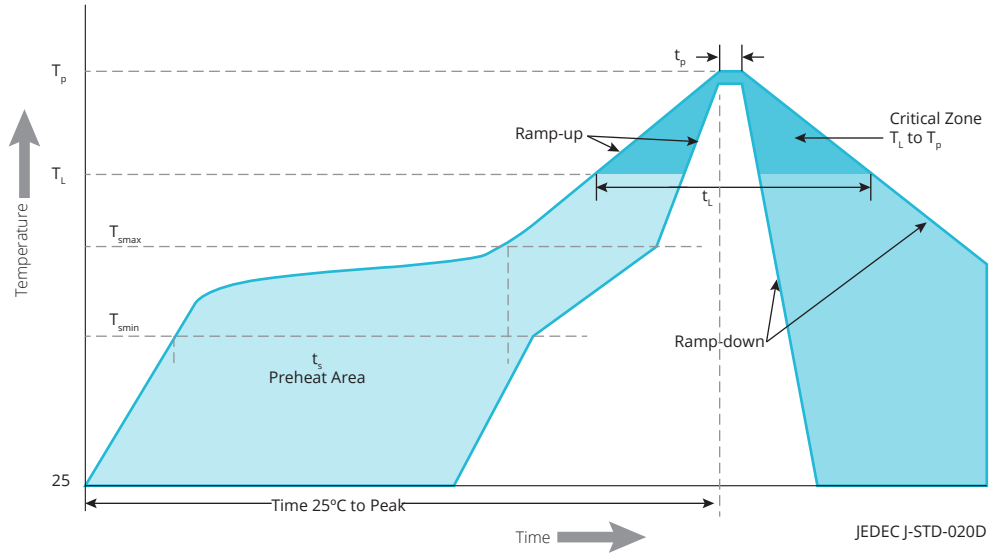


Figure 10. Visualization of the acceptable reflow temperature profile as specified in Table 8.

Table 8. Reflow profile characteristics for LUXEON 3030 HE Plus.

PROFILE FEATURE	LEAD FREE ASSEMBLY
Preheat Minimum Temperature (T_{smin})	150°C
Preheat Maximum Temperature (T_{smax})	200°C
Preheat Time (t_{smin} to t_{smax})	60 to 120 seconds
Ramp-Up Rate (T_L to T_p)	3°C / second maximum
Liquidous Temperature (T_L)	217°C
Time Maintained Above Temperature T_L (t_L)	60 to 150 seconds
Peak / Classification Temperature (T_p)	260°C
Time Within 5°C of Actual Peak Temperature (t_p)	20 to 40 seconds
Ramp-Down Rate (T_p to T_L)	6°C / second maximum
Time 25°C to Peak Temperature	8 minutes maximum

Notes for Table 8:

1. All temperatures refer to the application Printed Circuit Board (PCB), measured on the surface adjacent to the package body.

JEDEC Moisture Sensitivity

Table 9. Moisture sensitivity levels for LUXEON 3030 HE Plus.

LEVEL	FLOOR LIFE		SOAK REQUIREMENTS STANDARD	
	TIME	CONDITIONS	TIME	CONDITIONS
3	168 Hours	30°C / 60% RH	192 Hours +5 / -0	30°C / 60% RH

Solder Pad Design

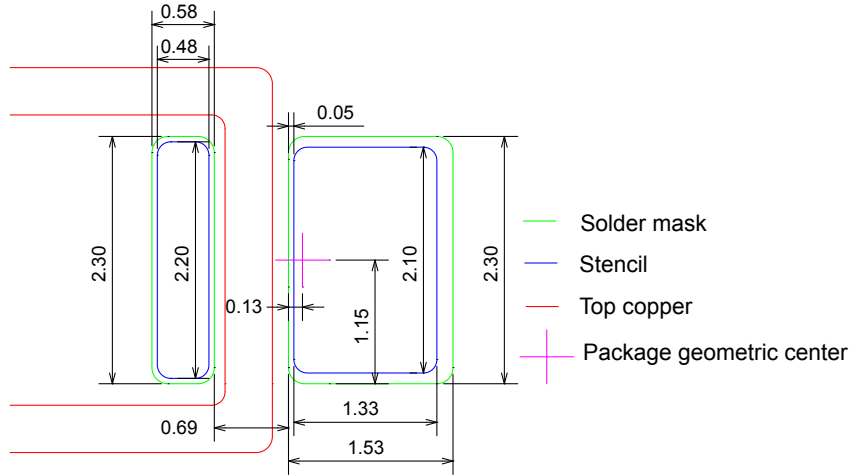


Figure 11. Recommended PCB solder pad layout for LUXEON 3030 HE Plus.

Notes for Figure 11:

- 1. Drawings are not to scale.
- 2. All dimensions are in millimeters.

Packaging Information

Pocket Tape Dimensions

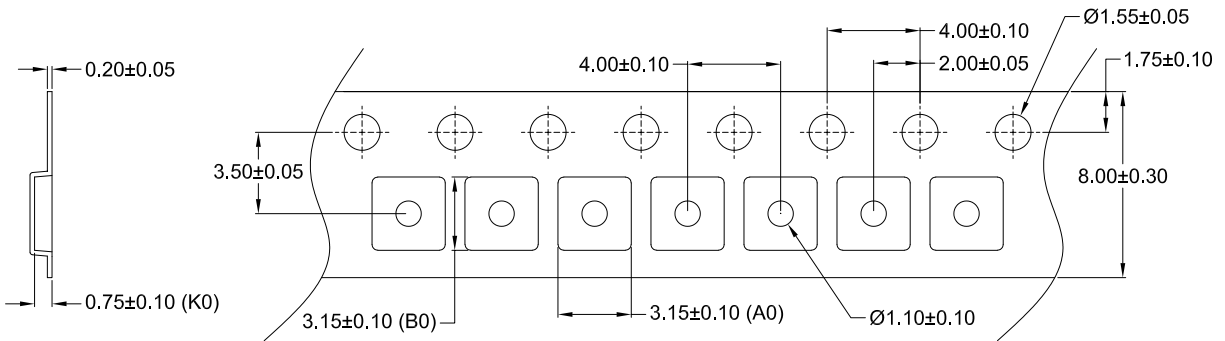


Figure 12. Pocket tape dimensions for LUXEON 3030 HE Plus.

Reel Dimensions

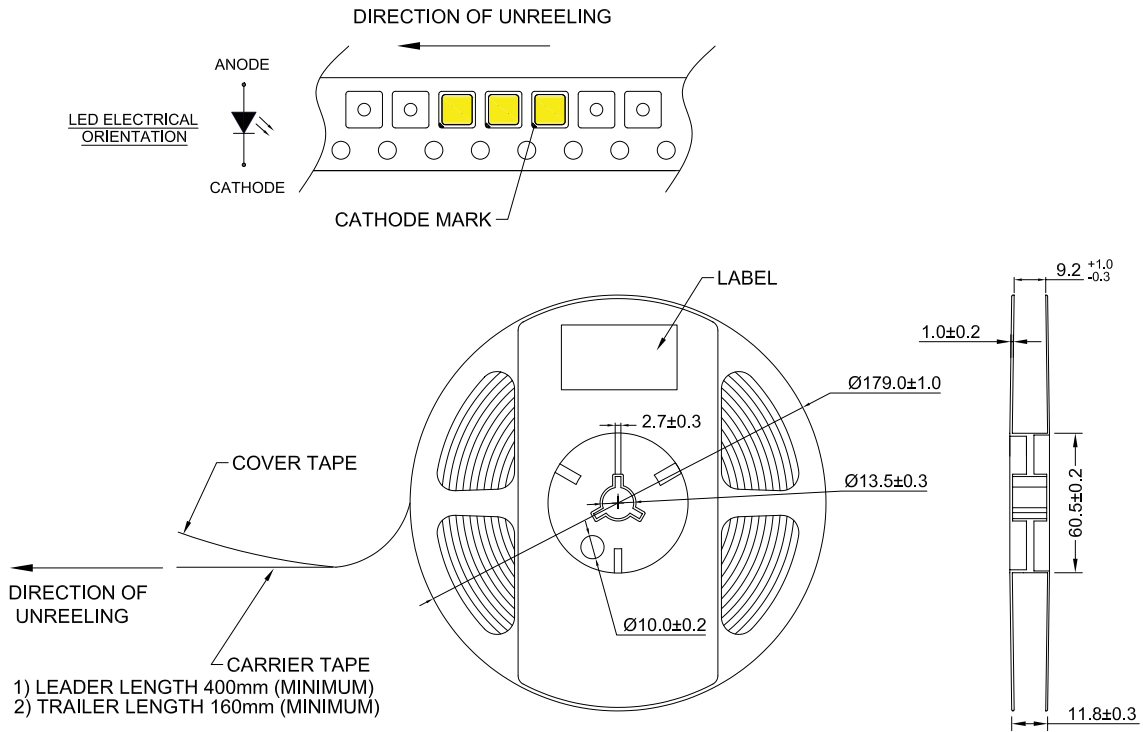


Figure 13. Reel dimensions for LUXEON 3030 HE Plus.

Notes for Figure 13:

1. Drawings are not to scale.
2. All dimensions are in millimeters.

About Lumileds

Companies developing automotive, mobile, IoT and illumination lighting applications need a partner who can collaborate with them to push the boundaries of light. With over 100 years of inventions and industry firsts, Lumileds is a global lighting solutions company that helps customers around the world deliver differentiated solutions to gain and maintain a competitive edge. As the inventor of Xenon technology, a pioneer in halogen lighting and the leader in high performance LEDs, Lumileds builds innovation, quality and reliability into its technology, products and every customer engagement. Together with its customers, Lumileds is making the world better, safer, more beautiful—with light.

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Lumileds

IESNA LM-80 Test Report

1. Description of LED light sources tested

LUXEON 3030 2D: L130-3080003000W2C (nominal CCT 3000K)

2a. Package Pictures



Figure 1. Picture of LUXEON 3030 2D Round LES (left) and LUXEON 3030 2D Square LES (right).

2b. Average current density per LED die at max. current tested

360.0 mA/mm²

2c. Average power density per LED die at max. current tested

2.21 W/mm²

2d. Average CRI Ra of LED light sources tested at max. current tested

82.99

2e. Minimum die edge to die edge spacing of LED light sources tested

0.1mm

2f. Total Input Power at max. current tested

1.17 W

This report issued to Relco

3a. Projected L_{70} extrapolations per IESNA TM-21-11

	If = 65mA	If = 100mA	If = 120mA	If = 150mA	If = 180mA
Ts = 115°C	-	-	142,789	-	110,606
Ts = 105°C	178,097	-	141,655	128,541	-
Ts = 85°C	-	153,225	-	-	-
Ts = 55°C	202,126	-	-	-	-

3b. Reported L_{70} extrapolations per IESNA TM-21-11

	If = 65mA	If = 100mA	If = 120mA	If = 150mA	If = 180mA
Ts = 115°C	-	-	> 60,000	-	> 60,000
Ts = 105°C	> 60,000	-	> 60,000	> 60,000	-
Ts = 85°C	-	> 60,000	-	-	-
Ts = 55°C	> 60,000	-	-	-	-

4. Applicable LUXEON® Series part number(s)

This IESNA LM-80 Test Report applies to the following LUXEON part numbers:

Product Family	Part Number	CCT
LUXEON 3030 2D	L130-AABBxx30xxxxx	white
LUXEON 3030 HE Plus	L130-AABBHA3000001	white
LUXEON HR30	L130-AABBCCHR00000	white

For LUXEON 3030 2D: AA designates nominal CCT (22=2200K, 27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K, 57=5700K and 65=6500K), BB designates minimum CRI (70=70CRI, 80=80CRI and 90=90CRI), CC designates ESD protection level (00=2kV and 0T=8kV), xx and xxxxx designate Lumileds internal codes.

For LUXEON 3030 HE Plus: AA designates nominal CCT (40=4000K, 50=5000K, 57=5700K and 65=6500K), BB designates minimum CRI (80=80CRI). Please note: For LUXEON 3030 HE Plus, drive current I_f' can be calculated as follows: $I_f' = I_f \cdot 2$, and voltage $V_f' = V_f / 2$ (2 dies in parallel).

For LUXEON HR30: AA designates nominal CCT (27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K, 57=5700K, 65=6500K), BB designates minimum CRI (70=70CRI, 80=80CRI and 90=90CRI), and CC designates ESD protection level (00=2kV and 0T=8kV).

5. Number of LED light sources reported

25 units per test condition.

6. Dates Tests Started

2016/08/24.

7. Date Report First Issued

2017/10/17.

This report issued to Relco

8. Mechanical Drawing

For detailed mechanical drawings, please see individual product data sheets.

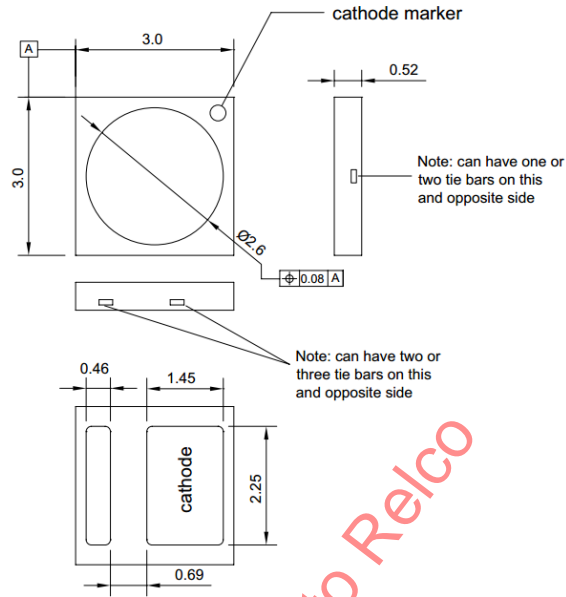


Figure 2a: Mechanical Drawing for LUXEON 3030 2D Round LES. All dimensions are in millimeters.

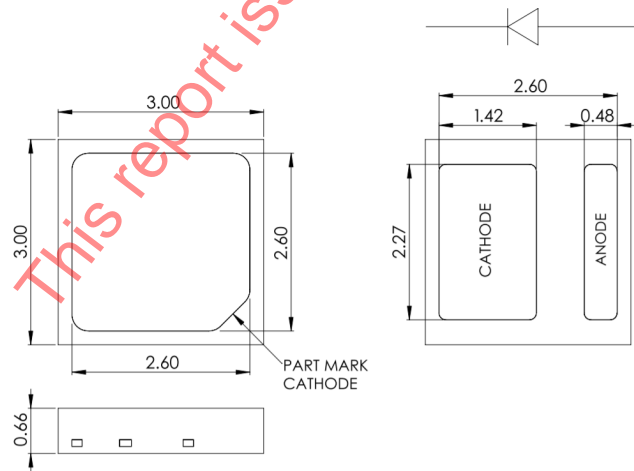


Figure 2b: Mechanical Drawing for LUXEON 3030 2D Square LES. All dimensions are in millimeters.

9. T_s Measurement Point

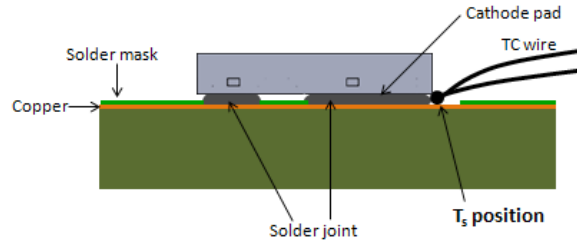


Figure 3: Preferred T_s measurement point for LUXEON 3030 2D.

For further information on measuring the in-situ T_s , please see Lumileds Application Brief AB207, which is available online at www.lumileds.com.

10. Description of auxiliary equipment

LUXEON LED devices are soldered to reliability stress boards.

Reliability stress boards are mounted in a chamber with minimal ambient airflow. The chamber temperature is controlled based on the temperature of a control T_s point, which is located on the stress board.

The reliability stress board is periodically removed from the thermal chamber, allowed to cool to room temperature, and then tested. After testing, the reliability stress board is returned to the thermal chamber for additional operation.

This report issued to Relco

11. Operating Cycle

LUXEON LEDs are driven with a constant direct current (DC).

12. Ambient conditions including airflow, temperature, and relative humidity

The typical relative humidity within the chamber is < 65%. The temperature uniformity of the board (center to edge) was experimentally determined to be less than 2°C.

The photometry measurement temperature is set and monitored to be within 25°C ± 2°C with no forced airflow and RH < 65%.

13. T_s and ambient temperatures (ambient temperature measured 5mm above reliability stress board)

In all cases, both T_s and T_{air} meet or exceed the IESNA LM-80-15 limits.

14. Drive current of the LED light source during lifetime test

See tables.

15. Initial luminous flux and forward voltage at photometric measurement current

See tables.

16. Lumen maintenance for data for each individual light source along with median value, standard deviation, minimum and maximum lumen maintenance value for all of the light sources

See tables.

17. Observation of LED light source failures including the failure conditions and time of failure

No failures observed in devices reported.

18. LED light source monitoring interval

Units were tested at 0 hour and at subsequent 1,000 hours intervals.

19. Photometric measurement uncertainty

Long-term measurement uncertainty is based on reproducibility tests done over a period of one year, calculated to $k = 2$ coverage (i.e. 95% coverage).

Luminous Flux (Φ_v) ± 1.59%

Correlated Color Temperature (CCT) ± 21K

20. Chromaticity shift reported over the measurement time

See tables.

21. Sampling Method/Sample size

Tested samples are selected to be representative of the overall LED population. LED sample size is indicated in Section 5 of this report.

22. ISO 17025-2005 Accreditation

SINGAPORE LABORATORY ACCREDITATION SCHEME

SINGAPORE ACCREDITATION COUNCIL

Number : **LA-2016-0634-E**

Date of Issue : **14 December 2016**

Date of Expiry : **13 December 2020**

Certificate of Accreditation

This certifies that

Lumileds Malaysia Sdn. Bhd.
Reliability Test Laboratory
No. 3, Lintang Bayan Lepas 8,
Phase 4, Bayan Lepas Industrial Park
11900, Penang, Malaysia

is accredited by the Singapore Accreditation Council to

ISO / IEC 17025 : 2005

for specific scope within the field of

Electrical Testing

as detailed in the attached schedule.


Chairman

This Certificate is awarded subject to the organisation's compliance with the stated criteria and terms and conditions laid down by the Singapore Accreditation Council.

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Notes

Data is for reference only and is not an endorsement to exceed the Data Sheet operating conditions. The data was collected by a subcontracted laboratory (ref. R2SH160822052-10, R2SH160822053-10 and R2SH160822051-10).

The TM-21 extrapolations are based on IES TM-21-11 "Projecting Long Term Lumen Maintenance of LED Light Sources. The TM-21 lumen maintenance model is based on the flux data normalized to 1 at 0 hours and the use of an exponential model for flux(time):

Flux(time) = B exp[-alpha*time], where normally B ≅ 1, and alpha > 0.

An L70 extrapolation less than 0 means that the model predicts an increasing flux output with time, i.e. alpha < 0 (see graphs). Generally, this means that additional test time is needed to determine the long-term lumen maintenance behavior.

Customer needs to check for all applicable local rules regarding application of LM-80 reports.

Number of LED light sources tested: 50 units per test condition.

Disclaimer

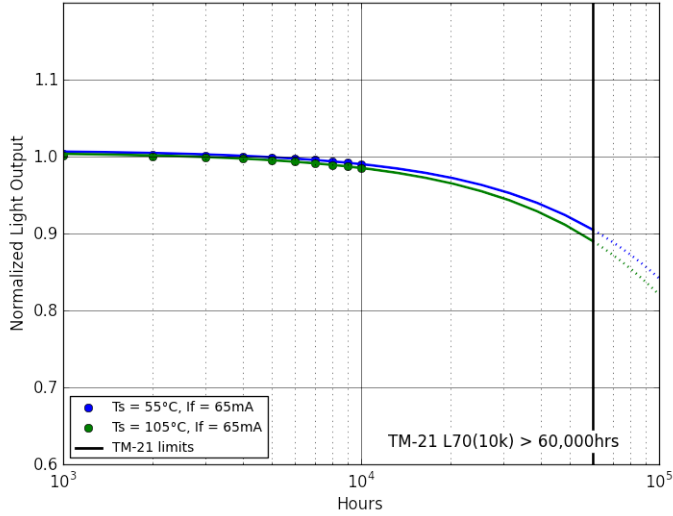
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Normalized Flux Statistics for I_f = 65mA

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	alpha	B	L70	
Ts=Tair=105°C	median =	1.0000	1.0018	0.9999	0.9985	0.9970	0.9953	0.9928	0.9910	0.9895	0.9878	0.9855			
	average =	1.0000	1.0017	1.0001	0.9988	0.9972	0.9953	0.9932	0.9913	0.9892	0.9873	0.9852	2.0333e-06	1.0055	178,097
	st dev =	0.0000	0.0008	0.0011	0.0013	0.0015	0.0015	0.0015	0.0017	0.0021	0.0022	0.0024	TM-21 L70(10k) > 60,000hrs		
	min =	1.0000	1.0001	0.9983	0.9970	0.9945	0.9925	0.9911	0.9879	0.9846	0.9823	0.9796			
	max =	1.0000	1.0031	1.0023	1.0015	0.9996	0.9989	0.9970	0.9951	0.9932	0.9918	0.9910			
Ts=Tair=55°C	median =	1.0000	1.0037	1.0026	1.0018	1.0003	0.9990	0.9972	0.9960	0.9939	0.9917	0.9900			
	average =	1.0000	1.0035	1.0026	1.0019	1.0004	0.9990	0.9975	0.9958	0.9939	0.9920	0.9901	1.8055e-06	1.0083	202,126
	st dev =	0.0000	0.0010	0.0010	0.0013	0.0009	0.0012	0.0011	0.0012	0.0016	0.0019	0.0022	TM-21 L70(10k) > 60,000hrs		
	min =	1.0000	1.0014	1.0004	0.9996	0.9989	0.9973	0.9951	0.9934	0.9907	0.9890	0.9866			
	max =	1.0000	1.0052	1.0045	1.0038	1.0020	1.0015	0.9992	0.9976	0.9969	0.9968	0.9962			

Lumen Maintenance for $I_f = 65\text{mA}$
Normalized to 1 at 0 hours



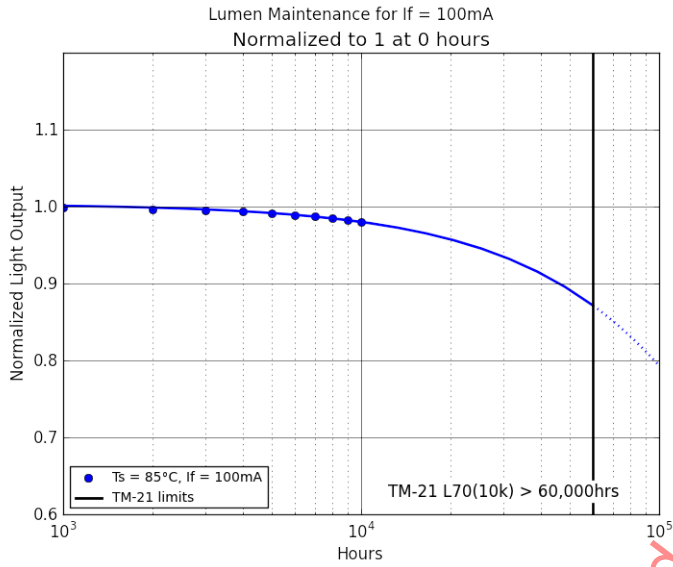
Delta u'v' for $I_f = 65\text{mA}$

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
median =	0.0000	0.0004	0.0007	0.0009	0.0013	0.0014	0.0016	0.0020	0.0023	0.0026	0.0030
Ts=Tair=105°C average =	0.0000	0.0004	0.0007	0.0008	0.0013	0.0015	0.0016	0.0019	0.0023	0.0026	0.0029
st dev =	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
min =	0.0000	0.0002	0.0005	0.0007	0.0011	0.0013	0.0014	0.0017	0.0021	0.0025	0.0027
max =	0.0000	0.0006	0.0009	0.0010	0.0014	0.0017	0.0018	0.0022	0.0026	0.0029	0.0032
median =	0.0000	0.0003	0.0004	0.0005	0.0010	0.0012	0.0014	0.0018	0.0022	0.0024	0.0026
Ts=Tair=55°C average =	0.0000	0.0003	0.0004	0.0005	0.0010	0.0013	0.0015	0.0018	0.0022	0.0024	0.0027
st dev =	0.0000	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
min =	0.0000	0.0001	0.0003	0.0003	0.0008	0.0011	0.0012	0.0016	0.0019	0.0022	0.0024
max =	0.0000	0.0009	0.0010	0.0010	0.0017	0.0019	0.0021	0.0024	0.0027	0.0030	0.0033

This report is issued by Lumileds

Normalized Flux Statistics for $I_f = 100\text{mA}$

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	alpha	B	L70
median =	1.0000	0.9982	0.9963	0.9953	0.9935	0.9917	0.9889	0.9870	0.9851	0.9823	0.9790			
Ts=Tair=85°C average =	1.0000	0.9986	0.9968	0.9952	0.9937	0.9916	0.9893	0.9870	0.9848	0.9825	0.9798	2.3496e-06	1.0034	153,225
st dev =	0.0000	0.0017	0.0019	0.0018	0.0019	0.0020	0.0020	0.0022	0.0026	0.0026	0.0027	TM-21 L70(10k) > 60,000hrs		
min =	1.0000	0.9962	0.9935	0.9925	0.9906	0.9880	0.9859	0.9835	0.9806	0.9784	0.9752			
max =	1.0000	1.0028	1.0018	0.9991	0.9982	0.9963	0.9935	0.9915	0.9896	0.9877	0.9852			



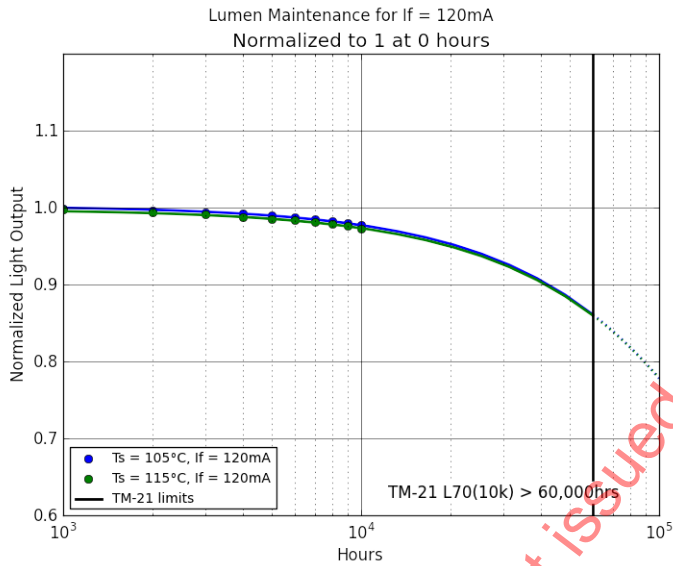
Delta u'v' for $I_f = 100\text{mA}$

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
median =	0.0000	0.0005	0.0007	0.0009	0.0012	0.0014	0.0017	0.0021	0.0023	0.0028	0.0031
Ts=Tair=85°C average =	0.0000	0.0005	0.0007	0.0009	0.0012	0.0014	0.0017	0.0021	0.0023	0.0028	0.0031
st dev =	0.0000	0.0002	0.0001	0.0001	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002
min =	0.0000	0.0002	0.0005	0.0007	0.0010	0.0012	0.0013	0.0019	0.0021	0.0025	0.0028
max =	0.0000	0.0009	0.0011	0.0014	0.0017	0.0020	0.0022	0.0025	0.0028	0.0032	0.0035

This report is sold to Relco

Normalized Flux Statistics for $I_f = 120\text{mA}$

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	alpha	B	L70
median =	1.0000	0.9969	0.9944	0.9920	0.9882	0.9850	0.9833	0.9805	0.9782	0.9756	0.9730			
Ts=Tair=115°C average =	1.0000	0.9973	0.9939	0.9912	0.9879	0.9848	0.9831	0.9808	0.9785	0.9756	0.9728	2.4816e-06	0.9977	142,789
st dev =	0.0000	0.0018	0.0021	0.0025	0.0031	0.0035	0.0035	0.0036	0.0037	0.0038	0.0040	TM-21 L70(10k) > 60,000hrs		
min =	1.0000	0.9945	0.9904	0.9867	0.9824	0.9778	0.9762	0.9736	0.9715	0.9691	0.9659			
max =	1.0000	1.0008	0.9984	0.9953	0.9929	0.9913	0.9889	0.9866	0.9842	0.9818	0.9788			
median =	1.0000	0.9984	0.9961	0.9944	0.9920	0.9890	0.9866	0.9841	0.9824	0.9797	0.9771			
Ts=Tair=105°C average =	1.0000	0.9985	0.9960	0.9942	0.9919	0.9895	0.9870	0.9847	0.9824	0.9796	0.9770	2.5336e-06	1.0022	141,655
st dev =	0.0000	0.0017	0.0016	0.0016	0.0016	0.0018	0.0020	0.0023	0.0028	0.0031	0.0032	TM-21 L70(10k) > 60,000hrs		
min =	1.0000	0.9952	0.9929	0.9907	0.9890	0.9859	0.9835	0.9811	0.9780	0.9740	0.9725			
max =	1.0000	1.0016	0.9984	0.9976	0.9952	0.9936	0.9920	0.9904	0.9888	0.9857	0.9833			

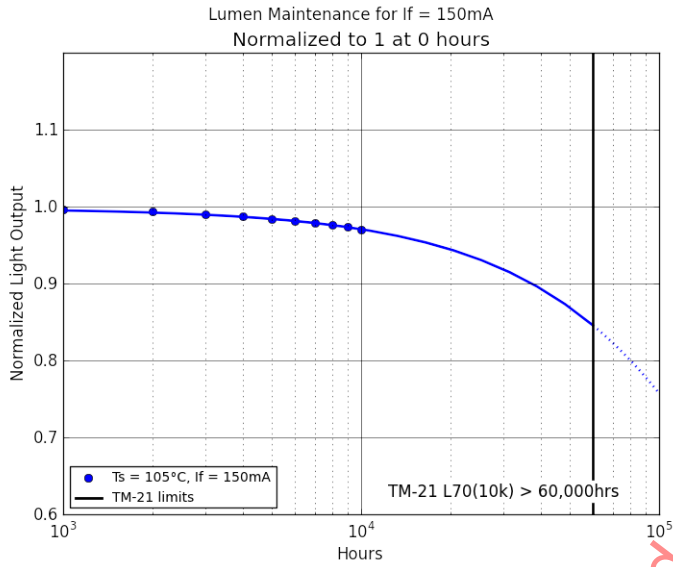


Delta u'v' for $I_f = 120\text{mA}$

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
median =	0.0000	0.0007	0.0009	0.0013	0.0014	0.0017	0.0022	0.0024	0.0026	0.0028	0.0031
Ts=Tair=115°C average =	0.0000	0.0007	0.0010	0.0013	0.0015	0.0018	0.0021	0.0024	0.0026	0.0028	0.0032
st dev =	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
min =	0.0000	0.0005	0.0008	0.0011	0.0015	0.0015	0.0019	0.0023	0.0023	0.0025	0.0029
max =	0.0000	0.0010	0.0013	0.0017	0.0020	0.0023	0.0025	0.0029	0.0031	0.0033	0.0037
median =	0.0000	0.0006	0.0007	0.0011	0.0013	0.0017	0.0019	0.0021	0.0024	0.0027	0.0030
Ts=Tair=105°C average =	0.0000	0.0006	0.0008	0.0011	0.0013	0.0017	0.0019	0.0022	0.0025	0.0028	0.0030
st dev =	0.0000	0.0002	0.0002	0.0002	0.0003	0.0003	0.0002	0.0003	0.0003	0.0003	0.0003
min =	0.0000	0.0002	0.0006	0.0009	0.0008	0.0012	0.0017	0.0019	0.0020	0.0022	0.0024
max =	0.0000	0.0013	0.0014	0.0020	0.0024	0.0027	0.0028	0.0031	0.0035	0.0038	0.0042

Normalized Flux Statistics for $I_f = 150\text{mA}$

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	alpha	B	L70
median =	1.0000	0.9961	0.9929	0.9902	0.9867	0.9837	0.9813	0.9791	0.9762	0.9741	0.9714			
Ts=Tair=105°C average =	1.0000	0.9965	0.9934	0.9904	0.9870	0.9840	0.9812	0.9787	0.9761	0.9733	0.9703	2.7566e-06	0.9977	128,541
st dev =	0.0000	0.0017	0.0018	0.0021	0.0022	0.0024	0.0022	0.0023	0.0024	0.0026	0.0028	TM-21 L70(10k) > 60,000hrs		
min =	1.0000	0.9942	0.9904	0.9866	0.9838	0.9806	0.9780	0.9741	0.9715	0.9683	0.9651			
max =	1.0000	1.0013	0.9980	0.9954	0.9935	0.9895	0.9852	0.9830	0.9810	0.9784	0.9758			



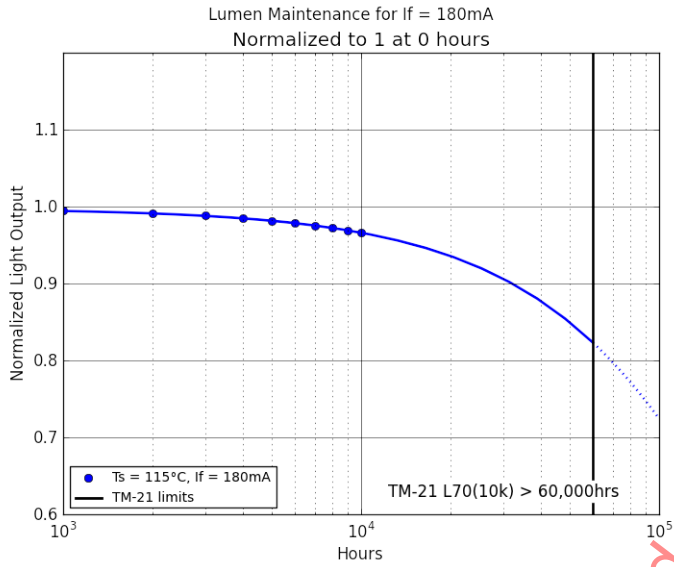
Delta u'v' for $I_f = 150\text{mA}$

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
median =	0.0000	0.0008	0.0011	0.0014	0.0019	0.0021	0.0023	0.0026	0.0029	0.0032	0.0036
Ts=Tair=105°C average =	0.0000	0.0008	0.0011	0.0014	0.0019	0.0021	0.0022	0.0026	0.0029	0.0032	0.0036
st dev =	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
min =	0.0000	0.0006	0.0009	0.0013	0.0017	0.0018	0.0021	0.0023	0.0027	0.0030	0.0033
max =	0.0000	0.0010	0.0012	0.0016	0.0021	0.0023	0.0025	0.0028	0.0030	0.0034	0.0040

This report is sold to Relco

Normalized Flux Statistics for $I_f = 180\text{mA}$

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	alpha	B	L70
median =	1.0000	0.9945	0.9912	0.9888	0.9848	0.9818	0.9786	0.9752	0.9724	0.9692	0.9662			
Ts=Tair=115°C average =	1.0000	0.9949	0.9917	0.9887	0.9849	0.9816	0.9784	0.9753	0.9724	0.9692	0.9659	3.2016e-06	0.9974	110,606
st dev =	0.0000	0.0018	0.0022	0.0023	0.0024	0.0026	0.0029	0.0029	0.0024	0.0024	0.0021	TM-21 L70(10k) > 60,000hrs		
min =	1.0000	0.9917	0.9873	0.9846	0.9791	0.9757	0.9719	0.9680	0.9658	0.9631	0.9609			
max =	1.0000	0.9989	0.9972	0.9949	0.9898	0.9864	0.9835	0.9801	0.9761	0.9733	0.9690			



Delta u'v' for $I_f = 180\text{mA}$

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
median =	0.0000	0.0008	0.0010	0.0015	0.0019	0.0021	0.0025	0.0028	0.0029	0.0031	0.0035
Ts=Tair=115°C average =	0.0000	0.0008	0.0011	0.0015	0.0019	0.0021	0.0025	0.0028	0.0029	0.0031	0.0035
st dev =	0.0000	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0002	0.0002
min =	0.0000	0.0005	0.0008	0.0013	0.0015	0.0017	0.0023	0.0026	0.0027	0.0028	0.0030
max =	0.0000	0.0012	0.0015	0.0019	0.0023	0.0025	0.0029	0.0032	0.0033	0.0035	0.0039

This report is sold to Relco

Luminous Flux [lm] data for tested units

$T_s = T_{air} = 55^{\circ}C$, $I_f = 65mA$; $T_s \geq 53^{\circ}C$ and $T_{air} \geq 50^{\circ}C$ in compliance with LM-80-15

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	3117K	72.490	72.770	72.730	72.720	72.600	72.450	72.370	72.230	72.010	71.760	71.540
2	3115K	72.320	72.550	72.490	72.410	72.300	72.250	72.230	72.150	72.040	71.910	71.770
3	3106K	72.840	72.940	72.910	72.830	72.760	72.670	72.630	72.610	72.520	72.420	72.270
4	3104K	72.790	73.130	73.080	73.070	72.920	72.850	72.730	72.580	72.480	72.330	72.240
5	3088K	73.240	73.430	73.290	73.220	73.200	73.090	72.970	72.860	72.790	72.630	72.400
6	3123K	72.120	72.470	72.440	72.380	72.260	72.200	72.030	71.860	71.680	71.520	71.450
7	3085K	72.660	72.930	72.850	72.840	72.630	72.620	72.470	72.420	72.300	72.070	71.910
8	3126K	72.960	73.220	73.140	73.030	72.990	72.880	72.750	72.600	72.560	72.520	72.440
9	3101K	73.140	73.430	73.370	73.340	73.190	73.150	73.050	72.860	72.650	72.450	72.300
10	3139K	73.820	74.200	74.100	74.040	73.960	73.930	73.710	73.570	73.420	73.290	73.080
11	3106K	73.070	73.340	73.260	73.160	73.150	73.050	72.870	72.730	72.470	72.290	72.090
12	3134K	70.820	71.090	71.020	70.890	70.850	70.750	70.580	70.540	70.390	70.270	70.130
13	3124K	70.900	71.140	71.090	71.080	70.980	70.890	70.820	70.710	70.680	70.670	70.630
14	3136K	72.000	72.220	72.160	72.130	71.970	71.810	71.770	71.570	71.330	71.210	71.120
15	3107K	73.470	73.570	73.500	73.440	73.390	73.270	73.110	73.020	72.830	72.730	72.570
16	3100K	72.310	72.570	72.460	72.400	72.300	72.170	72.090	71.930	71.780	71.630	71.500
17	3117K	72.930	73.210	73.150	73.080	72.980	72.870	72.680	72.550	72.450	72.280	72.200
18	3098K	73.160	73.390	73.320	73.230	73.120	73.060	72.880	72.680	72.600	72.440	72.340
19	3142K	71.640	72.010	71.960	71.900	71.780	71.670	71.570	71.450	71.340	71.190	71.070
20	3103K	73.540	73.810	73.710	73.650	73.560	73.350	73.330	73.270	73.180	73.040	72.900
21	3105K	72.790	73.100	73.080	73.060	72.860	72.780	72.660	72.470	72.440	72.290	72.160
22	3121K	72.370	72.540	72.480	72.420	72.380	72.230	72.150	72.020	71.850	71.690	71.540
23	2965K	73.800	74.000	73.980	73.880	73.760	73.650	73.550	73.370	73.220	73.120	72.960
24	3101K	73.060	73.330	73.280	73.240	73.080	73.030	72.910	72.880	72.710	72.650	72.470
25	3104K	70.290	70.470	70.460	70.450	70.270	70.110	70.090	69.980	69.740	69.610	69.560

Normalized Luminous Flux data for tested units

$T_s = T_{air} = 55^{\circ}C$, $I_f = 65mA$; $T_s \geq 53^{\circ}C$ and $T_{air} \geq 50^{\circ}C$ in compliance with LM-80-15

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	3117K	1.0000	1.0039	1.0033	1.0032	1.0015	0.9994	0.9983	0.9964	0.9934	0.9899	0.9869
2	3115K	1.0000	1.0032	1.0024	1.0012	0.9997	0.9990	0.9988	0.9976	0.9961	0.9943	0.9924
3	3106K	1.0000	1.0014	1.0010	0.9999	0.9989	0.9977	0.9971	0.9968	0.9956	0.9942	0.9922
4	3104K	1.0000	1.0047	1.0040	1.0038	1.0018	1.0008	0.9992	0.9971	0.9957	0.9937	0.9924
5	3088K	1.0000	1.0026	1.0007	0.9997	0.9995	0.9980	0.9963	0.9948	0.9939	0.9917	0.9885
6	3123K	1.0000	1.0049	1.0044	1.0036	1.0019	1.0011	0.9988	0.9964	0.9939	0.9917	0.9907
7	3085K	1.0000	1.0037	1.0026	1.0025	0.9996	0.9994	0.9974	0.9967	0.9950	0.9919	0.9897
8	3126K	1.0000	1.0036	1.0025	1.0010	1.0004	0.9989	0.9971	0.9951	0.9945	0.9940	0.9929
9	3101K	1.0000	1.0040	1.0031	1.0027	1.0007	1.0001	0.9988	0.9962	0.9933	0.9906	0.9885
10	3139K	1.0000	1.0051	1.0038	1.0030	1.0019	1.0015	0.9985	0.9966	0.9946	0.9928	0.9900
11	3106K	1.0000	1.0037	1.0026	1.0012	1.0011	0.9997	0.9973	0.9953	0.9918	0.9893	0.9866
12	3134K	1.0000	1.0038	1.0028	1.0010	1.0004	0.9990	0.9966	0.9960	0.9939	0.9922	0.9903
13	3124K	1.0000	1.0034	1.0027	1.0025	1.0011	0.9999	0.9989	0.9973	0.9969	0.9968	0.9962
14	3136K	1.0000	1.0031	1.0022	1.0018	0.9996	0.9974	0.9968	0.9940	0.9907	0.9890	0.9878
15	3107K	1.0000	1.0014	1.0004	0.9996	0.9989	0.9973	0.9951	0.9939	0.9913	0.9899	0.9878
16	3100K	1.0000	1.0036	1.0021	1.0012	0.9999	0.9981	0.9970	0.9947	0.9927	0.9906	0.9888
17	3117K	1.0000	1.0038	1.0030	1.0021	1.0007	0.9992	0.9966	0.9948	0.9934	0.9911	0.9900
18	3098K	1.0000	1.0031	1.0022	1.0010	0.9995	0.9986	0.9962	0.9934	0.9923	0.9902	0.9888
19	3142K	1.0000	1.0052	1.0045	1.0036	1.0020	1.0004	0.9990	0.9973	0.9958	0.9937	0.9920
20	3103K	1.0000	1.0037	1.0023	1.0015	1.0003	0.9974	0.9971	0.9963	0.9951	0.9932	0.9913
21	3105K	1.0000	1.0043	1.0040	1.0037	1.0010	0.9999	0.9982	0.9956	0.9952	0.9931	0.9913
22	3121K	1.0000	1.0023	1.0015	1.0007	1.0001	0.9981	0.9970	0.9952	0.9928	0.9906	0.9885
23	2965K	1.0000	1.0027	1.0024	1.0011	0.9995	0.9980	0.9966	0.9942	0.9921	0.9908	0.9886
24	3101K	1.0000	1.0037	1.0030	1.0025	1.0003	0.9996	0.9979	0.9975	0.9952	0.9944	0.9919
25	3104K	1.0000	1.0026	1.0024	1.0023	0.9997	0.9974	0.9972	0.9956	0.9922	0.9903	0.9896

CIE 1976 u' data for tested units

$T_s = T_{air} = 55^{\circ}\text{C}$, $I_f = 65\text{mA}$; $T_s \geq 53^{\circ}\text{C}$ and $T_{air} \geq 50^{\circ}\text{C}$ in compliance with LM-80-15

CCT (lm)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3117K	0.2469	0.2467	0.2469	0.2468	0.2465	0.2464	0.2466	0.2465	0.2463	0.2460	0.2460
2	3115K	0.2467	0.2463	0.2465	0.2462	0.2460	0.2459	0.2461	0.2461	0.2458	0.2455	0.2456
3	3106K	0.2473	0.2471	0.2472	0.2470	0.2468	0.2466	0.2469	0.2468	0.2465	0.2461	0.2463
4	3104K	0.2472	0.2469	0.2471	0.2470	0.2466	0.2466	0.2468	0.2467	0.2465	0.2461	0.2461
5	3088K	0.2480	0.2478	0.2480	0.2479	0.2476	0.2475	0.2477	0.2476	0.2473	0.2470	0.2471
6	3123K	0.2465	0.2463	0.2464	0.2464	0.2460	0.2459	0.2462	0.2461	0.2456	0.2454	0.2455
7	3085K	0.2481	0.2478	0.2480	0.2479	0.2476	0.2473	0.2477	0.2476	0.2472	0.2469	0.2470
8	3126K	0.2465	0.2463	0.2464	0.2463	0.2460	0.2459	0.2461	0.2460	0.2457	0.2454	0.2455
9	3101K	0.2471	0.2468	0.2470	0.2469	0.2466	0.2465	0.2467	0.2466	0.2463	0.2460	0.2462
10	3139K	0.2463	0.2460	0.2461	0.2460	0.2457	0.2456	0.2459	0.2457	0.2454	0.2450	0.2452
11	3106K	0.2473	0.2471	0.2473	0.2473	0.2468	0.2467	0.2471	0.2469	0.2465	0.2462	0.2463
12	3134K	0.2463	0.2462	0.2463	0.2463	0.2458	0.2458	0.2461	0.2459	0.2457	0.2453	0.2453
13	3124K	0.2465	0.2459	0.2460	0.2461	0.2455	0.2454	0.2459	0.2457	0.2454	0.2451	0.2451
14	3136K	0.2457	0.2455	0.2456	0.2456	0.2452	0.2451	0.2454	0.2452	0.2449	0.2447	0.2446
15	3107K	0.2470	0.2467	0.2468	0.2467	0.2463	0.2465	0.2467	0.2465	0.2462	0.2459	0.2458
16	3100K	0.2473	0.2471	0.2472	0.2471	0.2467	0.2469	0.2470	0.2468	0.2464	0.2462	0.2461
17	3117K	0.2469	0.2467	0.2467	0.2466	0.2462	0.2464	0.2466	0.2464	0.2460	0.2457	0.2457
18	3098K	0.2473	0.2471	0.2472	0.2471	0.2468	0.2469	0.2471	0.2469	0.2466	0.2463	0.2462
19	3142K	0.2456	0.2454	0.2455	0.2455	0.2451	0.2452	0.2454	0.2452	0.2448	0.2446	0.2446
20	3103K	0.2476	0.2474	0.2474	0.2474	0.2471	0.2472	0.2473	0.2472	0.2468	0.2466	0.2465
21	3105K	0.2472	0.2471	0.2472	0.2472	0.2468	0.2469	0.2471	0.2469	0.2465	0.2463	0.2463
22	3121K	0.2464	0.2462	0.2463	0.2462	0.2459	0.2460	0.2461	0.2459	0.2456	0.2452	0.2452
23	2965K	0.2512	0.2509	0.2511	0.2510	0.2506	0.2508	0.2509	0.2507	0.2503	0.2501	0.2500
24	3101K	0.2475	0.2473	0.2475	0.2474	0.2471	0.2472	0.2474	0.2472	0.2469	0.2466	0.2466
25	3104K	0.2476	0.2473	0.2474	0.2474	0.2470	0.2471	0.2473	0.2471	0.2467	0.2464	0.2464

CIE 1976 v' data for tested units

$T_s = T_{air} = 55^{\circ}\text{C}$, $I_f = 65\text{mA}$; $T_s \geq 53^{\circ}\text{C}$ and $T_{air} \geq 50^{\circ}\text{C}$ in compliance with LM-80-15

CCT (lm)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3117K	0.5179	0.5178	0.5176	0.5174	0.5170	0.5168	0.5164	0.5162	0.5159	0.5158	0.5156
2	3115K	0.5189	0.5185	0.5184	0.5182	0.5179	0.5177	0.5172	0.5169	0.5166	0.5166	0.5164
3	3106K	0.5179	0.5177	0.5175	0.5174	0.5170	0.5168	0.5164	0.5161	0.5158	0.5158	0.5155
4	3104K	0.5185	0.5182	0.5180	0.5179	0.5175	0.5174	0.5169	0.5167	0.5165	0.5164	0.5161
5	3088K	0.5179	0.5178	0.5176	0.5175	0.5171	0.5169	0.5165	0.5162	0.5159	0.5159	0.5156
6	3123K	0.5185	0.5182	0.5181	0.5179	0.5175	0.5174	0.5169	0.5167	0.5164	0.5163	0.5161
7	3085K	0.5179	0.5177	0.5175	0.5174	0.5170	0.5168	0.5163	0.5161	0.5158	0.5157	0.5155
8	3126K	0.5181	0.5179	0.5177	0.5176	0.5172	0.5171	0.5166	0.5163	0.5161	0.5160	0.5158
9	3101K	0.5193	0.5191	0.5189	0.5189	0.5185	0.5183	0.5179	0.5176	0.5173	0.5172	0.5171
10	3139K	0.5170	0.5167	0.5165	0.5165	0.5161	0.5159	0.5155	0.5152	0.5149	0.5148	0.5146
11	3106K	0.5179	0.5178	0.5175	0.5175	0.5171	0.5169	0.5166	0.5162	0.5159	0.5158	0.5155
12	3134K	0.5177	0.5175	0.5174	0.5173	0.5169	0.5167	0.5163	0.5160	0.5157	0.5156	0.5153
13	3124K	0.5184	0.5177	0.5175	0.5175	0.5170	0.5168	0.5164	0.5161	0.5159	0.5158	0.5154
14	3136K	0.5195	0.5194	0.5192	0.5191	0.5187	0.5186	0.5183	0.5177	0.5176	0.5175	0.5171
15	3107K	0.5188	0.5185	0.5183	0.5182	0.5178	0.5177	0.5174	0.5170	0.5168	0.5167	0.5162
16	3100K	0.5187	0.5185	0.5183	0.5182	0.5178	0.5176	0.5173	0.5169	0.5166	0.5165	0.5161
17	3117K	0.5178	0.5174	0.5172	0.5170	0.5167	0.5164	0.5162	0.5158	0.5155	0.5154	0.5150
18	3098K	0.5191	0.5190	0.5188	0.5185	0.5182	0.5179	0.5177	0.5173	0.5170	0.5169	0.5165
19	3142K	0.5191	0.5190	0.5188	0.5188	0.5184	0.5181	0.5178	0.5175	0.5172	0.5171	0.5168
20	3103K	0.5172	0.5170	0.5168	0.5168	0.5164	0.5160	0.5158	0.5155	0.5152	0.5151	0.5147
21	3105K	0.5184	0.5183	0.5180	0.5180	0.5176	0.5173	0.5170	0.5167	0.5164	0.5163	0.5159
22	3121K	0.5191	0.5189	0.5187	0.5186	0.5183	0.5180	0.5177	0.5174	0.5170	0.5168	0.5164
23	2965K	0.5245	0.5243	0.5240	0.5240	0.5237	0.5233	0.5231	0.5228	0.5224	0.5224	0.5220
24	3101K	0.5179	0.5178	0.5176	0.5175	0.5172	0.5168	0.5166	0.5163	0.5161	0.5159	0.5156
25	3104K	0.5171	0.5169	0.5167	0.5167	0.5163	0.5159	0.5158	0.5154	0.5151	0.5150	0.5146

Delta u'v' data for tested units

$T_s = T_{air} = 55^\circ\text{C}$; $I_f = 65\text{mA}$; $T_s \geq 53^\circ\text{C}$ and $T_{air} \geq 50^\circ\text{C}$ in compliance with LM-80-15

CCT (nd)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3117K	0.0000	0.0002	0.0003	0.0005	0.0010	0.0012	0.0015	0.0017	0.0021	0.0023	0.0025
2	3115K	0.0000	0.0006	0.0005	0.0009	0.0012	0.0014	0.0018	0.0021	0.0025	0.0026	0.0027
3	3106K	0.0000	0.0003	0.0004	0.0006	0.0010	0.0013	0.0016	0.0019	0.0022	0.0024	0.0026
4	3104K	0.0000	0.0004	0.0005	0.0006	0.0012	0.0013	0.0016	0.0019	0.0021	0.0024	0.0026
5	3088K	0.0000	0.0002	0.0003	0.0004	0.0009	0.0011	0.0014	0.0017	0.0021	0.0022	0.0025
6	3123K	0.0000	0.0004	0.0004	0.0006	0.0011	0.0013	0.0016	0.0018	0.0023	0.0025	0.0026
7	3085K	0.0000	0.0004	0.0004	0.0005	0.0010	0.0014	0.0016	0.0019	0.0023	0.0025	0.0026
8	3126K	0.0000	0.0003	0.0004	0.0005	0.0010	0.0012	0.0016	0.0019	0.0022	0.0024	0.0025
9	3101K	0.0000	0.0004	0.0004	0.0004	0.0009	0.0012	0.0015	0.0018	0.0022	0.0024	0.0024
10	3139K	0.0000	0.0004	0.0005	0.0006	0.0011	0.0013	0.0016	0.0019	0.0023	0.0026	0.0026
11	3106K	0.0000	0.0002	0.0004	0.0004	0.0009	0.0012	0.0013	0.0017	0.0022	0.0024	0.0026
12	3134K	0.0000	0.0002	0.0003	0.0004	0.0009	0.0011	0.0014	0.0017	0.0021	0.0023	0.0026
13	3124K	0.0000	0.0009	0.0010	0.0010	0.0017	0.0019	0.0021	0.0024	0.0027	0.0030	0.0033
14	3136K	0.0000	0.0002	0.0003	0.0004	0.0009	0.0011	0.0012	0.0019	0.0021	0.0022	0.0026
15	3107K	0.0000	0.0004	0.0005	0.0007	0.0012	0.0012	0.0014	0.0019	0.0022	0.0024	0.0029
16	3100K	0.0000	0.0003	0.0004	0.0005	0.0011	0.0012	0.0014	0.0019	0.0023	0.0025	0.0029
17	3117K	0.0000	0.0004	0.0006	0.0009	0.0013	0.0015	0.0016	0.0021	0.0025	0.0027	0.0030
18	3098K	0.0000	0.0002	0.0003	0.0006	0.0010	0.0013	0.0014	0.0018	0.0022	0.0024	0.0028
19	3142K	0.0000	0.0002	0.0003	0.0003	0.0009	0.0011	0.0013	0.0016	0.0021	0.0022	0.0025
20	3103K	0.0000	0.0003	0.0004	0.0004	0.0009	0.0013	0.0014	0.0017	0.0022	0.0023	0.0027
21	3105K	0.0000	0.0001	0.0004	0.0004	0.0009	0.0011	0.0014	0.0017	0.0021	0.0023	0.0027
22	3121K	0.0000	0.0003	0.0004	0.0005	0.0009	0.0012	0.0014	0.0018	0.0022	0.0026	0.0030
23	2965K	0.0000	0.0004	0.0005	0.0005	0.0010	0.0013	0.0014	0.0018	0.0023	0.0024	0.0028
24	3101K	0.0000	0.0002	0.0003	0.0004	0.0008	0.0011	0.0013	0.0016	0.0019	0.0022	0.0025
25	3104K	0.0000	0.0004	0.0004	0.0004	0.0010	0.0013	0.0013	0.0018	0.0022	0.0024	0.0028

Forward Voltage [V] data for tested units

$T_s = T_{air} = 55^\circ\text{C}$; $I_f = 65\text{mA}$; $T_s \geq 53^\circ\text{C}$ and $T_{air} \geq 50^\circ\text{C}$ in compliance with LM-80-15

CCT (nd)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3117K	5.546	5.548	5.556	5.553	5.551	5.546	5.553	5.546	5.557	5.545	5.547
2	3115K	5.577	5.584	5.582	5.588	5.584	5.575	5.599	5.575	5.574	5.575	5.575
3	3106K	5.642	5.620	5.613	5.620	5.616	5.611	5.620	5.617	5.608	5.607	5.612
4	3104K	5.602	5.602	5.597	5.606	5.678	5.597	5.601	5.596	5.592	5.594	5.598
5	3088K	5.705	5.611	5.603	5.607	5.602	5.596	5.605	5.595	5.596	5.596	5.596
6	3123K	5.567	5.584	5.568	5.579	5.573	5.577	5.575	5.567	5.564	5.569	5.565
7	3085K	5.565	5.568	5.570	5.582	5.571	5.607	5.576	5.565	5.563	5.564	5.567
8	3126K	5.595	5.595	5.596	5.611	5.601	5.598	5.596	5.596	5.592	5.590	5.594
9	3101K	5.602	5.567	5.559	5.587	5.568	5.561	5.563	5.557	5.555	5.558	5.558
10	3139K	5.697	5.744	5.615	5.627	5.616	5.676	5.616	5.612	5.609	5.609	5.612
11	3106K	5.580	5.627	5.577	5.586	5.581	5.637	5.577	5.584	5.574	5.572	5.574
12	3134K	5.606	5.566	5.567	5.576	5.570	5.568	5.566	5.563	5.561	5.563	5.571
13	3124K	5.589	5.591	5.595	5.607	5.640	5.705	5.594	5.590	5.591	5.589	5.590
14	3136K	5.601	5.587	5.585	5.595	5.589	5.583	5.587	5.581	5.578	5.581	5.583
15	3107K	5.575	5.577	5.575	5.584	5.585	5.586	5.581	5.574	5.573	5.572	5.577
16	3100K	5.577	5.728	5.555	5.566	5.557	5.562	5.558	5.555	5.551	5.551	5.553
17	3117K	5.593	5.594	5.598	5.607	5.600	5.612	5.595	5.594	5.591	5.591	5.594
18	3098K	5.566	5.568	5.567	5.577	5.572	5.572	5.572	5.566	5.562	5.563	5.567
19	3142K	5.797	5.610	5.595	5.646	5.596	5.637	5.592	5.590	5.586	5.586	5.589
20	3103K	5.593	5.603	5.597	5.606	5.598	5.646	5.601	5.596	5.594	5.592	5.595
21	3105K	5.578	5.580	5.582	5.590	5.593	5.586	5.582	5.581	5.577	5.578	5.579
22	3121K	5.574	5.574	5.575	5.583	5.577	5.576	5.575	5.570	5.570	5.569	5.570
23	2965K	5.599	5.603	5.609	5.611	5.832	5.602	5.599	5.597	5.595	5.596	5.602
24	3101K	5.576	5.601	5.593	5.587	5.585	5.582	5.588	5.575	5.574	5.571	5.578
25	3104K	5.595	5.602	5.593	5.608	5.598	5.614	5.596	5.595	5.612	5.590	5.601

Luminous Flux [lm] data for tested units

$T_s = T_{air} = 105^{\circ}\text{C}$; $I_f = 65\text{mA}$; $T_s \geq 103^{\circ}\text{C}$ and $T_{air} \geq 100^{\circ}\text{C}$ in compliance with LM-80-15

	CCT (±0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	3114K	73.390	73.610	73.550	73.500	73.360	73.310	73.170	73.030	72.890	72.790	72.730
2	3090K	72.100	72.280	72.150	72.110	72.040	71.800	71.690	71.520	71.350	71.150	71.060
3	3109K	73.490	73.600	73.500	73.380	73.210	73.040	72.910	72.810	72.680	72.520	72.260
4	3118K	73.570	73.710	73.590	73.480	73.300	73.220	73.010	72.880	72.700	72.530	72.380
5	2947K	73.070	73.160	73.020	72.910	72.700	72.650	72.520	72.370	72.130	71.930	71.770
6	3104K	72.430	72.580	72.550	72.480	72.330	72.210	71.970	71.890	71.670	71.600	71.380
7	2920K	71.660	71.790	71.550	71.540	71.420	71.300	71.100	70.960	70.760	70.680	70.570
8	3117K	73.240	73.390	73.310	73.230	73.120	72.910	72.810	72.550	72.520	72.370	72.230
9	3117K	70.540	70.590	70.420	70.390	70.320	70.260	70.110	69.920	69.840	69.660	69.610
10	3126K	71.440	71.550	71.420	71.240	71.090	70.970	70.940	70.760	70.540	70.440	70.370
11	3089K	72.030	72.070	71.990	71.820	71.670	71.500	71.420	71.310	71.130	70.910	70.770
12	3091K	71.480	71.600	71.470	71.330	71.270	71.210	70.990	70.820	70.750	70.700	70.560
13	3127K	70.920	71.140	71.040	70.990	70.870	70.700	70.620	70.450	70.280	70.140	69.960
14	3117K	71.880	72.080	71.930	71.830	71.800	71.670	71.520	71.390	71.310	71.170	70.950
15	3085K	72.680	72.820	72.660	72.560	72.490	72.380	72.230	72.110	72.000	71.940	71.730
16	3096K	71.200	71.270	71.160	71.050	70.950	70.760	70.670	70.590	70.460	70.330	70.170
17	3106K	73.460	73.470	73.400	73.290	73.240	73.120	72.990	72.880	72.710	72.610	72.450
18	3081K	72.870	72.900	72.820	72.690	72.630	72.480	72.320	72.200	72.100	72.010	71.770
19	3100K	72.430	72.480	72.370	72.210	72.030	71.890	71.820	71.590	71.320	71.290	71.210
20	3082K	71.610	71.680	71.590	71.460	71.370	71.200	70.970	70.740	70.510	70.340	70.150
21	2961K	73.470	73.620	73.460	73.380	73.340	73.120	72.890	72.770	72.550	72.340	72.150
22	3101K	72.680	72.840	72.620	72.580	72.430	72.260	72.080	72.030	71.880	71.790	71.660
23	3099K	72.430	72.560	72.420	72.390	72.270	72.100	71.910	71.780	71.750	71.620	71.400
24	3121K	72.650	72.860	72.820	72.730	72.590	72.500	72.350	72.270	72.090	71.930	71.820
25	3107K	72.460	72.570	72.470	72.370	72.240	72.120	71.940	71.890	71.660	71.450	71.280

Normalized Luminous Flux data for tested units

$T_s = T_{air} = 105^{\circ}\text{C}$; $I_f = 65\text{mA}$; $T_s \geq 103^{\circ}\text{C}$ and $T_{air} \geq 100^{\circ}\text{C}$ in compliance with LM-80-15

	CCT (±0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	3114K	1.0000	1.0030	1.0022	1.0015	0.9996	0.9989	0.9970	0.9951	0.9932	0.9918	0.9910
2	3090K	1.0000	1.0025	1.0007	1.0001	0.9992	0.9958	0.9943	0.9920	0.9896	0.9868	0.9856
3	3109K	1.0000	1.0015	1.0001	0.9985	0.9962	0.9939	0.9921	0.9907	0.9890	0.9868	0.9833
4	3118K	1.0000	1.0019	1.0003	0.9988	0.9963	0.9952	0.9924	0.9906	0.9882	0.9859	0.9838
5	2947K	1.0000	1.0012	0.9993	0.9978	0.9949	0.9943	0.9925	0.9904	0.9871	0.9844	0.9822
6	3104K	1.0000	1.0021	1.0017	1.0007	0.9986	0.9970	0.9936	0.9925	0.9895	0.9885	0.9855
7	2920K	1.0000	1.0018	0.9985	0.9983	0.9967	0.9950	0.9922	0.9902	0.9874	0.9863	0.9848
8	3117K	1.0000	1.0020	1.0010	0.9999	0.9984	0.9955	0.9941	0.9906	0.9902	0.9881	0.9862
9	3117K	1.0000	1.0007	0.9983	0.9979	0.9969	0.9960	0.9939	0.9912	0.9901	0.9875	0.9868
10	3126K	1.0000	1.0015	0.9997	0.9972	0.9951	0.9934	0.9930	0.9905	0.9874	0.9860	0.9850
11	3089K	1.0000	1.0006	0.9994	0.9971	0.9950	0.9926	0.9915	0.9900	0.9875	0.9845	0.9825
12	3091K	1.0000	1.0017	0.9999	0.9979	0.9971	0.9962	0.9931	0.9908	0.9898	0.9891	0.9871
13	3127K	1.0000	1.0031	1.0017	1.0010	0.9993	0.9969	0.9958	0.9934	0.9910	0.9890	0.9865
14	3117K	1.0000	1.0028	1.0007	0.9993	0.9989	0.9971	0.9950	0.9932	0.9921	0.9901	0.9871
15	3085K	1.0000	1.0019	0.9997	0.9983	0.9974	0.9959	0.9938	0.9922	0.9906	0.9898	0.9869
16	3096K	1.0000	1.0010	0.9994	0.9979	0.9965	0.9938	0.9926	0.9914	0.9896	0.9878	0.9855
17	3106K	1.0000	1.0001	0.9992	0.9977	0.9970	0.9954	0.9936	0.9921	0.9898	0.9884	0.9863
18	3081K	1.0000	1.0004	0.9993	0.9975	0.9967	0.9946	0.9925	0.9908	0.9894	0.9882	0.9849
19	3100K	1.0000	1.0007	0.9992	0.9970	0.9945	0.9925	0.9916	0.9884	0.9847	0.9843	0.9832
20	3082K	1.0000	1.0010	0.9997	0.9979	0.9966	0.9943	0.9911	0.9879	0.9846	0.9823	0.9796
21	2961K	1.0000	1.0020	0.9999	0.9988	0.9982	0.9952	0.9921	0.9905	0.9875	0.9846	0.9820
22	3101K	1.0000	1.0022	0.9992	0.9986	0.9966	0.9942	0.9917	0.9911	0.9890	0.9878	0.9860
23	3099K	1.0000	1.0018	0.9999	0.9994	0.9978	0.9954	0.9928	0.9910	0.9906	0.9888	0.9858
24	3121K	1.0000	1.0029	1.0023	1.0011	0.9992	0.9979	0.9959	0.9948	0.9923	0.9901	0.9886
25	3107K	1.0000	1.0015	1.0001	0.9988	0.9970	0.9953	0.9928	0.9921	0.9890	0.9861	0.9837

CIE 1976 u' data for tested units

$T_s = T_{air} = 105^{\circ}\text{C}$, $I_f = 65\text{mA}$; $T_s \geq 103^{\circ}\text{C}$ and $T_{air} \geq 100^{\circ}\text{C}$ in compliance with LM-80-15

CCT (mK)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1 3114K	0.2464	0.2461	0.2462	0.2461	0.2456	0.2459	0.2460	0.2459	0.2456	0.2452	0.2452
2 3090K	0.2481	0.2477	0.2478	0.2478	0.2474	0.2476	0.2477	0.2476	0.2472	0.2469	0.2469
3 3109K	0.2472	0.2469	0.2470	0.2470	0.2465	0.2467	0.2470	0.2468	0.2464	0.2461	0.2461
4 3118K	0.2468	0.2465	0.2466	0.2465	0.2461	0.2463	0.2465	0.2463	0.2459	0.2456	0.2456
5 2947K	0.2519	0.2515	0.2516	0.2515	0.2511	0.2513	0.2515	0.2513	0.2510	0.2507	0.2506
6 3104K	0.2474	0.2471	0.2472	0.2471	0.2467	0.2469	0.2471	0.2469	0.2466	0.2462	0.2462
7 2920K	0.2538	0.2535	0.2536	0.2535	0.2530	0.2533	0.2534	0.2533	0.2529	0.2526	0.2525
8 3117K	0.2467	0.2463	0.2464	0.2463	0.2458	0.2461	0.2463	0.2461	0.2458	0.2455	0.2454
9 3117K	0.2468	0.2467	0.2467	0.2465	0.2461	0.2464	0.2465	0.2464	0.2460	0.2457	0.2457
10 3126K	0.2470	0.2467	0.2468	0.2467	0.2463	0.2464	0.2466	0.2464	0.2461	0.2458	0.2457
11 3089K	0.2481	0.2478	0.2478	0.2478	0.2474	0.2476	0.2477	0.2475	0.2472	0.2468	0.2468
12 3091K	0.2477	0.2475	0.2475	0.2475	0.2470	0.2472	0.2474	0.2472	0.2469	0.2466	0.2466
13 3127K	0.2461	0.2458	0.2459	0.2458	0.2454	0.2456	0.2458	0.2456	0.2453	0.2449	0.2449
14 3117K	0.2459	0.2456	0.2456	0.2455	0.2452	0.2454	0.2455	0.2453	0.2450	0.2448	0.2447
15 3085K	0.2480	0.2476	0.2477	0.2477	0.2472	0.2474	0.2476	0.2474	0.2470	0.2467	0.2467
16 3096K	0.2477	0.2473	0.2474	0.2474	0.2469	0.2471	0.2472	0.2471	0.2467	0.2464	0.2464
17 3106K	0.2473	0.2470	0.2470	0.2470	0.2465	0.2468	0.2469	0.2467	0.2463	0.2460	0.2461
18 3081K	0.2482	0.2479	0.2480	0.2479	0.2474	0.2477	0.2478	0.2476	0.2473	0.2470	0.2469
19 3100K	0.2473	0.2469	0.2470	0.2469	0.2464	0.2466	0.2468	0.2466	0.2461	0.2459	0.2459
20 3082K	0.2483	0.2480	0.2481	0.2480	0.2476	0.2477	0.2479	0.2477	0.2475	0.2471	0.2471
21 2961K	0.2517	0.2513	0.2515	0.2514	0.2508	0.2510	0.2512	0.2510	0.2507	0.2504	0.2504
22 3101K	0.2474	0.2471	0.2471	0.2470	0.2466	0.2467	0.2469	0.2467	0.2464	0.2461	0.2462
23 3099K	0.2479	0.2476	0.2477	0.2476	0.2472	0.2473	0.2475	0.2473	0.2471	0.2467	0.2467
24 3121K	0.2471	0.2467	0.2468	0.2467	0.2463	0.2465	0.2466	0.2465	0.2462	0.2458	0.2458
25 3107K	0.2474	0.2471	0.2471	0.2470	0.2466	0.2467	0.2469	0.2467	0.2464	0.2461	0.2460

CIE 1976 v' data for tested units

$T_s = T_{air} = 105^{\circ}\text{C}$, $I_f = 65\text{mA}$; $T_s \geq 103^{\circ}\text{C}$ and $T_{air} \geq 100^{\circ}\text{C}$ in compliance with LM-80-15

CCT (mK)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1 3114K	0.5200	0.5197	0.5195	0.5192	0.5191	0.5187	0.5185	0.5182	0.5179	0.5177	0.5174
2 3090K	0.5172	0.5170	0.5166	0.5164	0.5162	0.5159	0.5157	0.5153	0.5150	0.5149	0.5145
3 3109K	0.5179	0.5176	0.5173	0.5172	0.5169	0.5166	0.5165	0.5162	0.5157	0.5156	0.5153
4 3118K	0.5181	0.5178	0.5175	0.5173	0.5170	0.5168	0.5166	0.5163	0.5160	0.5158	0.5154
5 2947K	0.5247	0.5244	0.5240	0.5239	0.5237	0.5234	0.5231	0.5228	0.5226	0.5225	0.5221
6 3104K	0.5178	0.5175	0.5171	0.5170	0.5167	0.5164	0.5162	0.5159	0.5156	0.5154	0.5151
7 2920K	0.5216	0.5213	0.5209	0.5208	0.5205	0.5202	0.5200	0.5197	0.5194	0.5192	0.5189
8 3117K	0.5186	0.5182	0.5179	0.5177	0.5175	0.5172	0.5170	0.5166	0.5164	0.5162	0.5159
9 3117K	0.5182	0.5180	0.5177	0.5175	0.5172	0.5169	0.5167	0.5164	0.5160	0.5159	0.5155
10 3126K	0.5163	0.5159	0.5156	0.5155	0.5152	0.5149	0.5147	0.5144	0.5142	0.5140	0.5136
11 3089K	0.5174	0.5169	0.5166	0.5165	0.5162	0.5159	0.5157	0.5153	0.5151	0.5148	0.5145
12 3091K	0.5186	0.5185	0.5180	0.5179	0.5177	0.5174	0.5172	0.5168	0.5166	0.5164	0.5161
13 3127K	0.5193	0.5190	0.5187	0.5185	0.5183	0.5180	0.5177	0.5174	0.5172	0.5169	0.5166
14 3117K	0.5214	0.5211	0.5208	0.5206	0.5204	0.5201	0.5199	0.5195	0.5193	0.5192	0.5188
15 3085K	0.5183	0.5180	0.5176	0.5175	0.5173	0.5170	0.5168	0.5164	0.5162	0.5160	0.5156
16 3096K	0.5179	0.5176	0.5173	0.5171	0.5169	0.5166	0.5164	0.5161	0.5158	0.5156	0.5153
17 3106K	0.5179	0.5177	0.5173	0.5172	0.5169	0.5167	0.5165	0.5161	0.5158	0.5157	0.5153
18 3081K	0.5182	0.5180	0.5177	0.5175	0.5172	0.5170	0.5167	0.5164	0.5161	0.5160	0.5156
19 3100K	0.5187	0.5184	0.5180	0.5179	0.5176	0.5173	0.5171	0.5168	0.5164	0.5163	0.5159
20 3082K	0.5176	0.5173	0.5169	0.5168	0.5165	0.5162	0.5159	0.5158	0.5155	0.5153	0.5149
21 2961K	0.5232	0.5230	0.5226	0.5225	0.5222	0.5218	0.5215	0.5214	0.5211	0.5209	0.5206
22 3101K	0.5183	0.5180	0.5176	0.5175	0.5172	0.5168	0.5166	0.5164	0.5161	0.5159	0.5158
23 3099K	0.5167	0.5163	0.5161	0.5159	0.5156	0.5152	0.5150	0.5148	0.5145	0.5144	0.5140
24 3121K	0.5166	0.5164	0.5161	0.5159	0.5157	0.5153	0.5151	0.5149	0.5147	0.5144	0.5140
25 3107K	0.5174	0.5171	0.5168	0.5166	0.5163	0.5159	0.5157	0.5155	0.5152	0.5150	0.5147

Delta u'v' data for tested units

T_s = T_{air} = 105°C, I_f = 65mA; T_s ≥ 103°C and T_{air} ≥ 100°C in compliance with LM-80-15

CCT (nd)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3114K	0.0000	0.0004	0.0005	0.0009	0.0012	0.0014	0.0016	0.0019	0.0022	0.0026	0.0029
2	3090K	0.0000	0.0004	0.0007	0.0009	0.0012	0.0014	0.0016	0.0020	0.0024	0.0026	0.0030
3	3109K	0.0000	0.0004	0.0006	0.0007	0.0012	0.0014	0.0014	0.0017	0.0023	0.0025	0.0028
4	3118K	0.0000	0.0004	0.0006	0.0009	0.0013	0.0014	0.0015	0.0019	0.0023	0.0026	0.0030
5	2947K	0.0000	0.0005	0.0008	0.0009	0.0013	0.0014	0.0016	0.0020	0.0023	0.0025	0.0029
6	3104K	0.0000	0.0004	0.0007	0.0009	0.0013	0.0015	0.0016	0.0020	0.0023	0.0027	0.0030
7	2920K	0.0000	0.0004	0.0007	0.0009	0.0014	0.0015	0.0016	0.0020	0.0024	0.0027	0.0030
8	3117K	0.0000	0.0006	0.0008	0.0010	0.0014	0.0015	0.0016	0.0021	0.0024	0.0027	0.0030
9	3117K	0.0000	0.0002	0.0005	0.0008	0.0012	0.0014	0.0015	0.0018	0.0023	0.0025	0.0029
10	3126K	0.0000	0.0005	0.0007	0.0009	0.0013	0.0015	0.0016	0.0020	0.0023	0.0026	0.0030
11	3089K	0.0000	0.0006	0.0009	0.0009	0.0014	0.0016	0.0017	0.0022	0.0025	0.0029	0.0032
12	3091K	0.0000	0.0002	0.0006	0.0007	0.0011	0.0013	0.0014	0.0019	0.0022	0.0025	0.0027
13	3127K	0.0000	0.0004	0.0006	0.0009	0.0012	0.0014	0.0016	0.0020	0.0022	0.0027	0.0030
14	3117K	0.0000	0.0004	0.0007	0.0009	0.0012	0.0014	0.0016	0.0020	0.0023	0.0025	0.0029
15	3085K	0.0000	0.0005	0.0008	0.0009	0.0013	0.0014	0.0016	0.0020	0.0023	0.0026	0.0030
16	3096K	0.0000	0.0005	0.0007	0.0009	0.0013	0.0014	0.0016	0.0019	0.0023	0.0026	0.0029
17	3106K	0.0000	0.0004	0.0007	0.0008	0.0013	0.0013	0.0015	0.0019	0.0023	0.0026	0.0029
18	3081K	0.0000	0.0004	0.0005	0.0008	0.0013	0.0013	0.0016	0.0019	0.0023	0.0025	0.0029
19	3100K	0.0000	0.0005	0.0008	0.0009	0.0014	0.0016	0.0017	0.0020	0.0026	0.0028	0.0031
20	3082K	0.0000	0.0004	0.0007	0.0009	0.0013	0.0015	0.0017	0.0019	0.0022	0.0026	0.0030
21	2961K	0.0000	0.0004	0.0006	0.0008	0.0013	0.0016	0.0018	0.0019	0.0023	0.0026	0.0029
22	3101K	0.0000	0.0004	0.0008	0.0009	0.0014	0.0017	0.0018	0.0020	0.0024	0.0027	0.0028
23	3099K	0.0000	0.0005	0.0006	0.0009	0.0013	0.0016	0.0017	0.0020	0.0023	0.0026	0.0030
24	3121K	0.0000	0.0004	0.0006	0.0008	0.0012	0.0014	0.0016	0.0018	0.0021	0.0026	0.0029
25	3107K	0.0000	0.0004	0.0007	0.0009	0.0014	0.0017	0.0018	0.0020	0.0024	0.0027	0.0030

Forward Voltage [V] data for tested units

T_s = T_{air} = 105°C, I_f = 65mA; T_s ≥ 103°C and T_{air} ≥ 100°C in compliance with LM-80-15

CCT (nd)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3114K	5.603	5.609	5.604	5.613	5.609	5.607	5.607	5.602	5.603	5.601	5.601
2	3090K	5.596	5.579	5.571	5.582	5.576	5.578	5.573	5.575	5.565	5.567	5.568
3	3109K	5.593	5.604	5.590	5.604	5.596	5.836	5.596	5.589	5.863	5.589	5.592
4	3118K	5.581	5.800	5.583	5.604	5.645	5.674	5.583	5.585	5.578	5.578	5.580
5	2947K	5.627	5.585	5.588	5.657	5.586	5.588	5.593	5.588	5.579	5.576	5.582
6	3104K	5.565	5.565	5.559	5.572	5.680	5.577	5.561	5.570	5.555	5.556	5.560
7	2920K	5.614	5.596	5.600	5.613	5.608	5.600	5.596	5.597	5.636	5.592	5.594
8	3117K	5.595	5.783	5.595	5.610	5.771	5.601	5.599	5.612	5.600	5.592	5.603
9	3117K	5.645	5.837	5.587	5.598	5.589	5.587	5.583	5.585	5.580	5.582	5.582
10	3126K	5.557	5.570	5.583	5.565	5.583	5.669	5.598	5.557	5.554	5.551	5.556
11	3089K	5.565	6.797	5.560	5.569	5.563	5.565	5.559	5.566	5.610	5.576	5.560
12	3091K	5.556	5.619	5.928	5.571	5.564	5.566	5.560	5.566	5.576	5.557	5.560
13	3127K	5.587	5.748	5.579	5.840	5.580	5.584	5.580	5.996	5.579	5.572	5.577
14	3117K	5.623	5.599	5.612	5.845	5.615	5.601	5.601	5.605	5.595	5.593	5.599
15	3085K	5.567	5.564	5.562	5.628	5.604	5.569	5.579	5.565	5.582	5.559	5.565
16	3096K	5.592	5.608	5.555	5.571	5.558	5.570	5.579	5.617	5.555	5.552	5.555
17	3106K	5.580	5.554	5.550	5.564	5.553	5.562	5.552	5.558	5.554	5.546	5.551
18	3081K	5.592	5.781	5.595	5.611	5.594	5.610	5.593	5.648	5.592	5.590	5.596
19	3100K	5.842	5.593	5.617	5.658	5.600	5.597	5.593	5.593	5.586	5.587	5.593
20	3082K	5.598	5.620	5.714	5.612	5.611	5.613	5.602	5.600	5.598	5.598	5.599
21	2961K	5.619	5.602	5.605	5.617	5.603	5.608	5.624	5.605	5.603	5.597	5.602
22	3101K	5.623	5.602	5.597	5.607	5.599	5.602	5.598	5.596	5.601	5.591	5.595
23	3099K	5.574	5.592	5.581	5.592	5.580	5.578	5.576	5.577	5.578	5.573	5.577
24	3121K	5.575	5.626	5.580	5.578	5.572	5.571	5.568	5.571	5.566	5.563	5.570
25	3107K	5.577	5.671	5.707	5.722	5.589	5.587	5.582	5.624	5.585	5.580	5.584

Luminous Flux [lm] data for tested units

$T_s = T_{air} = 85^{\circ}C$, $I_f = 100mA$; $T_s \geq 83^{\circ}C$ and $T_{air} \geq 80^{\circ}C$ in compliance with LM-80-15

	CCT (±0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	3118K	108.400	108.700	108.600	108.300	108.200	108.000	107.700	107.400	107.200	107.000	106.800
2	3111K	109.300	109.100	108.900	108.800	108.700	108.400	108.200	108.000	107.800	107.600	107.200
3	3129K	107.000	106.900	106.700	106.600	106.500	106.300	105.900	105.700	105.600	105.300	105.000
4	3129K	108.700	108.500	108.300	108.100	107.900	107.600	107.400	107.300	107.100	107.000	106.700
5	3134K	106.900	106.800	106.700	106.600	106.400	106.100	105.900	105.700	105.500	105.200	104.900
6	3131K	106.400	106.000	105.800	105.700	105.600	105.300	105.200	104.800	104.600	104.300	103.900
7	3109K	108.100	107.900	107.700	107.600	107.400	107.200	106.900	106.600	106.300	106.100	105.800
8	3124K	108.700	108.600	108.400	108.300	108.100	107.900	107.800	107.600	107.500	107.100	106.900
9	3130K	107.500	107.600	107.400	107.200	107.000	106.800	106.600	106.400	106.200	106.000	105.800
10	3131K	107.900	107.800	107.700	107.400	107.200	106.900	106.700	106.500	106.200	105.900	105.600
11	3078K	105.900	106.100	106.000	105.800	105.700	105.500	105.200	105.000	104.800	104.600	104.300
12	3086K	109.000	108.800	108.500	108.300	108.100	107.900	107.600	107.200	106.900	106.700	106.300
13	3162K	109.700	109.300	109.100	109.000	108.800	108.600	108.300	107.900	107.700	107.500	107.200
14	3123K	107.400	107.300	107.000	106.900	106.800	106.600	106.300	106.000	105.600	105.500	105.400
15	3150K	108.400	108.100	108.000	107.700	107.500	107.300	107.000	106.700	106.300	106.100	105.900
16	3148K	108.400	108.000	107.700	107.600	107.400	107.100	106.900	106.800	106.500	106.300	106.000
17	3128K	107.700	107.400	107.200	107.000	106.900	106.700	106.400	106.200	106.100	105.900	105.700
18	3103K	107.700	107.600	107.300	107.100	107.000	106.700	106.500	106.200	105.800	105.600	105.300
19	3132K	109.300	109.000	108.800	108.700	108.500	108.400	108.200	108.000	107.700	107.400	107.000
20	3099K	107.000	106.700	106.600	106.400	106.300	106.000	105.600	105.300	105.100	104.900	104.600
21	3114K	106.600	106.200	106.100	105.800	105.600	105.400	105.100	105.000	104.700	104.300	104.200
22	3088K	107.900	107.800	107.700	107.500	107.300	107.000	106.700	106.400	106.200	105.900	105.500
23	3141K	108.400	108.500	108.200	108.100	107.900	107.600	107.500	107.300	107.000	106.800	106.400
24	3116K	108.400	108.300	108.100	107.900	107.800	107.500	107.300	107.000	106.800	106.500	106.200
25	3121K	107.200	107.000	106.700	106.600	106.400	106.300	106.100	105.900	105.600	105.300	104.900

Normalized Luminous Flux data for tested units

$T_s = T_{air} = 85^{\circ}C$, $I_f = 100mA$; $T_s \geq 83^{\circ}C$ and $T_{air} \geq 80^{\circ}C$ in compliance with LM-80-15

	CCT (±0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	3118K	1.0000	1.0028	1.0018	0.9991	0.9982	0.9963	0.9935	0.9908	0.9889	0.9871	0.9852
2	3111K	1.0000	0.9982	0.9963	0.9954	0.9945	0.9918	0.9899	0.9881	0.9863	0.9844	0.9808
3	3129K	1.0000	0.9991	0.9972	0.9963	0.9953	0.9935	0.9897	0.9879	0.9869	0.9841	0.9813
4	3129K	1.0000	0.9982	0.9963	0.9945	0.9926	0.9899	0.9880	0.9871	0.9853	0.9844	0.9816
5	3134K	1.0000	0.9991	0.9981	0.9972	0.9953	0.9925	0.9906	0.9888	0.9869	0.9841	0.9813
6	3131K	1.0000	0.9962	0.9944	0.9934	0.9925	0.9897	0.9887	0.9850	0.9831	0.9803	0.9765
7	3109K	1.0000	0.9981	0.9963	0.9954	0.9935	0.9917	0.9889	0.9861	0.9833	0.9815	0.9787
8	3124K	1.0000	0.9991	0.9972	0.9963	0.9945	0.9926	0.9917	0.9899	0.9890	0.9853	0.9834
9	3130K	1.0000	1.0009	0.9991	0.9972	0.9953	0.9935	0.9916	0.9898	0.9879	0.9860	0.9842
10	3131K	1.0000	0.9991	0.9981	0.9954	0.9935	0.9907	0.9889	0.9870	0.9842	0.9815	0.9787
11	3078K	1.0000	1.0019	1.0009	0.9991	0.9981	0.9962	0.9934	0.9915	0.9896	0.9877	0.9849
12	3086K	1.0000	0.9982	0.9954	0.9936	0.9917	0.9899	0.9872	0.9835	0.9807	0.9789	0.9752
13	3162K	1.0000	0.9964	0.9945	0.9936	0.9918	0.9900	0.9872	0.9836	0.9818	0.9799	0.9772
14	3123K	1.0000	0.9991	0.9963	0.9953	0.9944	0.9926	0.9898	0.9870	0.9832	0.9823	0.9814
15	3150K	1.0000	0.9972	0.9963	0.9935	0.9917	0.9899	0.9871	0.9843	0.9806	0.9788	0.9769
16	3148K	1.0000	0.9963	0.9935	0.9926	0.9908	0.9880	0.9862	0.9852	0.9825	0.9806	0.9779
17	3128K	1.0000	0.9972	0.9954	0.9935	0.9926	0.9907	0.9879	0.9861	0.9851	0.9833	0.9814
18	3103K	1.0000	0.9991	0.9963	0.9944	0.9935	0.9907	0.9889	0.9861	0.9824	0.9805	0.9777
19	3132K	1.0000	0.9973	0.9954	0.9945	0.9927	0.9918	0.9899	0.9881	0.9854	0.9826	0.9790
20	3099K	1.0000	0.9972	0.9963	0.9944	0.9935	0.9907	0.9869	0.9841	0.9822	0.9804	0.9776
21	3114K	1.0000	0.9962	0.9953	0.9925	0.9906	0.9887	0.9859	0.9850	0.9822	0.9784	0.9775
22	3088K	1.0000	0.9991	0.9981	0.9963	0.9944	0.9917	0.9889	0.9861	0.9842	0.9815	0.9778
23	3141K	1.0000	1.0009	0.9982	0.9972	0.9954	0.9926	0.9917	0.9899	0.9871	0.9852	0.9815
24	3116K	1.0000	0.9991	0.9972	0.9954	0.9945	0.9917	0.9899	0.9871	0.9852	0.9825	0.9797
25	3121K	1.0000	0.9981	0.9953	0.9944	0.9925	0.9916	0.9897	0.9879	0.9851	0.9823	0.9785

CIE 1976 u' data for tested units

$T_s = T_{air} = 85^{\circ}\text{C}$; $I_f = 100\text{mA}$; $T_s \geq 83^{\circ}\text{C}$ and $T_{air} \geq 80^{\circ}\text{C}$ in compliance with LM-80-15

CCT (mK)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3118K	0.2467	0.2463	0.2462	0.2463	0.2458	0.2459	0.2460	0.2459	0.2456	0.2453	0.2452
2	3111K	0.2468	0.2465	0.2466	0.2467	0.2461	0.2462	0.2463	0.2462	0.2459	0.2456	0.2455
3	3129K	0.2464	0.2461	0.2462	0.2462	0.2457	0.2458	0.2460	0.2458	0.2456	0.2453	0.2451
4	3129K	0.2463	0.2459	0.2460	0.2460	0.2454	0.2456	0.2457	0.2456	0.2453	0.2449	0.2450
5	3134K	0.2461	0.2458	0.2459	0.2460	0.2454	0.2455	0.2457	0.2455	0.2453	0.2449	0.2449
6	3131K	0.2467	0.2461	0.2463	0.2464	0.2458	0.2459	0.2461	0.2459	0.2457	0.2453	0.2453
7	3109K	0.2469	0.2465	0.2465	0.2468	0.2461	0.2463	0.2464	0.2461	0.2459	0.2455	0.2455
8	3124K	0.2463	0.2461	0.2460	0.2462	0.2456	0.2457	0.2458	0.2455	0.2453	0.2449	0.2450
9	3130K	0.2467	0.2463	0.2464	0.2466	0.2460	0.2462	0.2463	0.2461	0.2459	0.2455	0.2455
10	3131K	0.2460	0.2457	0.2457	0.2459	0.2454	0.2455	0.2456	0.2454	0.2452	0.2449	0.2448
11	3078K	0.2482	0.2474	0.2474	0.2476	0.2471	0.2472	0.2472	0.2471	0.2469	0.2465	0.2465
12	3086K	0.2480	0.2475	0.2476	0.2478	0.2473	0.2474	0.2473	0.2473	0.2470	0.2466	0.2466
13	3162K	0.2447	0.2444	0.2445	0.2445	0.2441	0.2441	0.2442	0.2440	0.2454	0.2433	0.2433
14	3123K	0.2465	0.2464	0.2465	0.2465	0.2460	0.2462	0.2462	0.2460	0.2459	0.2454	0.2454
15	3150K	0.2454	0.2452	0.2452	0.2453	0.2448	0.2449	0.2449	0.2447	0.2446	0.2442	0.2441
16	3148K	0.2453	0.2449	0.2450	0.2451	0.2445	0.2447	0.2449	0.2445	0.2443	0.2440	0.2439
17	3128K	0.2461	0.2458	0.2459	0.2459	0.2455	0.2456	0.2459	0.2454	0.2453	0.2449	0.2449
18	3103K	0.2471	0.2469	0.2470	0.2470	0.2465	0.2466	0.2468	0.2465	0.2463	0.2459	0.2459
19	3132K	0.2460	0.2456	0.2457	0.2457	0.2453	0.2453	0.2456	0.2452	0.2451	0.2447	0.2446
20	3099K	0.2476	0.2472	0.2473	0.2473	0.2469	0.2470	0.2472	0.2466	0.2466	0.2462	0.2462
21	3114K	0.2469	0.2465	0.2466	0.2467	0.2461	0.2463	0.2465	0.2461	0.2460	0.2455	0.2455
22	3088K	0.2481	0.2479	0.2479	0.2480	0.2474	0.2476	0.2479	0.2474	0.2473	0.2469	0.2470
23	3141K	0.2456	0.2453	0.2453	0.2454	0.2449	0.2451	0.2453	0.2449	0.2448	0.2444	0.2444
24	3116K	0.2468	0.2465	0.2465	0.2465	0.2461	0.2462	0.2464	0.2461	0.2459	0.2455	0.2454
25	3121K	0.2467	0.2464	0.2465	0.2465	0.2460	0.2461	0.2464	0.2459	0.2457	0.2454	0.2453

CIE 1976 v' data for tested units

$T_s = T_{air} = 85^{\circ}\text{C}$; $I_f = 100\text{mA}$; $T_s \geq 83^{\circ}\text{C}$ and $T_{air} \geq 80^{\circ}\text{C}$ in compliance with LM-80-15

CCT (mK)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3118K	0.5184	0.5177	0.5174	0.5171	0.5169	0.5166	0.5163	0.5160	0.5158	0.5155	0.5152
2	3111K	0.5191	0.5188	0.5185	0.5182	0.5181	0.5178	0.5174	0.5172	0.5170	0.5168	0.5165
3	3129K	0.5180	0.5177	0.5174	0.5171	0.5170	0.5166	0.5162	0.5161	0.5159	0.5156	0.5153
4	3129K	0.5184	0.5180	0.5177	0.5175	0.5173	0.5170	0.5165	0.5164	0.5162	0.5159	0.5156
5	3134K	0.5184	0.5181	0.5179	0.5176	0.5175	0.5171	0.5167	0.5165	0.5163	0.5161	0.5158
6	3131K	0.5167	0.5162	0.5159	0.5156	0.5154	0.5152	0.5148	0.5146	0.5144	0.5141	0.5138
7	3109K	0.5189	0.5185	0.5183	0.5179	0.5178	0.5175	0.5170	0.5169	0.5166	0.5164	0.5160
8	3124K	0.5190	0.5187	0.5185	0.5181	0.5180	0.5177	0.5172	0.5170	0.5168	0.5166	0.5162
9	3130K	0.5168	0.5165	0.5163	0.5160	0.5158	0.5156	0.5151	0.5150	0.5147	0.5145	0.5142
10	3131K	0.5192	0.5190	0.5188	0.5185	0.5184	0.5181	0.5176	0.5174	0.5172	0.5170	0.5166
11	3078K	0.5185	0.5181	0.5179	0.5175	0.5175	0.5172	0.5166	0.5164	0.5163	0.5160	0.5157
12	3086K	0.5182	0.5178	0.5176	0.5173	0.5172	0.5169	0.5164	0.5162	0.5159	0.5158	0.5154
13	3162K	0.5196	0.5193	0.5191	0.5188	0.5187	0.5183	0.5178	0.5177	0.5176	0.5172	0.5168
14	3123K	0.5185	0.5183	0.5179	0.5177	0.5176	0.5173	0.5168	0.5166	0.5165	0.5162	0.5159
15	3150K	0.5188	0.5185	0.5182	0.5179	0.5179	0.5176	0.5170	0.5169	0.5168	0.5164	0.5160
16	3148K	0.5194	0.5190	0.5188	0.5186	0.5185	0.5181	0.5182	0.5174	0.5173	0.5169	0.5166
17	3128K	0.5192	0.5188	0.5185	0.5182	0.5182	0.5179	0.5179	0.5172	0.5170	0.5167	0.5164
18	3103K	0.5190	0.5186	0.5184	0.5181	0.5180	0.5177	0.5176	0.5170	0.5168	0.5165	0.5162
19	3132K	0.5190	0.5186	0.5183	0.5180	0.5180	0.5177	0.5176	0.5169	0.5168	0.5165	0.5161
20	3099K	0.5178	0.5174	0.5171	0.5169	0.5168	0.5165	0.5164	0.5157	0.5155	0.5152	0.5149
21	3114K	0.5182	0.5178	0.5175	0.5173	0.5172	0.5169	0.5168	0.5163	0.5160	0.5157	0.5154
22	3088K	0.5175	0.5172	0.5169	0.5166	0.5165	0.5163	0.5162	0.5156	0.5154	0.5151	0.5148
23	3141K	0.5192	0.5189	0.5185	0.5183	0.5183	0.5180	0.5179	0.5173	0.5171	0.5168	0.5165
24	3116K	0.5183	0.5180	0.5177	0.5175	0.5174	0.5171	0.5170	0.5165	0.5162	0.5159	0.5156
25	3121K	0.5180	0.5176	0.5174	0.5171	0.5170	0.5168	0.5167	0.5160	0.5158	0.5155	0.5152

Delta u'v' data for tested units

T_s = T_{air} = 85°C, I_f = 100mA; T_s ≥ 83°C and T_{air} ≥ 80°C in compliance with LM-80-15

CCT (mK)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3118K	0.0000	0.0008	0.0011	0.0014	0.0017	0.0020	0.0022	0.0025	0.0028	0.0032	0.0035
2	3111K	0.0000	0.0004	0.0006	0.0009	0.0012	0.0014	0.0018	0.0020	0.0023	0.0026	0.0029
3	3129K	0.0000	0.0004	0.0006	0.0009	0.0012	0.0015	0.0018	0.0020	0.0022	0.0026	0.0030
4	3129K	0.0000	0.0006	0.0008	0.0009	0.0014	0.0016	0.0020	0.0021	0.0024	0.0029	0.0031
5	3134K	0.0000	0.0004	0.0005	0.0008	0.0011	0.0014	0.0017	0.0020	0.0022	0.0026	0.0029
6	3131K	0.0000	0.0008	0.0009	0.0011	0.0016	0.0017	0.0020	0.0022	0.0025	0.0030	0.0032
7	3109K	0.0000	0.0006	0.0007	0.0010	0.0014	0.0015	0.0020	0.0022	0.0025	0.0029	0.0032
8	3124K	0.0000	0.0004	0.0006	0.0009	0.0012	0.0014	0.0019	0.0022	0.0024	0.0028	0.0031
9	3130K	0.0000	0.0005	0.0006	0.0008	0.0012	0.0013	0.0017	0.0019	0.0022	0.0026	0.0029
10	3131K	0.0000	0.0004	0.0005	0.0007	0.0010	0.0012	0.0016	0.0019	0.0022	0.0025	0.0029
11	3078K	0.0000	0.0009	0.0010	0.0012	0.0015	0.0016	0.0021	0.0024	0.0026	0.0030	0.0033
12	3086K	0.0000	0.0006	0.0007	0.0009	0.0012	0.0014	0.0019	0.0021	0.0025	0.0028	0.0031
13	3162K	0.0000	0.0004	0.0005	0.0008	0.0011	0.0014	0.0019	0.0020	0.0021	0.0028	0.0031
14	3123K	0.0000	0.0002	0.0006	0.0008	0.0010	0.0012	0.0017	0.0020	0.0021	0.0025	0.0028
15	3150K	0.0000	0.0004	0.0006	0.0009	0.0011	0.0013	0.0019	0.0020	0.0022	0.0027	0.0031
16	3148K	0.0000	0.0006	0.0007	0.0008	0.0012	0.0014	0.0013	0.0022	0.0023	0.0028	0.0031
17	3128K	0.0000	0.0005	0.0007	0.0010	0.0012	0.0014	0.0013	0.0021	0.0023	0.0028	0.0030
18	3103K	0.0000	0.0004	0.0006	0.0009	0.0012	0.0014	0.0014	0.0021	0.0023	0.0028	0.0030
19	3132K	0.0000	0.0006	0.0008	0.0010	0.0012	0.0015	0.0015	0.0022	0.0024	0.0028	0.0032
20	3099K	0.0000	0.0006	0.0008	0.0009	0.0012	0.0014	0.0015	0.0023	0.0025	0.0030	0.0032
21	3114K	0.0000	0.0006	0.0008	0.0009	0.0013	0.0014	0.0015	0.0021	0.0024	0.0029	0.0031
22	3088K	0.0000	0.0004	0.0006	0.0009	0.0012	0.0013	0.0013	0.0020	0.0022	0.0027	0.0029
23	3141K	0.0000	0.0004	0.0008	0.0009	0.0011	0.0013	0.0013	0.0020	0.0022	0.0027	0.0030
24	3116K	0.0000	0.0004	0.0007	0.0009	0.0011	0.0013	0.0014	0.0019	0.0023	0.0027	0.0030
25	3121K	0.0000	0.0005	0.0006	0.0009	0.0012	0.0013	0.0013	0.0022	0.0024	0.0028	0.0031

Forward Voltage [V] data for tested units

T_s = T_{air} = 85°C, I_f = 100mA; T_s ≥ 83°C and T_{air} ≥ 80°C in compliance with LM-80-15

CCT (mK)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3118K	5.742	6.466	5.754	5.757	5.751	5.755	5.745	5.742	5.744	5.745	5.740
2	3111K	5.765	5.773	5.800	5.782	5.767	5.771	5.771	5.765	5.766	5.784	5.767
3	3129K	5.721	5.720	5.951	5.737	5.730	5.723	5.720	5.717	5.715	5.723	5.713
4	3129K	5.815	5.793	5.796	5.900	5.810	5.831	5.790	5.785	5.803	5.789	5.785
5	3134K	5.763	5.766	5.764	5.781	5.868	5.778	5.776	5.998	5.758	5.852	5.760
6	3131K	5.786	6.164	5.922	5.790	5.746	5.747	5.744	5.740	5.754	5.738	5.741
7	3109K	5.775	5.782	5.782	5.811	5.782	6.069	5.787	5.777	5.776	5.781	5.778
8	3124K	5.771	5.808	5.825	5.819	5.829	5.778	5.792	5.770	5.771	5.774	5.770
9	3130K	5.732	5.741	6.137	5.746	5.738	5.739	5.739	5.733	5.735	5.735	5.732
10	3131K	5.952	5.810	5.820	5.798	5.882	5.783	5.781	5.774	5.776	5.779	5.775
11	3078K	5.827	5.773	5.770	5.781	5.895	5.767	5.765	5.760	5.760	5.762	5.759
12	3086K	5.722	5.744	5.729	5.763	5.728	5.732	5.727	5.721	5.719	5.725	5.723
13	3162K	5.786	5.822	5.788	5.801	5.809	5.788	5.788	5.779	5.707	5.784	5.784
14	3123K	5.721	5.722	5.727	5.736	5.729	5.728	5.934	5.722	5.724	5.722	5.722
15	3150K	5.751	5.752	5.749	5.761	5.755	5.760	5.869	5.748	5.746	5.748	5.749
16	3148K	5.734	5.889	5.741	5.755	5.744	5.743	5.741	5.740	5.735	5.740	5.752
17	3128K	5.755	5.760	5.766	5.772	5.761	5.751	5.751	5.752	5.745	5.750	5.750
18	3103K	5.720	5.956	5.726	5.755	5.728	5.732	5.726	5.730	5.722	5.724	5.720
19	3132K	5.776	5.888	5.745	5.755	5.910	5.758	5.742	5.742	5.741	5.742	5.738
20	3099K	5.821	5.792	5.731	5.744	5.731	5.735	5.730	5.732	5.726	5.727	5.728
21	3114K	5.772	5.730	5.709	5.726	5.708	5.718	5.711	5.709	5.720	5.705	5.706
22	3088K	5.869	5.753	5.735	5.758	5.837	5.743	5.744	5.744	5.734	5.734	5.735
23	3141K	5.736	5.807	5.740	5.752	5.741	5.748	5.741	5.740	5.739	5.741	5.737
24	3116K	5.774	5.798	5.775	5.753	5.745	5.760	5.744	5.739	5.733	5.737	5.738
25	3121K	5.732	5.737	5.732	5.748	5.733	5.738	5.738	5.749	5.728	5.732	5.733

Luminous Flux [lm] data for tested units

$T_s = T_{air} = 105^{\circ}\text{C}$, $I_f = 120\text{mA}$; $T_s \geq 103^{\circ}\text{C}$ and $T_{air} \geq 100^{\circ}\text{C}$ in compliance with LM-80-15

	CCT (±0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	3070K	125.800	125.500	125.200	124.900	124.500	124.300	124.100	123.800	123.600	123.200	123.100
2	3078K	125.600	125.400	125.300	125.100	124.900	124.700	124.400	124.200	124.100	123.800	123.500
3	3133K	127.500	127.100	126.800	126.500	126.100	125.700	125.600	125.300	125.000	124.800	124.300
4	3136K	125.300	125.000	124.800	124.600	124.300	123.900	123.700	123.300	123.000	122.900	122.600
5	2980K	127.400	127.500	127.100	127.000	126.500	126.400	126.000	125.600	125.500	125.100	125.000
6	3140K	124.900	125.100	124.700	124.600	124.300	124.100	123.900	123.700	123.500	123.100	122.600
7	3130K	126.700	126.800	126.500	126.200	126.000	125.600	125.200	125.000	124.500	124.200	123.900
8	3094K	127.200	127.000	126.500	126.400	126.100	125.800	125.500	125.100	124.800	124.300	123.900
9	3000K	127.200	127.100	126.700	126.500	126.300	125.800	125.400	125.100	124.500	124.100	123.700
10	3139K	127.100	126.800	126.500	126.400	126.100	125.700	125.400	125.000	124.600	124.400	124.200
11	3141K	128.300	128.100	127.800	127.400	127.300	127.000	126.600	126.300	126.100	125.700	125.300
12	3146K	128.400	127.900	127.500	127.200	127.000	126.800	126.400	126.300	125.800	125.500	125.200
13	3144K	120.200	120.000	119.600	119.400	119.100	118.900	118.800	118.600	118.300	117.900	117.500
14	3150K	125.800	125.900	125.400	125.100	124.900	124.600	124.200	123.800	123.500	123.000	122.800
15	3142K	127.800	127.600	127.200	127.000	126.700	126.400	125.900	125.500	125.100	124.800	124.700
16	3133K	126.900	126.800	126.400	126.000	125.800	125.500	125.200	124.900	124.700	124.400	124.000
17	3109K	126.800	126.900	126.500	126.100	125.800	125.600	125.400	125.300	125.200	124.900	124.600
18	3136K	124.700	124.400	124.100	124.000	123.600	123.300	123.000	122.700	122.500	122.300	122.000
19	3149K	127.100	126.600	126.200	126.100	125.900	125.500	125.000	124.700	124.300	123.800	123.600
20	3143K	125.900	125.600	125.400	125.200	124.700	124.400	124.100	123.700	123.400	122.900	122.500
21	3121K	122.500	122.600	122.300	122.000	121.800	121.400	121.100	121.000	120.700	120.400	120.100
22	3096K	124.600	124.000	123.800	123.600	123.400	123.000	122.600	122.500	122.200	121.600	121.200
23	3134K	127.000	126.800	126.600	126.400	125.900	125.600	125.200	124.900	124.500	124.100	123.600
24	3142K	126.000	125.900	125.600	125.300	125.000	124.800	124.400	124.000	123.800	123.500	123.000
25	3156K	127.700	127.400	127.300	127.100	126.800	126.500	126.300	125.900	125.500	125.300	124.900

Normalized Luminous Flux data for tested units

$T_s = T_{air} = 105^{\circ}\text{C}$, $I_f = 120\text{mA}$; $T_s \geq 103^{\circ}\text{C}$ and $T_{air} \geq 100^{\circ}\text{C}$ in compliance with LM-80-15

	CCT (±0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	3070K	1.0000	0.9976	0.9952	0.9928	0.9897	0.9881	0.9865	0.9841	0.9825	0.9793	0.9785
2	3078K	1.0000	0.9984	0.9976	0.9960	0.9944	0.9928	0.9904	0.9889	0.9881	0.9857	0.9833
3	3133K	1.0000	0.9969	0.9945	0.9922	0.9890	0.9859	0.9851	0.9827	0.9804	0.9788	0.9749
4	3136K	1.0000	0.9976	0.9960	0.9944	0.9920	0.9888	0.9872	0.9840	0.9816	0.9808	0.9785
5	2980K	1.0000	1.0008	0.9976	0.9969	0.9929	0.9922	0.9890	0.9859	0.9851	0.9819	0.9812
6	3140K	1.0000	1.0016	0.9984	0.9976	0.9952	0.9936	0.9920	0.9904	0.9888	0.9856	0.9816
7	3130K	1.0000	1.0008	0.9984	0.9961	0.9945	0.9913	0.9882	0.9866	0.9826	0.9803	0.9779
8	3094K	1.0000	0.9984	0.9945	0.9937	0.9914	0.9890	0.9866	0.9835	0.9811	0.9772	0.9741
9	3000K	1.0000	0.9992	0.9961	0.9945	0.9929	0.9890	0.9858	0.9835	0.9788	0.9756	0.9725
10	3139K	1.0000	0.9976	0.9953	0.9945	0.9921	0.9890	0.9866	0.9835	0.9803	0.9788	0.9772
11	3141K	1.0000	0.9984	0.9961	0.9930	0.9922	0.9899	0.9867	0.9844	0.9829	0.9797	0.9766
12	3146K	1.0000	0.9961	0.9930	0.9907	0.9891	0.9875	0.9844	0.9836	0.9798	0.9774	0.9751
13	3144K	1.0000	0.9983	0.9950	0.9933	0.9908	0.9892	0.9884	0.9867	0.9842	0.9809	0.9775
14	3150K	1.0000	1.0008	0.9968	0.9944	0.9928	0.9905	0.9873	0.9841	0.9817	0.9777	0.9762
15	3142K	1.0000	0.9984	0.9953	0.9937	0.9914	0.9890	0.9851	0.9820	0.9789	0.9765	0.9757
16	3133K	1.0000	0.9992	0.9961	0.9929	0.9913	0.9890	0.9866	0.9842	0.9827	0.9803	0.9771
17	3109K	1.0000	1.0008	0.9976	0.9945	0.9921	0.9905	0.9890	0.9882	0.9874	0.9850	0.9826
18	3136K	1.0000	0.9976	0.9952	0.9944	0.9912	0.9888	0.9864	0.9840	0.9824	0.9808	0.9783
19	3149K	1.0000	0.9961	0.9929	0.9921	0.9906	0.9874	0.9835	0.9811	0.9780	0.9740	0.9725
20	3143K	1.0000	0.9976	0.9960	0.9944	0.9905	0.9881	0.9857	0.9825	0.9801	0.9762	0.9730
21	3121K	1.0000	1.0008	0.9984	0.9959	0.9943	0.9910	0.9886	0.9878	0.9853	0.9829	0.9804
22	3096K	1.0000	0.9952	0.9936	0.9920	0.9904	0.9872	0.9839	0.9831	0.9807	0.9759	0.9727
23	3134K	1.0000	0.9984	0.9969	0.9953	0.9913	0.9890	0.9858	0.9835	0.9803	0.9772	0.9732
24	3142K	1.0000	0.9992	0.9968	0.9944	0.9921	0.9905	0.9873	0.9841	0.9825	0.9802	0.9762
25	3156K	1.0000	0.9977	0.9969	0.9953	0.9930	0.9906	0.9890	0.9859	0.9828	0.9812	0.9781

CIE 1976 u' data for tested units

$T_s = T_{air} = 105^\circ\text{C}$, $I_f = 120\text{mA}$; $T_s \geq 103^\circ\text{C}$ and $T_{air} \geq 100^\circ\text{C}$ in compliance with LM-80-15

CCT (K=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3070K	0.2487	0.2484	0.2486	0.2485	0.2480	0.2481	0.2485	0.2483	0.2479	0.2476	0.2475
2	3078K	0.2478	0.2469	0.2472	0.2468	0.2462	0.2463	0.2468	0.2464	0.2460	0.2457	0.2456
3	3133K	0.2459	0.2456	0.2458	0.2456	0.2452	0.2452	0.2458	0.2454	0.2450	0.2447	0.2446
4	3136K	0.2458	0.2453	0.2455	0.2454	0.2449	0.2450	0.2455	0.2451	0.2448	0.2445	0.2443
5	2980K	0.2504	0.2506	0.2504	0.2507	0.2502	0.2502	0.2503	0.2499	0.2501	0.2495	0.2497
6	3140K	0.2457	0.2452	0.2453	0.2453	0.2448	0.2449	0.2453	0.2449	0.2448	0.2444	0.2445
7	3130K	0.2462	0.2460	0.2461	0.2460	0.2456	0.2456	0.2459	0.2456	0.2453	0.2450	0.2450
8	3094K	0.2476	0.2473	0.2474	0.2473	0.2469	0.2470	0.2473	0.2470	0.2468	0.2464	0.2464
9	3000K	0.2495	0.2493	0.2494	0.2494	0.2489	0.2489	0.2493	0.2491	0.2488	0.2484	0.2484
10	3139K	0.2457	0.2456	0.2457	0.2456	0.2452	0.2453	0.2456	0.2454	0.2450	0.2447	0.2447
11	3141K	0.2458	0.2455	0.2457	0.2456	0.2452	0.2452	0.2455	0.2452	0.2450	0.2447	0.2447
12	3146K	0.2454	0.2452	0.2453	0.2453	0.2447	0.2448	0.2451	0.2449	0.2446	0.2443	0.2443
13	3144K	0.2452	0.2448	0.2450	0.2449	0.2445	0.2446	0.2449	0.2447	0.2445	0.2440	0.2441
14	3150K	0.2458	0.2457	0.2459	0.2457	0.2453	0.2454	0.2456	0.2453	0.2452	0.2447	0.2448
15	3142K	0.2449	0.2446	0.2448	0.2446	0.2443	0.2443	0.2446	0.2443	0.2441	0.2436	0.2438
16	3133K	0.2462	0.2459	0.2461	0.2460	0.2456	0.2457	0.2460	0.2457	0.2454	0.2450	0.2450
17	3109K	0.2466	0.2460	0.2462	0.2461	0.2455	0.2456	0.2459	0.2456	0.2454	0.2451	0.2451
18	3136K	0.2461	0.2457	0.2460	0.2458	0.2455	0.2455	0.2459	0.2455	0.2451	0.2448	0.2449
19	3149K	0.2453	0.2450	0.2452	0.2450	0.2446	0.2446	0.2449	0.2446	0.2444	0.2441	0.2440
20	3143K	0.2458	0.2456	0.2458	0.2457	0.2452	0.2453	0.2456	0.2453	0.2451	0.2447	0.2446
21	3121K	0.2464	0.2460	0.2463	0.2462	0.2458	0.2458	0.2461	0.2459	0.2456	0.2452	0.2452
22	3096K	0.2475	0.2472	0.2474	0.2471	0.2467	0.2467	0.2471	0.2468	0.2466	0.2462	0.2462
23	3134K	0.2456	0.2451	0.2454	0.2452	0.2448	0.2448	0.2452	0.2449	0.2446	0.2443	0.2444
24	3142K	0.2453	0.2450	0.2452	0.2450	0.2446	0.2446	0.2450	0.2447	0.2445	0.2443	0.2442
25	3156K	0.2455	0.2452	0.2453	0.2452	0.2448	0.2449	0.2452	0.2449	0.2447	0.2443	0.2443

CIE 1976 v' data for tested units

$T_s = T_{air} = 105^\circ\text{C}$, $I_f = 120\text{mA}$; $T_s \geq 103^\circ\text{C}$ and $T_{air} \geq 100^\circ\text{C}$ in compliance with LM-80-15

CCT (K=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3070K	0.5179	0.5173	0.5169	0.5167	0.5167	0.5163	0.5160	0.5159	0.5156	0.5153	0.5149
2	3078K	0.5201	0.5192	0.5188	0.5184	0.5183	0.5179	0.5175	0.5173	0.5171	0.5169	0.5165
3	3133K	0.5192	0.5187	0.5183	0.5180	0.5180	0.5177	0.5174	0.5171	0.5169	0.5167	0.5164
4	3136K	0.5192	0.5186	0.5182	0.5180	0.5180	0.5176	0.5173	0.5170	0.5168	0.5167	0.5163
5	2980K	0.5252	0.5251	0.5245	0.5244	0.5244	0.5240	0.5235	0.5232	0.5232	0.5230	0.5229
6	3140K	0.5190	0.5181	0.5178	0.5175	0.5175	0.5170	0.5167	0.5165	0.5163	0.5161	0.5160
7	3130K	0.5186	0.5181	0.5178	0.5175	0.5175	0.5171	0.5167	0.5165	0.5161	0.5159	0.5158
8	3094K	0.5185	0.5180	0.5176	0.5173	0.5173	0.5169	0.5166	0.5164	0.5162	0.5159	0.5157
9	3000K	0.5255	0.5250	0.5247	0.5244	0.5245	0.5240	0.5236	0.5235	0.5233	0.5232	0.5229
10	3139K	0.5191	0.5187	0.5185	0.5181	0.5181	0.5176	0.5173	0.5172	0.5169	0.5168	0.5165
11	3141K	0.5185	0.5180	0.5177	0.5175	0.5174	0.5169	0.5166	0.5164	0.5163	0.5161	0.5158
12	3146K	0.5193	0.5190	0.5187	0.5184	0.5183	0.5178	0.5175	0.5173	0.5172	0.5170	0.5168
13	3144K	0.5203	0.5196	0.5192	0.5189	0.5189	0.5184	0.5181	0.5179	0.5177	0.5175	0.5173
14	3150K	0.5173	0.5170	0.5167	0.5164	0.5163	0.5160	0.5156	0.5154	0.5152	0.5150	0.5148
15	3142K	0.5216	0.5211	0.5210	0.5206	0.5206	0.5202	0.5198	0.5196	0.5195	0.5193	0.5191
16	3133K	0.5182	0.5178	0.5176	0.5173	0.5173	0.5169	0.5165	0.5163	0.5161	0.5159	0.5156
17	3109K	0.5201	0.5195	0.5193	0.5190	0.5189	0.5184	0.5180	0.5178	0.5177	0.5175	0.5173
18	3136K	0.5181	0.5176	0.5174	0.5171	0.5171	0.5167	0.5163	0.5161	0.5158	0.5157	0.5154
19	3149K	0.5193	0.5189	0.5187	0.5183	0.5183	0.5178	0.5175	0.5173	0.5171	0.5170	0.5167
20	3143K	0.5183	0.5179	0.5177	0.5173	0.5173	0.5169	0.5165	0.5163	0.5161	0.5160	0.5157
21	3121K	0.5191	0.5186	0.5183	0.5180	0.5180	0.5175	0.5172	0.5171	0.5168	0.5166	0.5164
22	3096K	0.5186	0.5183	0.5180	0.5174	0.5174	0.5170	0.5166	0.5164	0.5162	0.5160	0.5158
23	3134K	0.5202	0.5197	0.5195	0.5191	0.5191	0.5187	0.5183	0.5182	0.5179	0.5177	0.5174
24	3142K	0.5202	0.5199	0.5196	0.5193	0.5193	0.5189	0.5185	0.5183	0.5181	0.5182	0.5177
25	3156K	0.5176	0.5172	0.5169	0.5165	0.5165	0.5160	0.5158	0.5156	0.5154	0.5152	0.5149

Delta u'v' data for tested units

T_s = T_{air} = 105°C, I_f = 120mA; T_s ≥ 103°C and T_{air} ≥ 100°C in compliance with LM-80-15

CCT (nd)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3070K	0.0000	0.0007	0.0010	0.0012	0.0014	0.0017	0.0019	0.0020	0.0024	0.0028	0.0032
2	3078K	0.0000	0.0013	0.0014	0.0020	0.0024	0.0027	0.0028	0.0031	0.0035	0.0038	0.0042
3	3133K	0.0000	0.0006	0.0009	0.0012	0.0014	0.0017	0.0018	0.0022	0.0025	0.0028	0.0031
4	3136K	0.0000	0.0008	0.0010	0.0013	0.0015	0.0018	0.0019	0.0023	0.0026	0.0028	0.0033
5	2980K	0.0000	0.0002	0.0007	0.0009	0.0008	0.0012	0.0017	0.0021	0.0020	0.0024	0.0024
6	3140K	0.0000	0.0010	0.0013	0.0016	0.0017	0.0022	0.0023	0.0026	0.0028	0.0032	0.0032
7	3130K	0.0000	0.0005	0.0008	0.0011	0.0013	0.0016	0.0019	0.0022	0.0027	0.0030	0.0030
8	3094K	0.0000	0.0006	0.0009	0.0012	0.0014	0.0017	0.0019	0.0022	0.0024	0.0029	0.0030
9	3000K	0.0000	0.0005	0.0008	0.0011	0.0012	0.0016	0.0019	0.0020	0.0023	0.0025	0.0028
10	3139K	0.0000	0.0004	0.0006	0.0010	0.0011	0.0016	0.0018	0.0019	0.0023	0.0025	0.0028
11	3141K	0.0000	0.0006	0.0008	0.0010	0.0013	0.0017	0.0019	0.0022	0.0023	0.0026	0.0029
12	3146K	0.0000	0.0004	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0022	0.0025	0.0027
13	3144K	0.0000	0.0008	0.0011	0.0014	0.0016	0.0020	0.0022	0.0025	0.0027	0.0030	0.0032
14	3150K	0.0000	0.0003	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0022	0.0025	0.0027
15	3142K	0.0000	0.0006	0.0006	0.0010	0.0012	0.0015	0.0018	0.0021	0.0022	0.0026	0.0027
16	3133K	0.0000	0.0005	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0022	0.0026	0.0029
17	3109K	0.0000	0.0008	0.0009	0.0012	0.0016	0.0020	0.0022	0.0025	0.0027	0.0030	0.0032
18	3136K	0.0000	0.0006	0.0007	0.0010	0.0012	0.0015	0.0018	0.0021	0.0025	0.0027	0.0030
19	3149K	0.0000	0.0005	0.0006	0.0010	0.0012	0.0017	0.0018	0.0021	0.0024	0.0026	0.0029
20	3143K	0.0000	0.0004	0.0006	0.0010	0.0012	0.0015	0.0018	0.0021	0.0023	0.0025	0.0029
21	3121K	0.0000	0.0006	0.0008	0.0011	0.0013	0.0017	0.0019	0.0021	0.0024	0.0028	0.0030
22	3096K	0.0000	0.0004	0.0006	0.0013	0.0014	0.0018	0.0020	0.0023	0.0026	0.0029	0.0031
23	3134K	0.0000	0.0007	0.0007	0.0012	0.0014	0.0017	0.0019	0.0021	0.0025	0.0028	0.0030
24	3142K	0.0000	0.0004	0.0006	0.0009	0.0011	0.0015	0.0017	0.0020	0.0022	0.0022	0.0027
25	3156K	0.0000	0.0005	0.0007	0.0011	0.0013	0.0017	0.0018	0.0021	0.0023	0.0027	0.0030

Forward Voltage [V] data for tested units

T_s = T_{air} = 105°C, I_f = 120mA; T_s ≥ 103°C and T_{air} ≥ 100°C in compliance with LM-80-15

CCT (nd)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3070K	5.787	5.784	5.784	5.800	5.785	5.801	5.789	5.782	5.780	5.779	5.782
2	3078K	5.864	5.867	5.928	5.876	5.874	5.881	5.889	5.859	5.860	5.864	5.858
3	3133K	5.830	5.843	5.833	5.880	5.841	5.844	5.830	5.823	5.822	5.824	5.827
4	3136K	5.784	6.032	5.786	5.794	5.785	5.790	5.820	5.788	5.781	5.783	5.785
5	2980K	5.843	5.839	5.844	5.875	5.851	5.850	5.846	5.844	5.837	5.843	5.845
6	3140K	5.881	5.875	5.890	5.890	5.883	5.898	5.888	5.884	5.876	5.962	5.880
7	3130K	5.832	5.828	5.836	6.025	5.869	5.851	5.902	5.837	5.827	5.828	5.830
8	3094K	5.855	5.852	5.855	5.874	5.857	5.866	5.863	5.861	5.849	5.854	5.855
9	3000K	5.889	5.942	5.900	5.902	5.896	5.889	5.928	5.890	6.068	5.887	5.886
10	3139K	5.905	5.885	5.886	5.908	5.927	5.885	5.895	5.889	5.883	5.889	5.882
11	3141K	5.948	5.860	5.879	5.901	5.866	5.909	5.866	5.869	5.860	5.866	5.860
12	3146K	5.871	5.866	5.885	5.940	5.871	5.868	5.872	5.869	5.880	5.868	5.867
13	3144K	5.835	5.836	5.841	5.953	5.841	6.010	5.842	5.847	5.831	5.834	5.833
14	3150K	5.820	5.801	5.796	5.808	5.803	5.801	5.806	5.795	5.792	5.793	5.792
15	3142K	5.861	5.801	5.850	5.810	5.796	6.022	5.830	5.801	5.789	5.794	5.794
16	3133K	5.887	5.820	5.839	5.837	5.824	6.071	5.828	5.832	5.818	5.829	5.825
17	3109K	5.904	5.886	5.880	5.894	5.885	5.907	5.885	5.900	5.881	5.881	5.878
18	3136K	5.886	5.882	5.872	5.933	5.873	5.880	5.878	5.869	5.863	5.870	5.868
19	3149K	5.866	5.867	5.876	5.885	5.871	5.997	5.870	5.871	5.861	5.867	5.863
20	3143K	5.838	5.845	5.950	5.862	5.890	5.899	5.847	5.840	5.838	5.845	5.840
21	3121K	5.882	5.884	5.880	6.089	5.892	5.891	5.919	5.887	5.874	5.879	5.879
22	3096K	5.868	5.920	5.857	5.867	5.867	5.865	5.861	5.866	5.858	5.856	5.854
23	3134K	5.837	5.838	5.840	5.865	5.850	5.841	5.845	5.842	5.835	5.840	5.838
24	3142K	5.957	6.098	5.872	5.938	5.896	6.061	5.873	5.870	5.863	5.866	5.866
25	3156K	5.840	5.842	5.841	5.901	5.844	5.841	5.844	5.841	5.833	5.840	5.842

Luminous Flux [lm] data for tested units

$T_s = T_{air} = 115^{\circ}C$, $I_f = 120mA$; $T_s \geq 113^{\circ}C$ and $T_{air} \geq 110^{\circ}C$ in compliance with LM-80-15

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	3165K	128.000	127.800	127.500	127.300	127.000	126.500	126.300	126.000	125.700	125.300	124.900
2	3117K	125.900	125.600	125.400	125.100	124.800	124.600	124.300	124.000	123.800	123.300	123.100
3	3116K	127.500	127.300	126.900	126.700	126.400	125.900	125.800	125.400	125.100	124.900	124.800
4	3129K	127.900	127.200	126.800	126.600	126.100	125.700	125.400	125.100	124.800	124.300	123.900
5	3131K	126.800	126.900	126.600	126.100	125.700	125.300	125.100	125.000	124.500	124.300	123.800
6	3120K	126.400	126.200	125.700	125.400	124.900	124.500	124.200	123.900	123.700	123.400	123.100
7	3115K	128.200	127.500	127.000	126.500	126.000	125.600	125.400	125.100	124.700	124.300	123.900
8	3123K	124.800	124.200	123.600	123.200	122.600	122.100	121.900	121.500	121.400	121.000	120.600
9	2972K	126.600	126.500	126.200	126.000	125.700	125.500	125.200	124.900	124.600	124.300	123.900
10	3140K	128.100	128.200	127.700	127.300	127.000	126.700	126.400	126.100	125.800	125.600	125.300
11	3093K	128.100	128.000	127.600	127.200	126.700	126.400	126.200	125.900	125.600	125.200	124.800
12	3135K	127.400	127.000	126.700	126.400	125.900	125.600	125.300	125.100	124.900	124.500	124.000
13	3143K	128.500	128.400	127.800	127.400	127.200	126.900	126.800	126.500	126.300	125.800	125.500
14	3170K	127.200	126.800	126.300	125.800	125.400	125.200	125.100	124.700	124.400	124.100	123.700
15	3142K	128.300	127.600	127.100	126.800	126.200	125.900	125.700	125.300	124.900	124.600	124.300
16	3103K	126.700	126.200	125.800	125.400	125.000	124.500	124.300	123.900	123.700	123.300	122.900
17	3132K	129.100	128.800	128.300	128.100	127.700	127.500	127.300	126.900	126.400	126.000	125.600
18	2974K	126.200	125.900	125.500	125.200	124.800	124.400	124.300	124.100	124.000	123.800	123.400
19	3137K	125.700	125.300	124.900	124.700	124.200	123.800	123.600	123.200	122.800	122.500	122.300
20	3117K	128.300	128.100	127.600	127.300	126.800	126.400	126.100	125.900	125.500	125.000	124.400
21	3128K	128.300	127.900	127.500	127.100	126.800	126.200	126.000	125.800	125.500	125.000	124.500
22	3141K	127.600	127.100	126.600	126.100	125.600	125.200	124.900	124.600	124.200	123.900	123.600
23	3114K	126.200	125.600	125.100	124.600	124.000	123.400	123.200	123.000	122.600	122.300	121.900
24	3115K	128.300	127.700	127.300	127.000	126.600	126.000	125.800	125.600	125.500	125.100	124.900
25	3117K	125.300	124.900	124.600	124.200	123.800	123.400	123.200	122.800	122.500	122.100	121.800

Normalized Luminous Flux data for tested units

$T_s = T_{air} = 115^{\circ}C$, $I_f = 120mA$; $T_s \geq 113^{\circ}C$ and $T_{air} \geq 110^{\circ}C$ in compliance with LM-80-15

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	3165K	1.0000	0.9984	0.9961	0.9945	0.9922	0.9883	0.9867	0.9844	0.9820	0.9789	0.9758
2	3117K	1.0000	0.9976	0.9960	0.9936	0.9913	0.9897	0.9873	0.9849	0.9833	0.9793	0.9778
3	3116K	1.0000	0.9984	0.9953	0.9937	0.9914	0.9875	0.9867	0.9835	0.9812	0.9796	0.9788
4	3129K	1.0000	0.9945	0.9914	0.9898	0.9859	0.9828	0.9805	0.9781	0.9758	0.9719	0.9687
5	3131K	1.0000	1.0008	0.9984	0.9945	0.9913	0.9882	0.9866	0.9858	0.9819	0.9803	0.9763
6	3120K	1.0000	0.9984	0.9945	0.9921	0.9881	0.9850	0.9826	0.9802	0.9786	0.9763	0.9739
7	3115K	1.0000	0.9945	0.9906	0.9867	0.9828	0.9797	0.9782	0.9758	0.9727	0.9696	0.9665
8	3123K	1.0000	0.9952	0.9904	0.9872	0.9824	0.9784	0.9768	0.9736	0.9728	0.9696	0.9663
9	2972K	1.0000	0.9992	0.9968	0.9953	0.9929	0.9913	0.9889	0.9866	0.9842	0.9818	0.9787
10	3140K	1.0000	1.0008	0.9969	0.9938	0.9914	0.9891	0.9867	0.9844	0.9820	0.9805	0.9781
11	3093K	1.0000	0.9992	0.9961	0.9930	0.9891	0.9867	0.9852	0.9828	0.9805	0.9774	0.9742
12	3135K	1.0000	0.9969	0.9945	0.9922	0.9882	0.9859	0.9835	0.9819	0.9804	0.9772	0.9733
13	3143K	1.0000	0.9992	0.9946	0.9914	0.9899	0.9875	0.9868	0.9844	0.9829	0.9790	0.9767
14	3170K	1.0000	0.9969	0.9929	0.9890	0.9858	0.9843	0.9835	0.9803	0.9780	0.9756	0.9725
15	3142K	1.0000	0.9945	0.9906	0.9883	0.9836	0.9813	0.9797	0.9766	0.9735	0.9712	0.9688
16	3103K	1.0000	0.9961	0.9929	0.9897	0.9866	0.9826	0.9811	0.9779	0.9763	0.9732	0.9700
17	3132K	1.0000	0.9977	0.9938	0.9923	0.9892	0.9876	0.9861	0.9830	0.9791	0.9760	0.9729
18	2974K	1.0000	0.9976	0.9945	0.9921	0.9889	0.9857	0.9849	0.9834	0.9826	0.9810	0.9778
19	3137K	1.0000	0.9968	0.9936	0.9920	0.9881	0.9849	0.9833	0.9801	0.9769	0.9745	0.9730
20	3117K	1.0000	0.9984	0.9945	0.9922	0.9883	0.9852	0.9829	0.9813	0.9782	0.9743	0.9696
21	3128K	1.0000	0.9969	0.9938	0.9906	0.9883	0.9836	0.9821	0.9805	0.9782	0.9743	0.9704
22	3141K	1.0000	0.9961	0.9922	0.9882	0.9843	0.9812	0.9788	0.9765	0.9734	0.9710	0.9687
23	3114K	1.0000	0.9952	0.9913	0.9873	0.9826	0.9778	0.9762	0.9746	0.9715	0.9691	0.9659
24	3115K	1.0000	0.9953	0.9922	0.9899	0.9867	0.9821	0.9805	0.9790	0.9782	0.9751	0.9735
25	3117K	1.0000	0.9968	0.9944	0.9912	0.9880	0.9848	0.9832	0.9800	0.9777	0.9745	0.9721

CIE 1976 u' data for tested units

$T_s = T_{air} = 115^{\circ}\text{C}$, $I_f = 120\text{mA}$; $T_s \geq 113^{\circ}\text{C}$ and $T_{air} \geq 110^{\circ}\text{C}$ in compliance with LM-80-15

CCT (K)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1 3165K	0.2448	0.2446	0.2447	0.2446	0.2442	0.2442	0.2446	0.2443	0.2441	0.2438	0.2437
2 3117K	0.2469	0.2466	0.2467	0.2464	0.2459	0.2461	0.2463	0.2461	0.2459	0.2456	0.2454
3 3116K	0.2463	0.2458	0.2457	0.2456	0.2451	0.2452	0.2455	0.2452	0.2450	0.2447	0.2447
4 3129K	0.2459	0.2457	0.2457	0.2455	0.2451	0.2451	0.2454	0.2451	0.2449	0.2446	0.2445
5 3131K	0.2462	0.2458	0.2459	0.2457	0.2453	0.2454	0.2456	0.2454	0.2452	0.2449	0.2448
6 3120K	0.2465	0.2462	0.2462	0.2461	0.2457	0.2458	0.2460	0.2458	0.2455	0.2453	0.2453
7 3115K	0.2469	0.2466	0.2466	0.2465	0.2460	0.2461	0.2462	0.2460	0.2457	0.2454	0.2455
8 3123K	0.2467	0.2465	0.2465	0.2464	0.2461	0.2461	0.2464	0.2462	0.2458	0.2456	0.2456
9 2972K	0.2509	0.2507	0.2507	0.2505	0.2501	0.2502	0.2504	0.2502	0.2499	0.2496	0.2497
10 3140K	0.2462	0.2459	0.2460	0.2459	0.2455	0.2455	0.2457	0.2455	0.2451	0.2449	0.2449
11 3093K	0.2476	0.2474	0.2473	0.2472	0.2468	0.2469	0.2471	0.2468	0.2466	0.2463	0.2463
12 3135K	0.2460	0.2457	0.2457	0.2456	0.2452	0.2453	0.2455	0.2453	0.2450	0.2447	0.2447
13 3143K	0.2456	0.2454	0.2454	0.2453	0.2449	0.2449	0.2451	0.2449	0.2447	0.2444	0.2444
14 3170K	0.2449	0.2448	0.2448	0.2446	0.2442	0.2443	0.2445	0.2442	0.2440	0.2437	0.2438
15 3142K	0.2455	0.2453	0.2453	0.2452	0.2447	0.2447	0.2450	0.2448	0.2445	0.2441	0.2442
16 3103K	0.2471	0.2469	0.2469	0.2468	0.2464	0.2465	0.2466	0.2465	0.2462	0.2459	0.2459
17 3132K	0.2455	0.2452	0.2452	0.2450	0.2446	0.2447	0.2449	0.2447	0.2445	0.2442	0.2442
18 2974K	0.2509	0.2508	0.2508	0.2506	0.2502	0.2503	0.2506	0.2504	0.2501	0.2498	0.2498
19 3137K	0.2462	0.2460	0.2460	0.2459	0.2454	0.2455	0.2457	0.2455	0.2453	0.2450	0.2449
20 3117K	0.2468	0.2466	0.2467	0.2465	0.2461	0.2462	0.2464	0.2462	0.2459	0.2457	0.2457
21 3128K	0.2462	0.2459	0.2459	0.2457	0.2452	0.2454	0.2456	0.2455	0.2452	0.2449	0.2449
22 3141K	0.2454	0.2451	0.2451	0.2451	0.2447	0.2448	0.2450	0.2448	0.2445	0.2442	0.2442
23 3114K	0.2470	0.2468	0.2469	0.2467	0.2463	0.2464	0.2466	0.2464	0.2462	0.2458	0.2458
24 3115K	0.2468	0.2464	0.2464	0.2463	0.2459	0.2461	0.2461	0.2459	0.2456	0.2453	0.2453
25 3117K	0.2469	0.2466	0.2466	0.2465	0.2461	0.2463	0.2464	0.2462	0.2461	0.2457	0.2457

CIE 1976 v' data for tested units

$T_s = T_{air} = 115^{\circ}\text{C}$, $I_f = 120\text{mA}$; $T_s \geq 113^{\circ}\text{C}$ and $T_{air} \geq 110^{\circ}\text{C}$ in compliance with LM-80-15

CCT (K)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1 3165K	0.5189	0.5182	0.5180	0.5178	0.5178	0.5173	0.5170	0.5167	0.5166	0.5165	0.5161
2 3117K	0.5178	0.5171	0.5169	0.5166	0.5166	0.5161	0.5157	0.5155	0.5153	0.5152	0.5148
3 3116K	0.5201	0.5192	0.5189	0.5186	0.5185	0.5181	0.5177	0.5174	0.5173	0.5172	0.5168
4 3129K	0.5198	0.5191	0.5188	0.5186	0.5185	0.5181	0.5177	0.5174	0.5173	0.5172	0.5168
5 3131K	0.5184	0.5177	0.5174	0.5171	0.5171	0.5167	0.5163	0.5160	0.5159	0.5158	0.5155
6 3120K	0.5189	0.5182	0.5179	0.5177	0.5177	0.5172	0.5168	0.5166	0.5165	0.5164	0.5160
7 3115K	0.5181	0.5173	0.5170	0.5167	0.5167	0.5163	0.5157	0.5155	0.5153	0.5152	0.5148
8 3123K	0.5177	0.5172	0.5169	0.5166	0.5166	0.5163	0.5158	0.5155	0.5154	0.5153	0.5149
9 2972K	0.5246	0.5240	0.5237	0.5234	0.5234	0.5230	0.5226	0.5223	0.5222	0.5222	0.5218
10 3140K	0.5172	0.5166	0.5163	0.5161	0.5161	0.5157	0.5152	0.5150	0.5148	0.5148	0.5144
11 3093K	0.5187	0.5181	0.5178	0.5175	0.5175	0.5171	0.5166	0.5164	0.5162	0.5162	0.5157
12 3135K	0.5186	0.5179	0.5176	0.5174	0.5174	0.5170	0.5165	0.5163	0.5161	0.5160	0.5156
13 3143K	0.5190	0.5184	0.5181	0.5178	0.5178	0.5174	0.5170	0.5167	0.5166	0.5165	0.5161
14 3170K	0.5179	0.5174	0.5171	0.5168	0.5168	0.5164	0.5159	0.5157	0.5156	0.5156	0.5151
15 3142K	0.5194	0.5187	0.5184	0.5181	0.5181	0.5177	0.5173	0.5171	0.5169	0.5168	0.5165
16 3103K	0.5190	0.5185	0.5182	0.5179	0.5179	0.5175	0.5170	0.5168	0.5167	0.5166	0.5163
17 3132K	0.5208	0.5202	0.5199	0.5196	0.5196	0.5192	0.5187	0.5185	0.5185	0.5183	0.5180
18 2974K	0.5242	0.5237	0.5234	0.5231	0.5231	0.5227	0.5222	0.5220	0.5219	0.5219	0.5215
19 3137K	0.5176	0.5170	0.5167	0.5164	0.5164	0.5160	0.5156	0.5153	0.5153	0.5151	0.5147
20 3117K	0.5182	0.5176	0.5174	0.5171	0.5170	0.5167	0.5162	0.5160	0.5159	0.5157	0.5154
21 3128K	0.5188	0.5181	0.5177	0.5175	0.5174	0.5170	0.5165	0.5163	0.5163	0.5161	0.5158
22 3141K	0.5199	0.5193	0.5190	0.5188	0.5188	0.5185	0.5180	0.5177	0.5175	0.5173	0.5170
23 3114K	0.5179	0.5174	0.5171	0.5168	0.5168	0.5164	0.5159	0.5157	0.5157	0.5155	0.5151
24 3115K	0.5185	0.5178	0.5175	0.5172	0.5172	0.5169	0.5163	0.5161	0.5160	0.5157	0.5154
25 3117K	0.5179	0.5173	0.5170	0.5167	0.5167	0.5163	0.5158	0.5157	0.5156	0.5154	0.5151

Delta u'v' data for tested units

T_s = T_{air} = 115°C, I_f = 120mA; T_s ≥ 113°C and T_{air} ≥ 110°C in compliance with LM-80-15

CCT (nd)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3165K	0.0000	0.0007	0.0009	0.0011	0.0013	0.0017	0.0019	0.0023	0.0024	0.0026	0.0030
2	3117K	0.0000	0.0008	0.0009	0.0013	0.0016	0.0019	0.0022	0.0024	0.0027	0.0029	0.0034
3	3116K	0.0000	0.0010	0.0013	0.0017	0.0020	0.0023	0.0025	0.0029	0.0031	0.0033	0.0037
4	3129K	0.0000	0.0007	0.0010	0.0013	0.0015	0.0019	0.0022	0.0025	0.0027	0.0029	0.0033
5	3131K	0.0000	0.0008	0.0010	0.0014	0.0016	0.0019	0.0022	0.0025	0.0027	0.0029	0.0032
6	3120K	0.0000	0.0008	0.0010	0.0013	0.0014	0.0018	0.0022	0.0024	0.0026	0.0028	0.0031
7	3115K	0.0000	0.0009	0.0011	0.0015	0.0017	0.0020	0.0025	0.0028	0.0030	0.0033	0.0036
8	3123K	0.0000	0.0005	0.0008	0.0011	0.0013	0.0015	0.0019	0.0023	0.0025	0.0026	0.0030
9	2972K	0.0000	0.0006	0.0009	0.0013	0.0014	0.0017	0.0021	0.0024	0.0026	0.0027	0.0030
10	3140K	0.0000	0.0007	0.0009	0.0011	0.0013	0.0017	0.0021	0.0023	0.0026	0.0027	0.0031
11	3093K	0.0000	0.0006	0.0009	0.0013	0.0014	0.0017	0.0022	0.0024	0.0027	0.0028	0.0033
12	3135K	0.0000	0.0008	0.0010	0.0013	0.0014	0.0017	0.0022	0.0024	0.0027	0.0029	0.0033
13	3143K	0.0000	0.0006	0.0009	0.0012	0.0014	0.0017	0.0021	0.0024	0.0026	0.0028	0.0031
14	3170K	0.0000	0.0005	0.0008	0.0011	0.0013	0.0016	0.0020	0.0023	0.0025	0.0026	0.0030
15	3142K	0.0000	0.0007	0.0010	0.0013	0.0015	0.0019	0.0022	0.0024	0.0027	0.0030	0.0032
16	3103K	0.0000	0.0005	0.0008	0.0011	0.0013	0.0016	0.0021	0.0023	0.0025	0.0027	0.0030
17	3132K	0.0000	0.0007	0.0009	0.0013	0.0015	0.0018	0.0022	0.0024	0.0025	0.0028	0.0031
18	2974K	0.0000	0.0005	0.0008	0.0011	0.0013	0.0016	0.0020	0.0023	0.0024	0.0025	0.0029
19	3137K	0.0000	0.0006	0.0009	0.0012	0.0014	0.0017	0.0021	0.0024	0.0025	0.0028	0.0032
20	3117K	0.0000	0.0006	0.0008	0.0011	0.0014	0.0016	0.0020	0.0023	0.0025	0.0027	0.0030
21	3128K	0.0000	0.0008	0.0011	0.0014	0.0017	0.0020	0.0024	0.0026	0.0027	0.0030	0.0033
22	3141K	0.0000	0.0007	0.0009	0.0011	0.0013	0.0015	0.0019	0.0023	0.0026	0.0029	0.0031
23	3114K	0.0000	0.0005	0.0008	0.0011	0.0013	0.0016	0.0020	0.0023	0.0023	0.0027	0.0030
24	3115K	0.0000	0.0008	0.0011	0.0014	0.0016	0.0017	0.0023	0.0026	0.0028	0.0032	0.0034
25	3117K	0.0000	0.0007	0.0009	0.0013	0.0014	0.0017	0.0022	0.0023	0.0024	0.0028	0.0030

Forward Voltage [V] data for tested units

T_s = T_{air} = 115°C, I_f = 120mA; T_s ≥ 113°C and T_{air} ≥ 110°C in compliance with LM-80-15

CCT (nd)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3165K	5.869	5.915	5.867	5.882	5.868	5.872	5.876	5.870	5.861	5.867	5.868
2	3117K	5.951	5.844	5.859	5.848	5.838	5.872	5.842	5.838	5.828	5.835	5.837
3	3116K	5.813	5.824	5.815	5.851	5.847	5.999	5.911	5.837	5.995	5.835	5.812
4	3129K	5.854	6.037	5.856	5.943	6.088	5.958	5.863	5.875	5.857	5.855	5.858
5	3131K	5.830	5.982	5.836	5.849	5.839	5.984	5.841	5.838	5.825	5.834	5.831
6	3120K	5.889	5.906	5.886	5.900	5.899	5.837	5.992	6.070	5.931	5.885	5.885
7	3115K	5.837	5.829	5.830	5.845	5.908	5.909	5.848	5.832	5.821	5.828	5.826
8	3123K	5.919	5.840	5.848	5.852	5.880	6.138	5.851	5.843	5.838	5.845	5.840
9	2972K	5.860	5.878	5.856	5.881	5.855	5.859	5.861	5.854	5.849	5.854	5.850
10	3140K	5.819	5.835	5.824	5.887	5.934	5.899	5.818	5.812	5.821	5.811	5.812
11	3093K	5.864	5.864	5.855	5.875	5.868	5.889	5.886	5.869	5.855	5.869	5.856
12	3135K	5.875	5.940	5.882	5.894	5.883	6.019	5.884	5.881	5.873	5.882	5.878
13	3143K	5.840	5.950	5.840	5.895	5.931	5.976	5.841	5.865	5.843	5.836	5.837
14	3170K	5.960	5.932	5.880	6.086	5.888	5.943	5.889	5.968	5.873	5.883	5.888
15	3142K	5.877	5.909	5.878	5.888	5.910	6.115	5.881	5.876	5.867	5.881	5.876
16	3103K	5.854	5.843	5.788	5.844	5.803	5.793	5.791	5.790	5.783	5.790	5.786
17	3132K	5.845	5.846	6.075	5.866	5.850	5.867	5.960	5.849	5.844	5.846	5.844
18	2974K	5.853	6.103	5.850	5.896	5.904	6.136	5.851	5.851	5.865	5.954	5.847
19	3137K	5.902	5.888	5.875	6.212	5.855	6.063	5.858	5.855	5.852	5.852	5.851
20	3117K	5.858	6.096	5.865	5.891	5.866	6.154	5.874	5.862	5.870	5.860	5.863
21	3128K	5.947	5.913	5.844	5.895	5.861	5.867	5.850	5.844	5.858	5.998	5.844
22	3141K	5.842	5.872	5.850	5.854	5.951	5.943	5.842	5.839	5.876	5.837	5.837
23	3114K	5.785	5.801	5.789	5.946	5.811	6.100	5.793	5.791	5.786	5.787	5.789
24	3115K	5.879	5.967	5.882	5.909	5.895	5.886	5.887	5.886	5.882	5.886	5.882
25	3117K	5.832	6.055	5.835	5.875	5.840	5.870	5.841	5.839	5.834	5.841	5.841

Luminous Flux [lm] data for tested units

T_s = T_{air} = 105°C, I_f = 150mA; T_s ≥ 103°C and T_{air} ≥ 100°C in compliance with LM-80-15

CCT (±0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3006K	155.200	154.700	154.100	153.700	153.200	152.700	152.200	152.000	151.500	151.000	150.500
2	3148K	155.400	154.800	154.300	153.700	153.100	152.600	152.100	151.700	151.200	150.900	150.400
3	3132K	156.900	156.100	155.400	154.800	154.400	154.100	153.700	153.500	152.900	152.500	152.100
4	3127K	154.700	154.100	153.700	153.200	152.500	151.900	151.600	151.400	151.000	150.700	150.500
5	3147K	155.500	155.200	154.900	154.500	154.000	153.600	153.200	152.800	152.300	151.900	151.300
6	3139K	155.400	155.200	154.600	154.400	153.800	153.300	152.700	152.300	151.900	151.400	151.100
7	3161K	156.200	155.400	155.000	154.400	154.000	153.400	153.000	152.500	152.100	151.600	151.200
8	3156K	154.800	153.900	153.500	152.900	152.300	151.800	151.500	151.000	150.500	149.900	149.400
9	3145K	153.000	153.200	152.700	152.300	152.000	151.400	150.700	150.400	150.100	149.700	149.300
10	3114K	157.200	156.400	156.000	155.500	154.900	154.200	153.800	153.500	153.000	152.500	152.000
11	3106K	155.200	154.900	154.400	153.800	153.300	152.800	152.300	151.900	151.500	151.200	150.800
12	3163K	154.700	154.200	153.800	153.600	152.900	152.600	152.200	151.800	151.300	150.700	150.300
13	3161K	153.800	153.100	152.900	152.300	151.700	151.200	150.700	150.600	150.200	150.000	149.400
14	3130K	156.200	155.600	155.200	154.600	154.100	153.600	153.400	153.200	152.900	152.400	151.900
15	3127K	153.500	153.300	152.800	152.200	151.900	151.500	151.000	150.400	150.000	149.600	149.300
16	3127K	154.000	153.300	152.900	152.400	151.700	151.100	150.800	150.300	150.100	149.700	149.000
17	3109K	153.800	153.300	152.600	152.400	151.900	151.500	151.100	150.700	150.500	150.000	149.300
18	2967K	154.200	153.800	153.200	152.800	152.200	151.800	151.600	151.000	150.600	150.400	149.800
19	3158K	154.900	154.400	154.100	153.800	153.100	152.800	152.200	152.000	151.600	151.200	150.600
20	3129K	153.700	153.100	152.600	152.200	151.900	151.500	151.100	150.700	150.400	149.900	149.800
21	3107K	158.000	157.100	156.700	156.100	155.800	155.600	155.100	154.400	154.200	153.700	153.500
22	3133K	154.600	153.900	153.200	152.800	152.100	151.600	151.200	150.600	150.200	149.800	149.300
23	2988K	158.200	157.500	156.800	156.500	156.100	155.500	155.000	154.900	154.300	153.600	153.200
24	3130K	156.000	155.200	154.700	154.300	153.700	153.300	152.600	152.200	151.900	151.300	150.800
25	3127K	153.200	153.000	152.400	151.900	151.200	150.700	150.400	149.800	149.400	149.200	148.400

Normalized Luminous Flux data for tested units

T_s = T_{air} = 105°C, I_f = 150mA; T_s ≥ 103°C and T_{air} ≥ 100°C in compliance with LM-80-15

CCT (±0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3006K	1.0000	0.9968	0.9929	0.9903	0.9871	0.9839	0.9807	0.9794	0.9762	0.9729	0.9697
2	3148K	1.0000	0.9961	0.9929	0.9891	0.9852	0.9820	0.9788	0.9762	0.9730	0.9710	0.9678
3	3132K	1.0000	0.9949	0.9904	0.9866	0.9841	0.9822	0.9796	0.9783	0.9745	0.9720	0.9694
4	3127K	1.0000	0.9961	0.9935	0.9903	0.9858	0.9819	0.9800	0.9787	0.9761	0.9741	0.9729
5	3147K	1.0000	0.9981	0.9961	0.9936	0.9904	0.9878	0.9852	0.9826	0.9794	0.9768	0.9730
6	3139K	1.0000	0.9987	0.9949	0.9936	0.9897	0.9865	0.9826	0.9801	0.9775	0.9743	0.9723
7	3161K	1.0000	0.9949	0.9923	0.9885	0.9859	0.9821	0.9795	0.9763	0.9738	0.9706	0.9680
8	3156K	1.0000	0.9942	0.9916	0.9877	0.9839	0.9806	0.9767	0.9755	0.9722	0.9683	0.9651
9	3145K	1.0000	1.0013	0.9980	0.9954	0.9935	0.9895	0.9850	0.9830	0.9810	0.9784	0.9758
10	3114K	1.0000	0.9949	0.9924	0.9892	0.9854	0.9809	0.9784	0.9765	0.9733	0.9701	0.9669
11	3106K	1.0000	0.9981	0.9948	0.9910	0.9878	0.9845	0.9813	0.9787	0.9762	0.9742	0.9716
12	3163K	1.0000	0.9968	0.9942	0.9929	0.9884	0.9864	0.9838	0.9813	0.9780	0.9741	0.9716
13	3161K	1.0000	0.9954	0.9941	0.9902	0.9863	0.9831	0.9798	0.9792	0.9766	0.9753	0.9714
14	3130K	1.0000	0.9962	0.9936	0.9898	0.9866	0.9834	0.9821	0.9808	0.9789	0.9757	0.9725
15	3127K	1.0000	0.9987	0.9954	0.9915	0.9896	0.9870	0.9837	0.9798	0.9772	0.9746	0.9726
16	3127K	1.0000	0.9955	0.9929	0.9896	0.9851	0.9812	0.9792	0.9760	0.9747	0.9721	0.9675
17	3109K	1.0000	0.9967	0.9922	0.9909	0.9876	0.9850	0.9824	0.9798	0.9785	0.9753	0.9707
18	2967K	1.0000	0.9974	0.9935	0.9909	0.9870	0.9844	0.9831	0.9792	0.9767	0.9754	0.9715
19	3158K	1.0000	0.9968	0.9948	0.9929	0.9884	0.9864	0.9826	0.9813	0.9787	0.9761	0.9722
20	3129K	1.0000	0.9961	0.9928	0.9902	0.9883	0.9857	0.9831	0.9805	0.9785	0.9753	0.9746
21	3107K	1.0000	0.9943	0.9918	0.9880	0.9861	0.9848	0.9816	0.9772	0.9759	0.9728	0.9715
22	3133K	1.0000	0.9955	0.9909	0.9884	0.9838	0.9806	0.9780	0.9741	0.9715	0.9690	0.9657
23	2988K	1.0000	0.9956	0.9912	0.9893	0.9867	0.9829	0.9798	0.9791	0.9753	0.9709	0.9684
24	3130K	1.0000	0.9949	0.9917	0.9891	0.9853	0.9827	0.9782	0.9756	0.9737	0.9699	0.9667
25	3127K	1.0000	0.9987	0.9948	0.9915	0.9869	0.9837	0.9817	0.9778	0.9752	0.9739	0.9687

CIE 1976 u' data for tested units

$T_s = T_{air} = 105^\circ\text{C}$, $I_f = 150\text{mA}$; $T_s \geq 103^\circ\text{C}$ and $T_{air} \geq 100^\circ\text{C}$ in compliance with LM-80-15

CCT (K=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3006K	0.2494	0.2492	0.2492	0.2490	0.2486	0.2487	0.2490	0.2489	0.2485	0.2481	0.2482
2	3148K	0.2448	0.2444	0.2444	0.2443	0.2439	0.2439	0.2442	0.2440	0.2437	0.2433	0.2433
3	3132K	0.2460	0.2456	0.2456	0.2455	0.2451	0.2451	0.2454	0.2453	0.2449	0.2445	0.2445
4	3127K	0.2464	0.2460	0.2460	0.2458	0.2455	0.2455	0.2458	0.2457	0.2452	0.2448	0.2449
5	3147K	0.2452	0.2448	0.2448	0.2447	0.2443	0.2443	0.2446	0.2445	0.2440	0.2437	0.2436
6	3139K	0.2459	0.2455	0.2453	0.2453	0.2449	0.2450	0.2452	0.2451	0.2447	0.2444	0.2443
7	3161K	0.2451	0.2447	0.2447	0.2447	0.2443	0.2443	0.2446	0.2444	0.2439	0.2436	0.2436
8	3156K	0.2454	0.2449	0.2450	0.2449	0.2444	0.2444	0.2447	0.2446	0.2442	0.2438	0.2439
9	3145K	0.2457	0.2453	0.2453	0.2453	0.2449	0.2448	0.2452	0.2450	0.2447	0.2443	0.2443
10	3114K	0.2467	0.2462	0.2462	0.2461	0.2458	0.2458	0.2460	0.2459	0.2455	0.2452	0.2452
11	3106K	0.2473	0.2469	0.2469	0.2469	0.2465	0.2465	0.2467	0.2465	0.2462	0.2458	0.2458
12	3163K	0.2451	0.2447	0.2447	0.2447	0.2442	0.2443	0.2444	0.2444	0.2440	0.2437	0.2437
13	3161K	0.2453	0.2448	0.2449	0.2447	0.2443	0.2443	0.2446	0.2445	0.2441	0.2438	0.2438
14	3130K	0.2461	0.2457	0.2457	0.2457	0.2452	0.2452	0.2455	0.2453	0.2450	0.2447	0.2446
15	3127K	0.2463	0.2458	0.2458	0.2457	0.2453	0.2454	0.2456	0.2455	0.2452	0.2448	0.2448
16	3127K	0.2463	0.2458	0.2458	0.2457	0.2453	0.2453	0.2456	0.2454	0.2451	0.2447	0.2447
17	3109K	0.2469	0.2464	0.2465	0.2464	0.2459	0.2459	0.2462	0.2460	0.2458	0.2453	0.2451
18	2967K	0.2513	0.2508	0.2509	0.2509	0.2504	0.2505	0.2507	0.2505	0.2502	0.2498	0.2498
19	3158K	0.2455	0.2451	0.2451	0.2450	0.2445	0.2446	0.2448	0.2446	0.2444	0.2440	0.2439
20	3129K	0.2462	0.2456	0.2457	0.2457	0.2453	0.2453	0.2456	0.2453	0.2451	0.2448	0.2448
21	3107K	0.2469	0.2464	0.2464	0.2465	0.2459	0.2460	0.2462	0.2460	0.2457	0.2454	0.2455
22	3133K	0.2461	0.2457	0.2457	0.2456	0.2451	0.2452	0.2455	0.2452	0.2450	0.2447	0.2446
23	2988K	0.2496	0.2491	0.2491	0.2490	0.2486	0.2487	0.2489	0.2486	0.2483	0.2479	0.2480
24	3130K	0.2463	0.2458	0.2458	0.2457	0.2453	0.2453	0.2456	0.2453	0.2451	0.2447	0.2447
25	3127K	0.2460	0.2455	0.2456	0.2454	0.2450	0.2451	0.2453	0.2451	0.2449	0.2446	0.2446

CIE 1976 v' data for tested units

$T_s = T_{air} = 105^\circ\text{C}$, $I_f = 150\text{mA}$; $T_s \geq 103^\circ\text{C}$ and $T_{air} \geq 100^\circ\text{C}$ in compliance with LM-80-15

CCT (K=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3006K	0.5249	0.5243	0.5239	0.5236	0.5234	0.5232	0.5228	0.5226	0.5224	0.5222	0.5218
2	3148K	0.5211	0.5205	0.5203	0.5199	0.5197	0.5194	0.5191	0.5188	0.5186	0.5183	0.5178
3	3132K	0.5190	0.5182	0.5179	0.5176	0.5173	0.5171	0.5168	0.5164	0.5163	0.5160	0.5155
4	3127K	0.5183	0.5176	0.5173	0.5169	0.5166	0.5164	0.5161	0.5158	0.5156	0.5153	0.5148
5	3147K	0.5198	0.5191	0.5189	0.5186	0.5183	0.5181	0.5178	0.5174	0.5172	0.5169	0.5165
6	3139K	0.5184	0.5178	0.5175	0.5171	0.5168	0.5167	0.5164	0.5161	0.5158	0.5156	0.5152
7	3161K	0.5183	0.5176	0.5174	0.5170	0.5167	0.5166	0.5163	0.5158	0.5157	0.5154	0.5150
8	3156K	0.5180	0.5173	0.5170	0.5167	0.5162	0.5160	0.5159	0.5155	0.5153	0.5150	0.5146
9	3145K	0.5183	0.5177	0.5175	0.5171	0.5168	0.5165	0.5163	0.5160	0.5158	0.5156	0.5152
10	3114K	0.5190	0.5182	0.5180	0.5176	0.5173	0.5171	0.5169	0.5165	0.5163	0.5161	0.5156
11	3106K	0.5179	0.5173	0.5169	0.5166	0.5163	0.5160	0.5157	0.5154	0.5152	0.5150	0.5146
12	3163K	0.5181	0.5175	0.5172	0.5169	0.5166	0.5163	0.5160	0.5157	0.5155	0.5153	0.5149
13	3161K	0.5177	0.5171	0.5168	0.5165	0.5161	0.5159	0.5156	0.5155	0.5151	0.5150	0.5145
14	3130K	0.5190	0.5184	0.5181	0.5178	0.5174	0.5171	0.5168	0.5167	0.5164	0.5163	0.5158
15	3127K	0.5187	0.5180	0.5177	0.5174	0.5171	0.5168	0.5165	0.5163	0.5161	0.5159	0.5155
16	3127K	0.5186	0.5180	0.5176	0.5172	0.5170	0.5167	0.5165	0.5162	0.5160	0.5158	0.5153
17	3109K	0.5190	0.5182	0.5179	0.5175	0.5172	0.5169	0.5166	0.5164	0.5162	0.5161	0.5154
18	2967K	0.5237	0.5230	0.5226	0.5223	0.5220	0.5218	0.5215	0.5212	0.5211	0.5209	0.5204
19	3158K	0.5174	0.5167	0.5164	0.5160	0.5157	0.5154	0.5152	0.5149	0.5147	0.5145	0.5140
20	3129K	0.5187	0.5179	0.5177	0.5174	0.5170	0.5167	0.5164	0.5163	0.5161	0.5159	0.5155
21	3107K	0.5192	0.5185	0.5182	0.5180	0.5175	0.5173	0.5170	0.5167	0.5165	0.5164	0.5159
22	3133K	0.5185	0.5178	0.5175	0.5172	0.5168	0.5166	0.5164	0.5160	0.5159	0.5157	0.5152
23	2988K	0.5271	0.5264	0.5261	0.5257	0.5254	0.5252	0.5249	0.5246	0.5244	0.5242	0.5238
24	3130K	0.5183	0.5176	0.5173	0.5169	0.5166	0.5163	0.5160	0.5157	0.5156	0.5154	0.5149
25	3127K	0.5197	0.5189	0.5186	0.5183	0.5180	0.5177	0.5175	0.5172	0.5170	0.5169	0.5164

Delta u'v' data for tested units

T_s = T_{air} = 105°C, I_f = 150mA; T_s ≥ 103°C and T_{air} ≥ 100°C in compliance with LM-80-15

CCT (nd)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3006K	0.0000	0.0006	0.0010	0.0014	0.0017	0.0018	0.0021	0.0024	0.0027	0.0030	0.0033
2	3148K	0.0000	0.0007	0.0009	0.0013	0.0017	0.0019	0.0021	0.0024	0.0027	0.0032	0.0036
3	3132K	0.0000	0.0009	0.0012	0.0015	0.0019	0.0021	0.0023	0.0027	0.0029	0.0034	0.0038
4	3127K	0.0000	0.0008	0.0011	0.0015	0.0019	0.0021	0.0023	0.0026	0.0030	0.0034	0.0038
5	3147K	0.0000	0.0008	0.0010	0.0013	0.0017	0.0019	0.0021	0.0025	0.0029	0.0033	0.0037
6	3139K	0.0000	0.0007	0.0011	0.0014	0.0019	0.0019	0.0021	0.0024	0.0029	0.0032	0.0036
7	3161K	0.0000	0.0008	0.0010	0.0014	0.0018	0.0019	0.0021	0.0026	0.0029	0.0033	0.0036
8	3156K	0.0000	0.0009	0.0011	0.0014	0.0021	0.0022	0.0022	0.0026	0.0030	0.0034	0.0037
9	3145K	0.0000	0.0007	0.0009	0.0013	0.0017	0.0020	0.0021	0.0024	0.0027	0.0030	0.0034
10	3114K	0.0000	0.0009	0.0011	0.0015	0.0019	0.0021	0.0022	0.0026	0.0030	0.0033	0.0037
11	3106K	0.0000	0.0007	0.0011	0.0014	0.0018	0.0021	0.0023	0.0026	0.0029	0.0033	0.0036
12	3163K	0.0000	0.0007	0.0010	0.0013	0.0017	0.0020	0.0022	0.0025	0.0028	0.0031	0.0035
13	3161K	0.0000	0.0008	0.0010	0.0013	0.0019	0.0021	0.0022	0.0023	0.0029	0.0031	0.0035
14	3130K	0.0000	0.0007	0.0010	0.0013	0.0018	0.0021	0.0023	0.0024	0.0028	0.0030	0.0035
15	3127K	0.0000	0.0009	0.0011	0.0014	0.0019	0.0021	0.0023	0.0025	0.0028	0.0032	0.0035
16	3127K	0.0000	0.0008	0.0011	0.0015	0.0019	0.0021	0.0022	0.0026	0.0029	0.0032	0.0037
17	3109K	0.0000	0.0009	0.0012	0.0016	0.0021	0.0023	0.0025	0.0028	0.0030	0.0033	0.0040
18	2967K	0.0000	0.0009	0.0012	0.0015	0.0019	0.0021	0.0023	0.0026	0.0028	0.0032	0.0036
19	3158K	0.0000	0.0008	0.0011	0.0015	0.0020	0.0022	0.0023	0.0027	0.0029	0.0033	0.0038
20	3129K	0.0000	0.0010	0.0011	0.0014	0.0019	0.0022	0.0024	0.0026	0.0028	0.0031	0.0035
21	3107K	0.0000	0.0009	0.0011	0.0013	0.0020	0.0021	0.0023	0.0027	0.0030	0.0032	0.0036
22	3133K	0.0000	0.0008	0.0011	0.0014	0.0020	0.0021	0.0022	0.0027	0.0028	0.0031	0.0036
23	2988K	0.0000	0.0009	0.0011	0.0015	0.0020	0.0021	0.0023	0.0027	0.0030	0.0034	0.0037
24	3130K	0.0000	0.0009	0.0011	0.0015	0.0020	0.0022	0.0024	0.0028	0.0030	0.0033	0.0038
25	3127K	0.0000	0.0009	0.0012	0.0015	0.0020	0.0022	0.0023	0.0027	0.0029	0.0031	0.0036

Forward Voltage [V] data for tested units

T_s = T_{air} = 105°C, I_f = 150mA; T_s ≥ 103°C and T_{air} ≥ 100°C in compliance with LM-80-15

CCT (nd)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3006K	6.011	6.018	6.012	6.044	6.023	6.052	6.026	6.053	6.009	6.010	6.012
2	3148K	5.989	5.956	6.124	6.003	5.966	5.985	6.211	5.962	5.955	5.952	5.955
3	3132K	6.042	6.029	6.037	6.046	6.045	6.036	6.039	6.037	6.072	6.024	6.029
4	3127K	5.982	5.981	5.973	5.982	6.064	5.982	5.985	5.981	5.988	5.970	5.971
5	3147K	5.991	5.965	5.978	6.264	5.972	5.968	5.958	5.952	5.944	5.943	5.945
6	3139K	6.049	6.010	5.999	6.023	6.018	6.206	6.011	5.999	5.993	5.992	5.998
7	3161K	6.013	5.970	5.978	5.985	6.000	6.060	5.987	5.974	5.973	5.965	5.977
8	3156K	5.929	5.939	5.939	6.135	5.972	6.061	5.962	5.957	5.937	5.925	5.927
9	3145K	5.969	5.964	5.972	6.075	5.989	5.988	5.977	5.974	5.966	5.960	5.969
10	3114K	6.036	6.070	6.033	6.198	6.050	6.160	6.039	6.035	6.284	6.028	6.030
11	3106K	6.014	6.022	6.030	6.264	6.026	6.068	6.087	6.044	6.016	6.015	6.030
12	3163K	6.023	5.947	5.991	5.994	5.956	6.118	5.992	5.951	5.940	5.941	5.950
13	3161K	6.001	5.996	5.941	5.952	5.947	6.071	5.944	5.974	5.931	5.936	5.941
14	3130K	6.031	6.002	6.009	6.011	6.008	6.061	6.004	6.003	5.992	5.996	6.000
15	3127K	6.011	5.929	5.923	5.936	5.932	6.103	5.926	5.922	5.914	5.914	5.922
16	3127K	6.036	5.990	6.058	6.014	5.998	6.119	6.007	5.991	5.984	5.984	5.993
17	3109K	5.950	5.976	6.064	5.948	6.015	5.981	5.975	5.936	5.935	5.937	5.940
18	2967K	6.033	6.018	6.140	6.011	6.027	6.179	6.017	6.008	6.006	6.005	6.012
19	3158K	6.016	6.102	6.014	6.082	6.077	6.217	6.023	6.022	6.096	6.010	6.015
20	3129K	5.956	6.022	5.937	5.978	5.948	6.014	5.952	5.943	6.179	5.940	5.961
21	3107K	6.026	6.322	6.036	6.034	6.016	6.096	6.040	6.027	6.023	6.022	6.046
22	3133K	5.946	5.980	5.958	6.267	6.001	6.099	5.958	5.951	5.951	5.941	5.949
23	2988K	6.003	5.955	5.966	5.962	5.989	6.081	5.962	5.953	5.996	5.949	5.957
24	3130K	5.980	5.965	6.015	5.934	5.943	5.932	5.973	6.170	5.917	5.920	5.943
25	3127K	6.013	6.305	6.019	6.020	6.164	6.024	6.023	6.016	6.016	6.012	6.022

Luminous Flux [lm] data for tested units

T_s = T_{air} = 115°C, I_f = 180mA; T_s ≥ 113°C and T_{air} ≥ 110°C in compliance with LM-80-15

	CCT (±0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	3134K	182.600	181.400	180.700	180.100	179.600	179.000	178.400	177.900	177.300	176.700	176.100
2	3121K	179.700	178.500	177.900	177.300	176.600	175.700	175.200	174.600	174.200	173.400	172.800
3	3143K	181.500	180.700	179.900	179.400	178.700	178.200	177.600	177.000	176.400	175.700	174.900
4	3107K	179.600	178.600	178.000	177.200	176.500	175.900	175.300	174.500	174.200	173.900	173.300
5	3116K	182.600	181.600	181.000	180.800	180.200	179.700	179.200	178.600	178.100	177.600	176.800
6	3169K	181.500	180.600	180.200	179.500	178.700	178.100	177.400	177.000	176.800	176.200	175.500
7	3142K	180.700	179.600	178.800	178.300	177.600	177.000	176.700	176.000	175.600	175.000	174.600
8	3152K	180.500	180.200	179.600	179.100	178.100	177.500	176.800	176.200	175.800	175.100	174.500
9	3149K	175.900	175.700	175.400	175.000	174.100	173.500	173.000	172.300	171.700	171.200	170.300
10	3164K	180.600	180.000	179.700	179.100	178.600	178.000	177.600	177.000	176.100	175.400	174.700
11	3147K	176.900	175.900	175.300	174.800	174.400	173.700	173.300	172.900	172.400	171.600	171.100
12	3171K	184.300	183.400	182.700	182.200	181.500	180.900	180.400	179.800	179.400	178.800	178.400
13	3155K	181.500	180.400	179.900	179.100	178.500	177.900	177.400	177.200	176.700	176.100	175.400
14	3139K	178.500	177.200	176.500	175.900	175.400	174.800	174.000	173.700	173.200	172.600	172.400
15	3182K	177.800	177.100	176.600	175.900	175.100	174.700	174.200	173.300	172.900	172.500	171.700
16	3134K	177.400	176.400	176.000	175.500	174.900	174.200	173.800	173.100	172.400	171.900	171.300
17	3163K	181.800	180.900	180.200	179.800	179.300	179.100	178.500	177.800	176.900	176.400	175.800
18	3113K	177.500	176.400	176.000	175.600	174.800	174.000	173.700	173.100	172.600	171.800	171.600
19	3149K	179.300	178.400	177.900	177.300	176.800	176.100	175.200	174.800	174.300	173.700	173.200
20	3122K	180.500	180.000	179.400	178.800	178.200	177.600	177.100	176.600	175.900	175.500	174.900
21	3149K	178.800	178.100	177.500	176.800	176.100	175.600	175.200	174.500	173.900	173.300	172.600
22	3114K	178.600	178.100	177.400	177.100	176.400	175.800	175.100	174.800	174.100	173.600	173.000
23	3147K	177.600	176.400	175.900	175.400	174.600	174.200	173.600	173.000	172.600	172.000	171.400
24	3150K	178.100	176.800	176.200	175.700	174.800	174.200	173.300	172.800	172.300	172.000	171.300
25	3144K	181.400	179.900	179.100	178.600	177.600	177.000	176.300	175.600	175.200	174.700	174.300

Normalized Luminous Flux data for tested units

T_s = T_{air} = 115°C, I_f = 180mA; T_s ≥ 113°C and T_{air} ≥ 110°C in compliance with LM-80-15

	CCT (±0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	3134K	1.0000	0.9934	0.9896	0.9863	0.9836	0.9803	0.9770	0.9743	0.9710	0.9677	0.9644
2	3121K	1.0000	0.9933	0.9900	0.9866	0.9827	0.9777	0.9750	0.9716	0.9684	0.9649	0.9616
3	3143K	1.0000	0.9956	0.9912	0.9884	0.9846	0.9818	0.9785	0.9752	0.9719	0.9680	0.9636
4	3107K	1.0000	0.9944	0.9911	0.9866	0.9827	0.9794	0.9761	0.9716	0.9699	0.9683	0.9649
5	3116K	1.0000	0.9945	0.9912	0.9901	0.9869	0.9841	0.9814	0.9781	0.9754	0.9726	0.9682
6	3169K	1.0000	0.9950	0.9928	0.9890	0.9846	0.9813	0.9774	0.9752	0.9741	0.9708	0.9669
7	3142K	1.0000	0.9939	0.9895	0.9867	0.9828	0.9795	0.9779	0.9740	0.9718	0.9685	0.9662
8	3152K	1.0000	0.9983	0.9950	0.9922	0.9867	0.9834	0.9795	0.9762	0.9740	0.9701	0.9668
9	3149K	1.0000	0.9989	0.9972	0.9949	0.9898	0.9864	0.9835	0.9795	0.9761	0.9733	0.9682
10	3164K	1.0000	0.9967	0.9950	0.9917	0.9889	0.9856	0.9834	0.9801	0.9751	0.9712	0.9673
11	3147K	1.0000	0.9943	0.9910	0.9881	0.9859	0.9819	0.9796	0.9774	0.9746	0.9700	0.9672
12	3171K	1.0000	0.9951	0.9913	0.9886	0.9848	0.9816	0.9788	0.9756	0.9734	0.9702	0.9680
13	3155K	1.0000	0.9939	0.9912	0.9868	0.9835	0.9802	0.9774	0.9763	0.9736	0.9702	0.9664
14	3139K	1.0000	0.9927	0.9888	0.9854	0.9826	0.9793	0.9748	0.9731	0.9703	0.9669	0.9658
15	3182K	1.0000	0.9961	0.9933	0.9893	0.9848	0.9826	0.9798	0.9747	0.9724	0.9702	0.9657
16	3134K	1.0000	0.9944	0.9921	0.9893	0.9859	0.9820	0.9797	0.9758	0.9718	0.9690	0.9656
17	3163K	1.0000	0.9950	0.9912	0.9890	0.9862	0.9851	0.9818	0.9780	0.9730	0.9703	0.9670
18	3113K	1.0000	0.9938	0.9915	0.9893	0.9848	0.9803	0.9786	0.9752	0.9724	0.9679	0.9668
19	3149K	1.0000	0.9950	0.9922	0.9888	0.9861	0.9822	0.9771	0.9749	0.9721	0.9688	0.9660
20	3122K	1.0000	0.9972	0.9939	0.9906	0.9873	0.9839	0.9812	0.9784	0.9745	0.9723	0.9690
21	3149K	1.0000	0.9961	0.9927	0.9888	0.9849	0.9821	0.9799	0.9760	0.9726	0.9692	0.9653
22	3114K	1.0000	0.9972	0.9933	0.9916	0.9877	0.9843	0.9804	0.9787	0.9748	0.9720	0.9686
23	3147K	1.0000	0.9932	0.9904	0.9876	0.9831	0.9809	0.9775	0.9741	0.9718	0.9685	0.9651
24	3150K	1.0000	0.9927	0.9893	0.9865	0.9815	0.9781	0.9730	0.9702	0.9674	0.9657	0.9618
25	3144K	1.0000	0.9917	0.9873	0.9846	0.9791	0.9757	0.9719	0.9680	0.9658	0.9631	0.9609

CIE 1976 u' data for tested units

$T_s = T_{air} = 115^{\circ}\text{C}$, $I_f = 180\text{mA}$; $T_s \geq 113^{\circ}\text{C}$ and $T_{air} \geq 110^{\circ}\text{C}$ in compliance with LM-80-15

CCT (K)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3134K	0.2459	0.2455	0.2454	0.2454	0.2450	0.2448	0.2451	0.2450	0.2445	0.2444	0.2444
2	3121K	0.2467	0.2463	0.2462	0.2461	0.2458	0.2456	0.2459	0.2458	0.2454	0.2453	0.2451
3	3143K	0.2456	0.2453	0.2454	0.2452	0.2449	0.2449	0.2449	0.2449	0.2446	0.2444	0.2442
4	3107K	0.2470	0.2468	0.2469	0.2466	0.2464	0.2464	0.2465	0.2464	0.2461	0.2459	0.2458
5	3116K	0.2468	0.2463	0.2464	0.2463	0.2459	0.2459	0.2460	0.2459	0.2457	0.2455	0.2455
6	3169K	0.2447	0.2445	0.2445	0.2442	0.2439	0.2440	0.2440	0.2439	0.2436	0.2434	0.2433
7	3142K	0.2460	0.2457	0.2457	0.2455	0.2452	0.2452	0.2454	0.2452	0.2449	0.2446	0.2447
8	3152K	0.2453	0.2451	0.2451	0.2449	0.2446	0.2446	0.2446	0.2445	0.2443	0.2440	0.2441
9	3149K	0.2455	0.2452	0.2452	0.2450	0.2447	0.2447	0.2447	0.2447	0.2445	0.2443	0.2445
10	3164K	0.2452	0.2447	0.2448	0.2445	0.2442	0.2443	0.2444	0.2442	0.2440	0.2438	0.2438
11	3147K	0.2457	0.2453	0.2453	0.2450	0.2448	0.2448	0.2449	0.2448	0.2445	0.2442	0.2443
12	3171K	0.2445	0.2441	0.2441	0.2439	0.2436	0.2436	0.2437	0.2436	0.2433	0.2431	0.2432
13	3155K	0.2453	0.2449	0.2449	0.2446	0.2444	0.2444	0.2445	0.2444	0.2441	0.2439	0.2439
14	3139K	0.2458	0.2454	0.2455	0.2452	0.2449	0.2450	0.2450	0.2450	0.2447	0.2445	0.2447
15	3182K	0.2447	0.2444	0.2444	0.2440	0.2438	0.2439	0.2439	0.2439	0.2436	0.2434	0.2434
16	3134K	0.2462	0.2459	0.2460	0.2457	0.2455	0.2455	0.2456	0.2455	0.2453	0.2450	0.2450
17	3163K	0.2445	0.2441	0.2441	0.2439	0.2436	0.2436	0.2437	0.2436	0.2434	0.2432	0.2431
18	3113K	0.2471	0.2468	0.2468	0.2466	0.2463	0.2463	0.2463	0.2462	0.2461	0.2458	0.2459
19	3149K	0.2453	0.2448	0.2449	0.2445	0.2443	0.2444	0.2444	0.2444	0.2441	0.2437	0.2437
20	3122K	0.2465	0.2463	0.2463	0.2460	0.2457	0.2457	0.2458	0.2457	0.2455	0.2452	0.2452
21	3149K	0.2455	0.2451	0.2451	0.2449	0.2446	0.2446	0.2447	0.2447	0.2444	0.2440	0.2441
22	3114K	0.2471	0.2469	0.2469	0.2468	0.2464	0.2465	0.2465	0.2465	0.2462	0.2460	0.2459
23	3147K	0.2457	0.2454	0.2455	0.2453	0.2451	0.2452	0.2452	0.2451	0.2448	0.2446	0.2446
24	3150K	0.2454	0.2451	0.2451	0.2449	0.2446	0.2447	0.2448	0.2447	0.2445	0.2442	0.2441
25	3144K	0.2458	0.2456	0.2457	0.2454	0.2451	0.2452	0.2452	0.2451	0.2450	0.2446	0.2447

CIE 1976 v' data for tested units

$T_s = T_{air} = 115^{\circ}\text{C}$, $I_f = 180\text{mA}$; $T_s \geq 113^{\circ}\text{C}$ and $T_{air} \geq 110^{\circ}\text{C}$ in compliance with LM-80-15

CCT (K)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3134K	0.5191	0.5183	0.5180	0.5177	0.5174	0.5171	0.5167	0.5164	0.5164	0.5161	0.5156
2	3121K	0.5180	0.5171	0.5168	0.5164	0.5162	0.5158	0.5154	0.5152	0.5151	0.5150	0.5145
3	3143K	0.5190	0.5183	0.5180	0.5176	0.5174	0.5171	0.5167	0.5164	0.5163	0.5162	0.5158
4	3107K	0.5189	0.5183	0.5180	0.5176	0.5173	0.5171	0.5166	0.5163	0.5162	0.5162	0.5157
5	3116K	0.5183	0.5176	0.5173	0.5169	0.5166	0.5164	0.5159	0.5157	0.5156	0.5155	0.5151
6	3169K	0.5187	0.5182	0.5178	0.5174	0.5170	0.5168	0.5164	0.5161	0.5160	0.5159	0.5155
7	3142K	0.5177	0.5171	0.5167	0.5164	0.5161	0.5159	0.5154	0.5151	0.5150	0.5149	0.5146
8	3152K	0.5189	0.5183	0.5179	0.5176	0.5173	0.5170	0.5165	0.5162	0.5162	0.5160	0.5156
9	3149K	0.5185	0.5179	0.5176	0.5172	0.5169	0.5166	0.5162	0.5159	0.5158	0.5157	0.5155
10	3164K	0.5176	0.5168	0.5165	0.5161	0.5157	0.5155	0.5151	0.5148	0.5147	0.5146	0.5145
11	3147K	0.5181	0.5173	0.5169	0.5165	0.5162	0.5159	0.5155	0.5153	0.5152	0.5150	0.5148
12	3171K	0.5192	0.5184	0.5180	0.5177	0.5174	0.5171	0.5167	0.5164	0.5163	0.5162	0.5159
13	3155K	0.5184	0.5177	0.5174	0.5169	0.5167	0.5164	0.5160	0.5157	0.5157	0.5156	0.5153
14	3139K	0.5188	0.5181	0.5178	0.5174	0.5171	0.5169	0.5164	0.5162	0.5161	0.5160	0.5160
15	3182K	0.5171	0.5164	0.5161	0.5157	0.5154	0.5152	0.5147	0.5145	0.5144	0.5143	0.5139
16	3134K	0.5180	0.5174	0.5172	0.5168	0.5165	0.5163	0.5158	0.5155	0.5154	0.5153	0.5150
17	3163K	0.5202	0.5191	0.5188	0.5184	0.5181	0.5180	0.5174	0.5171	0.5171	0.5170	0.5166
18	3113K	0.5177	0.5170	0.5167	0.5163	0.5161	0.5158	0.5153	0.5150	0.5150	0.5149	0.5145
19	3149K	0.5193	0.5186	0.5184	0.5179	0.5177	0.5175	0.5170	0.5168	0.5166	0.5165	0.5161
20	3122K	0.5186	0.5180	0.5177	0.5172	0.5169	0.5167	0.5162	0.5159	0.5158	0.5157	0.5153
21	3149K	0.5185	0.5177	0.5175	0.5170	0.5167	0.5165	0.5160	0.5158	0.5157	0.5155	0.5152
22	3114K	0.5176	0.5170	0.5167	0.5163	0.5160	0.5158	0.5154	0.5151	0.5150	0.5150	0.5145
23	3147K	0.5181	0.5175	0.5173	0.5169	0.5167	0.5165	0.5159	0.5156	0.5156	0.5155	0.5151
24	3150K	0.5187	0.5180	0.5176	0.5172	0.5170	0.5168	0.5164	0.5160	0.5160	0.5159	0.5154
25	3144K	0.5182	0.5176	0.5172	0.5169	0.5166	0.5164	0.5159	0.5156	0.5155	0.5154	0.5150

Delta u'v' data for tested units

T_s = T_{air} = 115°C, I_f = 180mA; T_s ≥ 113°C and T_{air} ≥ 110°C in compliance with LM-80-15

CCT (nd)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3134K	0.0000	0.0009	0.0012	0.0015	0.0019	0.0023	0.0025	0.0028	0.0030	0.0034	0.0038
2	3121K	0.0000	0.0010	0.0013	0.0017	0.0020	0.0025	0.0027	0.0029	0.0032	0.0033	0.0038
3	3143K	0.0000	0.0008	0.0010	0.0015	0.0017	0.0020	0.0024	0.0027	0.0029	0.0030	0.0035
4	3107K	0.0000	0.0006	0.0009	0.0014	0.0017	0.0019	0.0024	0.0027	0.0028	0.0029	0.0034
5	3116K	0.0000	0.0009	0.0011	0.0015	0.0019	0.0021	0.0025	0.0028	0.0029	0.0031	0.0035
6	3169K	0.0000	0.0005	0.0009	0.0014	0.0019	0.0020	0.0024	0.0027	0.0029	0.0031	0.0035
7	3142K	0.0000	0.0007	0.0010	0.0014	0.0018	0.0020	0.0024	0.0027	0.0029	0.0031	0.0034
8	3152K	0.0000	0.0006	0.0010	0.0014	0.0017	0.0020	0.0025	0.0028	0.0029	0.0032	0.0035
9	3149K	0.0000	0.0007	0.0009	0.0014	0.0018	0.0021	0.0024	0.0027	0.0029	0.0030	0.0032
10	3164K	0.0000	0.0009	0.0012	0.0017	0.0021	0.0023	0.0026	0.0030	0.0031	0.0033	0.0034
11	3147K	0.0000	0.0009	0.0013	0.0017	0.0021	0.0024	0.0027	0.0029	0.0031	0.0034	0.0036
12	3171K	0.0000	0.0009	0.0013	0.0016	0.0020	0.0023	0.0026	0.0029	0.0031	0.0033	0.0035
13	3155K	0.0000	0.0008	0.0011	0.0017	0.0019	0.0022	0.0025	0.0028	0.0030	0.0031	0.0034
14	3139K	0.0000	0.0008	0.0010	0.0015	0.0019	0.0021	0.0025	0.0027	0.0029	0.0031	0.0030
15	3182K	0.0000	0.0008	0.0010	0.0016	0.0019	0.0021	0.0025	0.0027	0.0029	0.0031	0.0035
16	3134K	0.0000	0.0007	0.0008	0.0013	0.0017	0.0018	0.0023	0.0026	0.0028	0.0030	0.0032
17	3163K	0.0000	0.0012	0.0015	0.0019	0.0023	0.0024	0.0029	0.0032	0.0033	0.0035	0.0039
18	3113K	0.0000	0.0008	0.0010	0.0015	0.0018	0.0021	0.0025	0.0028	0.0029	0.0031	0.0034
19	3149K	0.0000	0.0009	0.0010	0.0016	0.0019	0.0020	0.0025	0.0027	0.0030	0.0032	0.0036
20	3122K	0.0000	0.0006	0.0009	0.0015	0.0019	0.0021	0.0025	0.0028	0.0030	0.0032	0.0035
21	3149K	0.0000	0.0009	0.0011	0.0016	0.0020	0.0022	0.0026	0.0028	0.0030	0.0034	0.0036
22	3114K	0.0000	0.0006	0.0009	0.0013	0.0017	0.0019	0.0023	0.0026	0.0028	0.0028	0.0033
23	3147K	0.0000	0.0007	0.0008	0.0013	0.0015	0.0017	0.0023	0.0026	0.0027	0.0028	0.0032
24	3150K	0.0000	0.0008	0.0011	0.0016	0.0019	0.0020	0.0024	0.0028	0.0028	0.0030	0.0035
25	3144K	0.0000	0.0006	0.0010	0.0014	0.0017	0.0019	0.0024	0.0027	0.0028	0.0030	0.0034

Forward Voltage [V] data for tested units

T_s = T_{air} = 115°C, I_f = 180mA; T_s ≥ 113°C and T_{air} ≥ 110°C in compliance with LM-80-15

CCT (nd)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	
1	3134K	6.048	6.049	6.045	6.067	6.242	6.051	6.050	6.050	6.052	6.046	6.115
2	3121K	6.032	6.150	6.128	6.035	6.034	6.088	6.033	6.043	6.036	6.029	6.031
3	3143K	6.160	6.224	6.228	6.261	6.176	6.185	6.165	6.163	6.153	6.161	6.159
4	3107K	6.148	6.186	6.326	6.170	6.170	6.185	6.155	6.151	6.144	6.145	6.151
5	3116K	6.154	6.136	6.177	6.160	6.160	6.177	6.156	6.152	6.146	6.149	6.150
6	3169K	6.188	6.185	6.165	6.176	6.176	6.155	6.174	6.166	6.164	6.163	6.168
7	3142K	6.094	6.284	6.068	6.075	6.071	6.133	6.091	6.157	6.067	6.063	6.064
8	3152K	6.180	6.211	6.220	6.179	6.188	6.258	6.176	6.175	6.174	6.165	6.174
9	3149K	6.116	6.132	6.107	6.420	6.388	6.188	6.120	6.131	6.118	6.112	6.136
10	3164K	6.154	6.173	6.154	6.167	6.183	6.191	6.161	6.149	6.156	6.149	6.190
11	3147K	6.161	6.171	6.167	6.164	6.173	6.281	6.217	6.167	6.149	6.152	6.162
12	3171K	6.211	6.167	6.148	6.404	6.173	6.167	6.147	6.155	6.145	6.159	6.148
13	3155K	6.209	6.160	6.516	6.176	6.292	6.186	6.233	6.160	6.179	6.151	6.154
14	3139K	6.170	6.141	6.171	6.145	6.159	6.156	6.130	6.134	6.127	6.122	6.137
15	3182K	6.186	6.187	6.146	6.153	6.149	6.147	6.150	6.141	6.138	6.135	6.162
16	3134K	6.159	6.201	6.139	6.179	6.152	6.192	6.151	6.143	6.133	6.134	6.143
17	3163K	6.219	6.192	6.136	6.302	6.167	6.160	6.139	6.130	6.126	6.124	6.130
18	3113K	6.082	6.065	6.056	6.181	6.058	6.100	6.056	6.103	6.056	6.049	6.055
19	3149K	6.059	6.101	6.065	6.102	6.102	6.100	6.055	6.071	6.065	6.059	6.112
20	3122K	6.128	6.265	6.129	6.160	6.135	6.138	6.136	6.139	6.134	6.117	6.131
21	3149K	6.064	6.091	6.077	6.070	6.074	6.102	6.074	6.068	6.065	6.065	6.080
22	3114K	6.121	6.056	6.057	6.058	6.060	6.276	6.060	6.056	6.050	6.051	6.051
23	3147K	6.148	6.157	6.138	6.151	6.170	6.254	6.142	6.142	6.149	6.134	6.138
24	3150K	6.210	6.160	6.141	6.157	6.174	6.218	6.149	6.213	6.136	6.135	6.156
25	3144K	6.143	6.099	6.101	6.107	6.103	6.106	6.103	6.112	6.100	6.100	6.103

Disclaimer

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Company Information

Lumileds is a leading provider of power LEDs for everyday lighting applications. The company's records for light output, efficacy and thermal management are direct results of the ongoing commitment to advancing solid-state lighting technology and enabling lighting solutions that are more environmentally friendly, help reduce CO2 emissions and reduce the need for power plant expansion. Lumileds LUXEON LEDs are enabling never before possible applications in outdoor lighting, shop lighting, home lighting, digital imaging, display and automotive lighting.

Lumileds is a fully integrated supplier, producing core LED material in all three base colors, (red, green, blue) and white. Lumileds has R & D centers in San Jose, California and in the Netherlands, and production capabilities in San Jose, Singapore and Penang, Malaysia. Founded in 1999, Lumileds is the high flux LED technology leader and is dedicated to bridging the gap between solid-state technology and the lighting world. More information about the company's LUXEON LED products and solid-state lighting technologies can be found at www.lumileds.com.

This report issued to Relco

Appendix: Additional Projected Extrapolations per IESNA TM-21-11

Projected L_{75} extrapolations per IESNA TM-21-11

	If = 65mA	If = 100mA	If = 120mA	If = 150mA	If = 180mA
Ts = 115°C	-	-	114,987	-	89,057
Ts = 105°C	144,166	-	114,424	103,513	-
Ts = 85°C	-	123,862	-	-	-
Ts = 55°C	163,913	-	-	-	-

Projected L_{80} extrapolations per IESNA TM-21-11



	If = 65mA	If = 100mA	If = 120mA	If = 150mA	If = 180mA
Ts = 115°C	-	-	88,980	-	68,899
Ts = 105°C	112,426	-	88,951	80,101	-
Ts = 85°C	-	96,395	-	-	-
Ts = 55°C	128,166	-	-	-	-

Projected L_{85} extrapolations per IESNA TM-21-11


	If = 65mA	If = 100mA	If = 120mA	If = 150mA	If = 180mA
Ts = 115°C	-	-	64,550	-	49,963
Ts = 105°C	82,610	-	65,022	58,108	-
Ts = 85°C	-	70,593	-	-	-
Ts = 55°C	94,588	-	-	-	-

Projected L_{90} extrapolations per IESNA TM-21-11

	If = 65mA	If = 100mA	If = 120mA	If = 150mA	If = 180mA
Ts = 115°C	-	-	41,517	-	32,110
Ts = 105°C	54,500	-	42,462	37,373	-
Ts = 85°C	-	46,267	-	-	-
Ts = 55°C	62,929	-	-	-	-

	Test report n.	776-QL20-R01 ver. 0	
	Applicant	Relco Srl Via delle Azalee, 6/A 20090 - Buccinasco - Milano - Italy	
	Type	LED SEMPIONE	



TEST REPORT Nr. 776-QL20-R01 ver. 0

Addresses Indirizzi		
Applicant Richiedente	Relco Srl – Via delle Azalee, 6/A – 20090 - Buccinasco - Milano - Italy	
Manufacturer Produttore	Same as applicant/Come il richiedente	
Dates and authorization Date e autorizzazioni		
Report Date Data emissione rapporto di prova	15/06/2020	
Total number of pages Numero totale pagine	Test Report/Rapporto di prova	5
	Annex/Annesso “photometric result”	39
Written by Preparato da	Ing. Nicola Parolini	
Authorized by Autorizzato da	Ing. Michele Peschiera	 
Sample under test (data declared by the applicant and under applicant's responsibility) Dispositivo sottoposto a prova (Dati forniti dal richiedente e sotto la sua responsabilità)		
Sample description Descrizione dispositivo	LED luminaire/Apparecchio di illuminazione a LED	
Type Modello	LED SEMPIONE	
Light source Sorgente luminosa	N° 320 LED 3030 LUXEON Code L130-4070HA30000B1 4000 K	
Secondary optic Ottica secondaria	LENTE STRAD. LED 3030 (DK5050-157x77-OUT-OFF-11-5-16H1 (alt.LT-20201)	
Power supply Alimentazione	AC 230 V, 50 Hz	
Driver model Modello alimentatore	LED DRIVER Xi LP 165 W 0,2-0,7 A S1 0-10 V 230 V C170 sXt (9290015354)	
Single led supply current Corrente sul singolo led	165 mA	
Relevant Dimensions Dimensioni rilevanti	Length x Width x Height [mm]	700 x 350 x 112
Luminous area dimensions Dimensioni area luminosa	Lunghezza x Larghezza x Altezza [mm]	265 x 215 x 0

The test results and observations indicated in this test report refer exclusively to the samples tested. It is not permitted to transfer the results to other systems or configurations. The publication or duplication of this test report with enclosures, or Part of this test report or enclosures, without a written consent of the test laboratory is not permitted. The test laboratory not assumes any liability to any party for any loss, expense or damage occasioned by the use of this report. Any use of the laboratories name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by the test laboratory. In case of a multilingual test report, the English version is the only official version.

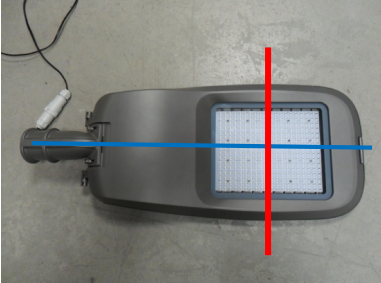

I risultati e le osservazioni indicate in questo rapporto di prova sono riferite esclusivamente ai campioni testati. Non è permesso utilizzare i risultati e le osservazioni di questo rapporto di prova per altri sistemi o configurazioni. Non è permessa la pubblicazione o la duplicazione completa o parziale di questo rapporto di prova e dei suoi allegati senza un consenso scritto da parte del laboratorio di prova. Il laboratorio di prova non si assume responsabilità nei confronti di terzi per danni o eventuali costi derivanti dall'utilizzo dei dati presenti in questo rapporto di prova. Ogni uso del nome del laboratorio di prova e dei suoi marchi per la vendita o per pubblicizzare il prodotto testato deve essere prima approvato in forma scritta dal laboratorio di prova. In caso di rapporti di prova con più lingue, la versione inglese è da considerarsi quella ufficiale.



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	Test report n.	776-QL20-R01 ver. 0	 <small>LAB N° 1235 L</small> <small>Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC</small> <small>Signatory of EA, IAF and ILAC Mutual Recognition Agreements</small>
	Applicant	Relco Srl Via delle Azalee, 6/A 20090 - Buccinasco - Milano - Italy	
	Type	LED SEMPIONE	

Applicable standards Norme applicabili	
	IES LM-79-19, EN13032-4:2015+A1:2019, EN13032-1:2004+A1:2012

Test Setup Setup di prova	
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Place of test Luogo di prova	Qualilab Srl - Via Trento, 87 - 25020 - Capriano del Colle (BS) - Italy	
Test instrument Strumento di misura	Type C mirror photogoniometer/Fotogoniometro Tipo C LMT GO-DS 2000 ref. N° QL-IN-001 Powermeter/Wattmetro YOKOGAWA WT2010 ref. N° QL-IN-006 Temperature-Humidity sensor/Sensore di temperatura-umidità TESTO 174H ref. N° QL-IN-181 Spectrometer/Spettrometro Bentham IDR300-PSL ref.N° QL-IN-009	
Photometric distance Distanza fotometrica	15,84 m	
Aging and stabilization time Invecchiam. e tempo di stabilizzazione	0 hours, >1 hours	
Test date photom. measurem. Data prove fotometriche	11/06/2020	
Test date colour measurement Data prove colorimetriche	11/06/2020	
Test ambient temperature Temperatura ambiente durante la prova	25,0 °C ± 1,0 °C. Ambient temperature registrations available on request Le registrazioni delle temperature ambientali sono disponibili su richiesta	
Power supply characteristics Caratteristiche alimentazione	According to IES LM-79-19 § 5.1 In accordo a IES LM-79-19 § 5.1	
Relative position to the coordinate system (according to EN13032-4) Posizione relativa rispetto al Sistema di coordinate (in accordo a EN13032-4)		
	<p>— C = 90° - 270°</p> <p>— C = 0° - 180°</p>	<p>— G = 90°</p>
Color measurement procedure Procedura misura colore	As spatially averaged values, numerically averaging the goniospectroradiometric data/Come media pesata, mediando i dati del goniospettroradiometro	

	Test report n.	776-QL20-R01 ver. 0	 LAB N° 1235 L Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC Signatory of EA, IAF and ILAC Mutual Recognition Agreements
	Applicant	Relco Srl Via delle Azalee, 6/A 20090 - Buccinasco - Milano - Italy	
	Type	LED SEMPIONE	

Test Name Identificazione prova	Result Esito
Total Luminous flux measurement (IES LM-79-19 § 7, EN13032-04:2015+A1:2019 § 6.2) Flusso luminoso totale (IES LM-79-19 § 7, EN13032-04:2015+A1:2019 § 6.2)	22785 lm
Luminous efficacy (IES LM-79-19 § 11, EN13032-04:2015+A1:2019 § 6.4) Efficacia luminosa (IES LM-79-19 § 11, EN13032-04:2015+A1:2019 § 6.4)	143 lm/W
Luminous intensity distribution (IES LM-79-19 § 8, EN13032-04:2015+A1:2019 § 6.5) Distribuzione intensità luminosa (IES LM-79-19 § 8, EN13032-04: 2015+A1:2019 § 6.5)	See annex “photometric results” Vedi appendice “photometric results”
Average chromaticity coordinates (IES LM-79-19 § 9) Coordinate cromatiche medie (IES LM-79-19 § 9)	$x = 0,3779$ $y = 0,3769$
Spatial non uniformity of chromaticity/ Angular colour uniformity $\Delta u'v'$ (IES LM-79-19 § 9, EN13032-04:2015+A1:2019 §7.1.4) Disomogeneità del colore/ Uniformità angolare del colore $\Delta u'v'$ (IES LM-79-19 § 9, EN13032-04:2015+A1:2019 §7.1.4)	$u' = 0,2234$ $v' = 0,5013$ $\Delta u'v' = 0,0363$
Correlated colour temperature - CCT (IES LM-79-19 § 9, EN13032-04:2015+A1:2019 §7.1.2) Temperatura colore - CCT (IES LM-79-19 § 9, EN13032-04: 2015+A1:2019 § 7.1.2)	4071 K
Colour rendering index - R_a (IES LM-79-19 § 9, EN13032-04: 2015+A1:2019 §7.1.3) Indice di resa cromatica - R_a (IES LM-79-19 § 9, EN13032-04: 2015+A1:2019 § 7.1.3)	72
Electrical protocol (U, I, P, PF) Protocollo Elettrico (U, I, P, PF)	See annex “photometric results” Vedi appendice “photometric results”

Uncertainty Incertezza	
Photometric parameter Parametri fotometrici	Luminous flux and intensity: 2,5 % Luminous efficacy: 2,8 % Flusso e intensità luminosa, Efficacia luminosa
Sample mounting precision Precisione montaggio dispositivo	$\pm 0,5^\circ$
Average chromaticity coordin. Coordinate cromatiche medie	$x = \pm 0,0007; y = \pm 0,0009$
Correlated colour temperature Temperatura colore	± 21 K
Colour rendering index (R_a) Indice di resa cromatica	1
Angular colour uniform. $\Delta u'v'$ Uniformità angolare del colore	$\pm 0,0009$
Electrical parameter Parametri elettrici	Wattage: 0,17 %, Voltage: 0,01 %, Current: 0,13 %, Power factor: 0,40 % Potenza, Tensione, Corrente, Fattore di potenza
Statement Dichiarazione	The measured value (y) and the associated expanded uncertainty (U) represent the interval ($y \pm U$) which contains the value of the measured quantity with a probability of approximately 95 % and a coverage factor $k = 2$. The values of the annex “photometric results” have the maximum significant figures managed by the measurement software. In the annex “photometric results” C and G are measured in [°]. Il valore misurato (y) e l'incertezza estesa associata (U) rappresentano l'intervallo ($y \pm U$) che contiene il valore della grandezza misurata con una probabilità di circa il 95 % e un fattore di copertura $k = 2$. I valori dell'appendice “photometric results” sono riportati con il massimo numero di cifre significative gestite dal software della strumentazione. Nell'appendice “photometric results” C e G sono misurati in [°]

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Test report n. 776-QL20-R01 ver. 0
 Applicant Relco Srl
 Via delle Azalee, 6/A
 20090 - Buccinasco - Milano - Italy
 Type LED SEMPIONE



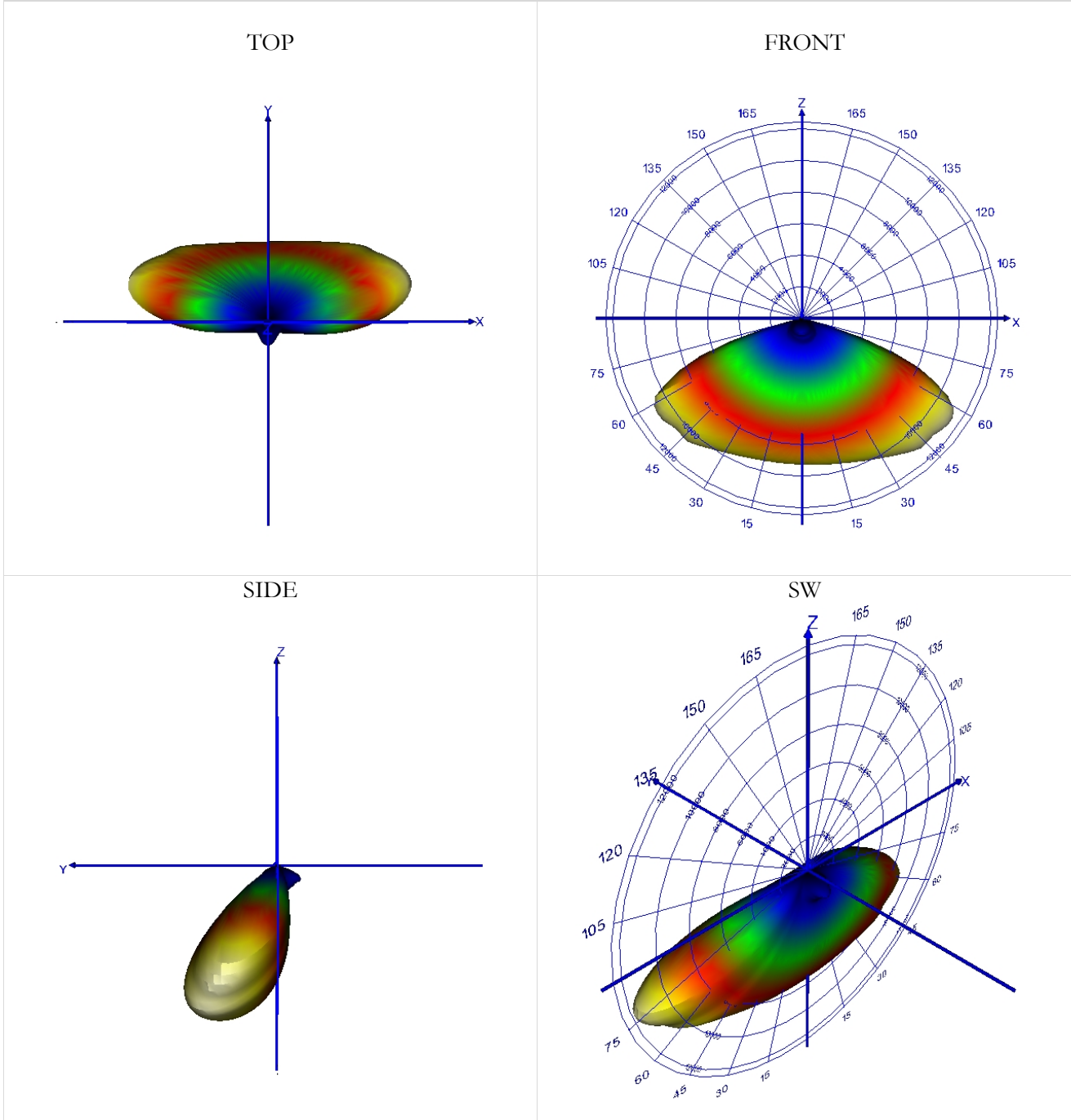
LAB N° 1235 L

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 Mutual Recognition Agreements

Photographs
 Foto



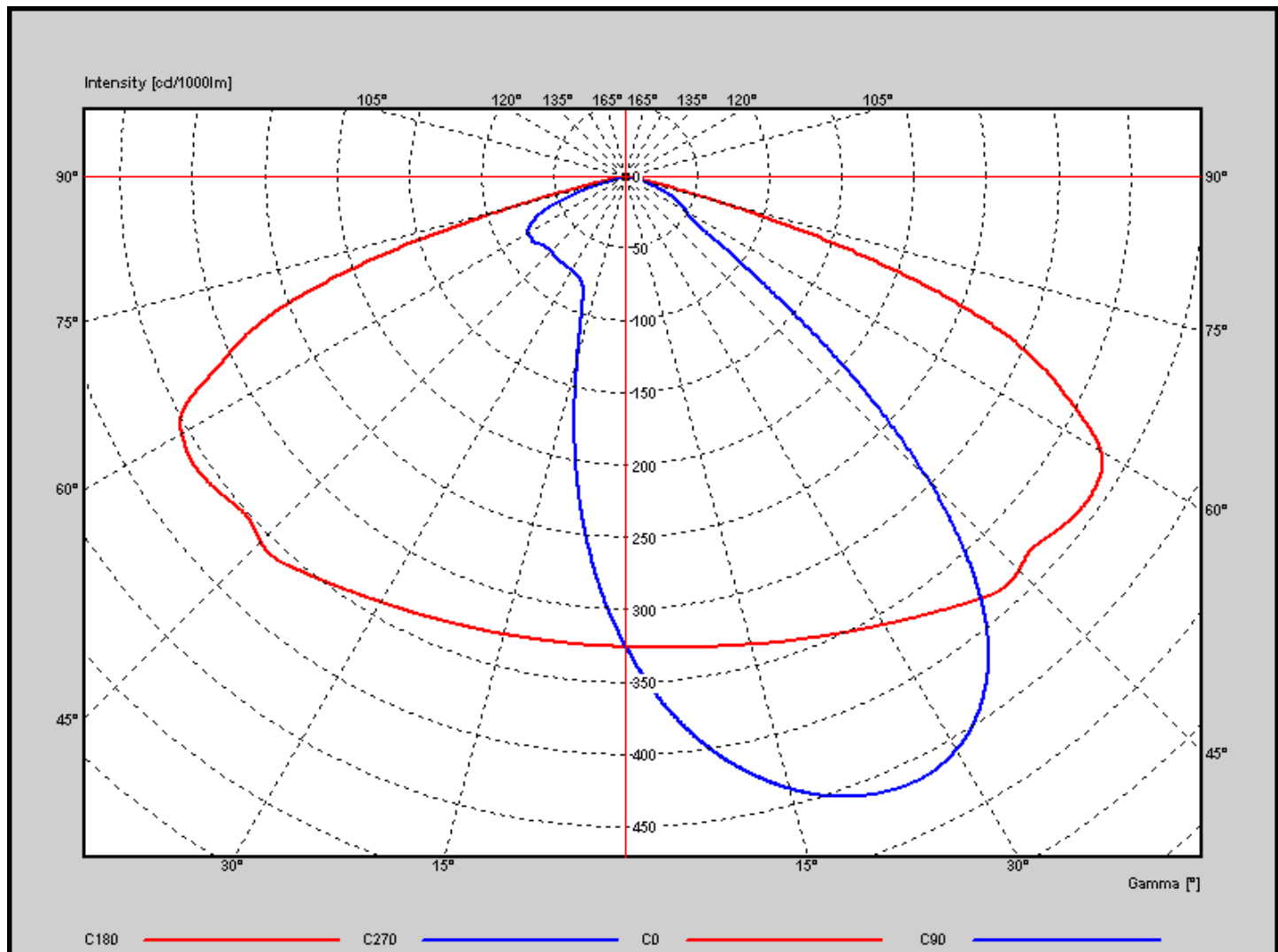
3D Light intensity distribution
Distribuzione 3d intensità luminosa



PHOTOMETRIC RESULTS

Sample Number	776-QL20-S01	Report Number	776-QL20-R01
Date:	11/06/2020 10.40.21	Manufacturer	RELCO
Flux:	22785 lm	Efficacy:	143 lm/W
Av. Voltage:	230,01 V	Av. Current:	0,698 A
Av. Power Factor:	0,9910	Av. Power:	159,0 W

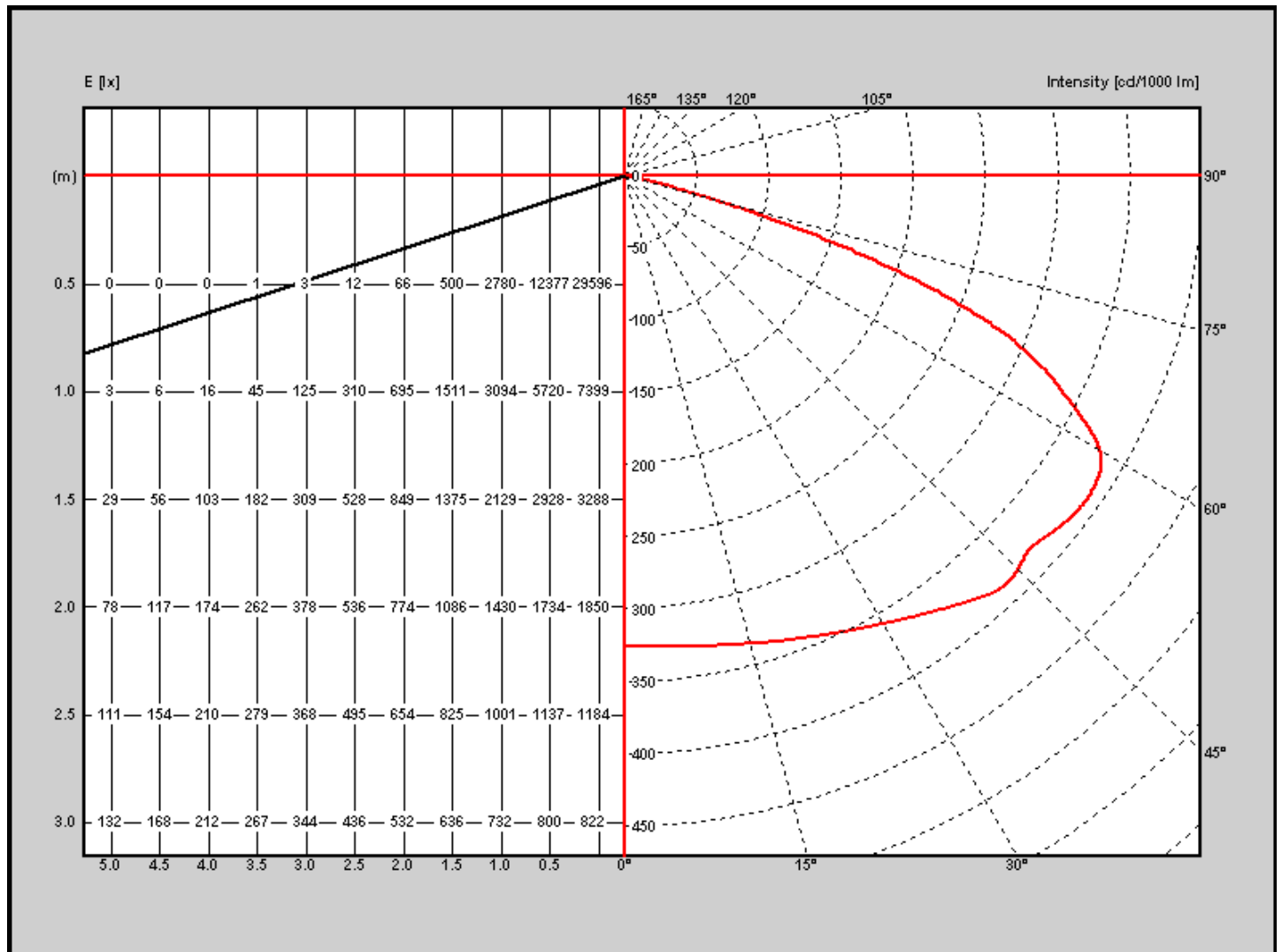
Polar diagram RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110



PHOTOMETRIC RESULTS

Sample Number	776-QL20-S01	Report Number	776-QL20-R01
Date:	11/06/2020 10.40.21	Manufacturer	RELCO
Flux:	22785 lm	Efficacy:	143 lm/W
Av. Voltage:	230,01 V	Av. Current:	0,698 A
Av. Power Factor:	0,9910	Av. Power:	159,0 W

Illuminance and Intensity diagram RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110



PHOTOMETRIC RESULTS

Sample Number	776-QL20-S01	Report Number	776-QL20-R01
Date:	11/06/2020 10.40.21	Manufacturer	RELCO
Flux:	22785 lm	Efficacy:	143 lm/W
Av. Voltage:	230,01 V	Av. Current:	0,698 A
Av. Power Factor:	0,9910	Av. Power:	159,0 W

Zonal flux RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

Gamma [°]	Imin [cd/klm]	Imax [cd/klm]	Imean [cd/klm]	Zonal flux [lm]	Sum. zonal flux [lm]	Rel. zonal flux [%]	Sum. rel. zonal flux [%]
0,0	324,73	324,73	324,73	0	0	0,00	0,00
2,5	297,50	350,31	324,41	44	44	0,19	0,19
5,0	266,90	373,34	322,78	132	176	0,58	0,77
7,5	234,30	393,43	319,99	219	395	0,96	1,73
10,0	200,04	410,66	316,19	302	697	1,33	3,06
12,5	164,46	425,35	311,40	382	1080	1,68	4,74
15,0	130,31	438,05	306,11	458	1538	2,01	6,75
17,5	103,65	448,44	301,27	531	2069	2,33	9,08
20,0	86,69	456,26	297,46	601	2670	2,64	11,72
22,5	79,04	462,94	295,09	671	3341	2,94	14,66
25,0	76,72	469,14	293,96	741	4081	3,25	17,91
27,5	75,37	476,05	293,35	811	4893	3,56	21,47
30,0	73,97	484,04	292,78	880	5773	3,86	25,34
32,5	72,36	491,94	292,00	947	6721	4,16	29,50
35,0	70,82	501,43	290,69	1011	7732	4,44	33,93
37,5	69,29	511,09	288,58	1070	8801	4,69	38,63
40,0	67,53	522,13	285,04	1121	9923	4,92	43,55
42,5	65,67	533,23	279,43	1162	11085	5,10	48,65
45,0	63,61	543,72	270,20	1187	12272	5,21	53,86
47,5	61,42	546,26	256,89	1189	13461	5,22	59,08
50,0	59,07	539,27	241,08	1169	14630	5,13	64,21
52,5	55,78	541,66	223,74	1132	15763	4,97	69,18
55,0	52,48	545,82	206,18	1083	16845	4,75	73,93
57,5	48,77	542,03	189,51	1027	17873	4,51	78,44
60,0	44,93	528,65	173,76	970	18843	4,26	82,70
62,5	40,87	497,86	156,22	903	19746	3,97	86,66
65,0	36,04	448,21	134,42	814	20560	3,57	90,24
67,5	29,96	388,25	111,50	703	21263	3,09	93,32
70,0	23,98	317,15	86,43	576	21839	2,53	95,85
72,5	17,71	222,20	59,06	430	22270	1,89	97,74
75,0	11,96	123,48	33,15	276	22546	1,21	98,95
77,5	2,10	51,43	14,65	145	22691	0,64	99,59
80,0	0,04	16,32	5,60	62	22753	0,27	99,86
82,5	0,00	4,58	1,82	23	22776	0,10	99,96
85,0	0,00	1,20	0,40	7	22783	0,03	99,99

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Zonal flux RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

Gamma [°]	Imin [cd/klm]	Imax [cd/klm]	Imean [cd/klm]	Zonal flux [lm]	Sum. zonal flux [lm]	Rel. zonal flux [%]	Sum. rel. zonal flux [%]
87,5	0,00	0,24	0,11	2	22784	0,01	100,00
90,0	0,00	0,00	0,00	0	22785	0,00	100,00
91,0	0,00	0,00	0,00	0	22785	0,00	100,00
92,0	0,00	0,00	0,00	0	22785	0,00	100,00
93,0	0,00	0,00	0,00	0	22785	0,00	100,00
94,0	0,00	0,00	0,00	0	22785	0,00	100,00
95,0	0,00	0,00	0,00	0	22785	0,00	100,00
100,0	0,00	0,00	0,00	0	22785	0,00	100,00
110,0	0,00	0,00	0,00	0	22785	0,00	100,00
120,0	0,00	0,00	0,00	0	22785	0,00	100,00
130,0	0,00	0,00	0,00	0	22785	0,00	100,00
140,0	0,00	0,00	0,00	0	22785	0,00	100,00
150,0	0,00	0,00	0,00	0	22785	0,00	100,00
160,0	0,00	0,00	0,00	0	22785	0,00	100,00
170,0	0,00	0,00	0,00	0	22785	0,00	100,00
180,0	0,00	0,00	0,00	0	22785	0,00	100,00

PHOTOMETRIC RESULTS

Sample Number	776-QL20-S01	Report Number	776-QL20-R01
Date:	11/06/2020 10.40.21	Manufacturer	RELCO
Flux:	22785 lm	Efficacy:	143 lm/W
Av. Voltage:	230,01 V	Av. Current:	0,698 A
Av. Power Factor:	0,9910	Av. Power:	159,0 W

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	0,0	2,5	5,0	7,5	10,0	12,5	15,0	17,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	325,39	326,50	327,60	328,71	329,81	330,92	332,14	333,13
5,0	326,50	328,71	330,92	333,24	335,56	337,77	339,88	341,97
7,5	327,82	331,37	334,90	338,21	341,64	344,84	347,96	350,93
10,0	329,70	334,46	339,10	343,62	347,83	352,13	356,25	360,10
12,5	331,79	337,89	343,74	349,25	354,57	359,76	364,77	369,49
15,0	334,44	341,76	348,60	355,11	361,65	367,82	373,73	379,11
17,5	337,53	346,08	354,13	361,62	369,05	376,22	382,91	389,06
20,0	340,62	350,39	359,77	368,25	376,57	384,51	391,98	398,45
22,5	344,15	355,26	365,85	375,21	384,42	393,23	401,38	408,40
25,0	348,12	360,68	372,04	382,50	392,71	402,29	411,00	418,68
27,5	352,43	366,21	378,89	390,12	401,33	411,69	421,07	429,29
30,0	357,06	372,18	386,07	398,29	410,50	421,74	431,68	440,56
32,5	362,25	378,82	393,81	407,13	420,34	432,46	443,19	452,61
35,0	367,87	385,89	402,10	416,63	431,06	443,95	455,46	465,54
37,5	374,05	393,64	411,27	427,12	442,55	456,32	468,63	479,36
40,0	380,34	401,49	420,56	437,83	454,60	469,47	482,67	493,95
42,5	385,53	408,35	429,18	448,22	466,54	482,95	497,27	509,09
45,0	384,09	408,46	431,06	452,08	472,17	490,58	506,56	519,81
47,5	380,34	406,02	429,29	451,31	472,29	491,46	508,00	521,58
50,0	384,09	411,22	436,03	459,26	480,57	499,42	514,86	525,67
52,5	387,73	417,08	444,43	469,53	492,40	512,12	527,24	536,39
55,0	389,50	421,07	450,73	477,93	502,13	521,96	536,31	543,47
57,5	387,85	421,84	453,50	481,90	506,33	525,27	537,75	542,03
60,0	379,24	415,43	448,74	478,26	502,02	519,08	528,35	528,65
62,5	352,32	388,22	421,22	449,21	470,96	486,60	494,73	493,06
65,0	322,30	355,92	384,97	406,69	422,66	431,46	432,57	424,76
67,5	282,91	313,01	336,78	353,23	365,29	370,14	367,98	358,22
70,0	221,78	243,33	259,63	271,27	279,19	281,42	278,61	270,79
72,5	144,66	155,73	165,68	174,63	181,38	184,96	184,26	179,17
75,0	66,76	68,24	69,85	72,35	76,49	82,09	87,16	90,19
77,5	25,08	24,21	22,86	21,43	20,75	21,92	25,04	29,27
80,0	7,62	7,09	6,20	5,17	4,72	4,85	5,35	6,40
82,5	1,43	1,31	1,12	1,07	1,14	1,29	1,49	1,71
85,0	0,20	0,21	0,22	0,23	0,25	0,26	0,27	0,28
87,5	0,06	0,07	0,08	0,08	0,09	0,10	0,10	0,11
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	0,0	2,5	5,0	7,5	10,0	12,5	15,0	17,5
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	20,0	22,5	25,0	27,5	30,0	32,5	35,0	37,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	334,12	335,11	336,21	337,09	338,09	338,96	339,83	340,60
5,0	343,85	345,83	347,81	349,68	351,44	353,20	354,82	356,26
7,5	353,79	356,65	359,51	362,04	364,58	366,99	369,26	371,47
10,0	363,84	367,48	371,22	374,29	377,38	380,45	383,15	385,80
12,5	373,79	378,19	382,37	386,10	389,74	393,25	396,27	399,35
15,0	384,17	389,01	393,74	397,91	401,99	405,72	409,05	412,36
17,5	394,45	399,73	404,89	409,39	413,69	417,75	421,29	424,82
20,0	404,50	410,22	415,82	420,54	425,17	429,33	432,97	436,72
22,5	414,78	420,93	426,86	431,80	436,65	440,81	444,33	448,19
25,0	425,61	431,98	438,24	443,39	448,24	452,50	455,90	459,54
27,5	436,77	443,47	449,83	455,20	460,05	464,31	467,37	470,56
30,0	448,26	455,29	461,87	467,23	471,86	475,90	478,61	481,36
32,5	460,63	467,88	474,45	479,59	483,90	487,48	489,52	491,62
35,0	474,00	481,46	487,92	492,61	496,48	499,29	500,54	501,43
37,5	488,15	495,71	501,84	506,19	509,28	511,10	511,02	510,35
40,0	502,84	510,18	515,97	519,66	521,75	522,13	520,38	517,96
42,5	518,20	525,20	530,10	532,57	533,23	531,73	527,99	523,03
45,0	529,80	537,35	542,36	543,72	542,73	539,23	532,40	524,35
47,5	532,01	539,89	544,79	546,26	544,71	539,89	530,97	519,83
50,0	533,23	537,68	539,27	537,98	533,68	526,98	516,64	503,96
52,5	541,29	541,66	537,72	530,14	518,99	506,13	490,07	471,66
55,0	545,82	542,43	533,97	521,31	504,65	485,05	460,42	433,30
57,5	540,74	532,82	519,83	502,55	480,91	454,93	424,49	390,98
60,0	522,95	510,18	492,67	470,54	443,17	412,34	377,09	338,51
62,5	485,38	470,97	450,27	423,74	392,83	357,83	317,68	274,47
65,0	412,57	396,19	375,74	352,66	324,40	289,42	247,90	203,92
67,5	343,96	324,51	300,77	273,74	241,84	205,78	168,54	131,17
70,0	258,66	242,77	223,48	199,12	169,21	136,71	102,29	71,43
72,5	169,82	157,95	142,66	122,74	99,67	74,15	50,48	35,16
75,0	90,38	86,59	79,50	67,22	50,00	33,87	23,48	18,30
77,5	33,67	36,67	35,17	28,51	20,21	14,90	12,15	10,96
80,0	8,10	10,14	11,11	9,86	8,26	7,09	6,38	5,96
82,5	1,98	2,36	2,80	3,09	3,09	2,88	2,57	2,34
85,0	0,29	0,31	0,34	0,38	0,44	0,49	0,52	0,53
87,5	0,12	0,12	0,12	0,13	0,13	0,13	0,14	0,14
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	20,0	22,5	25,0	27,5	30,0	32,5	35,0	37,5
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	40,0	42,5	45,0	47,5	50,0	52,5	55,0	57,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	341,47	342,34	342,95	343,79	344,61	345,50	346,04	346,83
5,0	357,89	359,39	360,73	362,07	363,60	364,94	366,03	367,27
7,5	373,64	375,57	377,39	379,26	381,04	382,72	384,13	385,72
10,0	388,40	390,65	392,83	394,79	396,94	398,84	400,36	402,18
12,5	402,06	404,62	407,05	409,11	411,41	413,42	415,16	416,88
15,0	415,28	417,83	420,49	422,55	424,88	427,01	428,63	430,47
17,5	427,72	430,37	433,16	435,21	437,35	439,38	440,89	442,51
20,0	439,51	442,03	444,82	446,45	448,62	450,43	451,71	452,90
22,5	450,64	452,93	455,82	457,02	458,77	460,15	460,98	461,74
25,0	461,54	463,38	465,93	466,50	467,83	468,65	468,93	469,14
27,5	472,23	473,40	475,38	475,20	475,89	476,05	475,56	474,78
30,0	482,47	482,64	484,04	482,80	482,51	481,68	480,08	478,20
32,5	491,94	491,22	491,60	488,97	487,37	485,33	482,62	479,42
35,0	500,64	498,27	497,48	493,26	490,24	486,43	481,96	477,10
37,5	507,91	503,77	501,26	494,92	489,91	483,89	477,32	470,25
40,0	513,31	506,74	502,04	493,04	485,50	476,60	467,61	458,31
42,5	515,63	506,30	498,93	486,55	475,78	463,79	452,04	439,75
45,0	513,75	500,69	489,71	473,55	459,11	443,14	426,97	410,80
47,5	505,60	488,25	473,15	452,07	432,39	411,77	391,86	372,57
50,0	487,43	465,91	445,27	418,91	394,62	369,68	346,04	323,29
52,5	450,41	426,74	404,27	374,85	346,26	317,44	290,17	264,29
55,0	404,48	374,14	346,51	315,48	286,09	255,15	225,36	197,67
57,5	355,24	317,80	283,18	247,07	214,98	185,01	156,35	128,50
60,0	297,30	254,74	217,64	179,88	145,75	114,32	88,55	70,27
62,5	230,33	188,61	150,87	114,78	84,80	62,96	49,91	44,42
65,0	161,26	121,71	88,99	63,34	46,93	38,88	36,88	36,57
67,5	95,72	68,01	48,99	36,90	32,02	31,15	31,03	31,49
70,0	49,57	36,09	29,11	26,22	25,95	26,18	26,61	26,96
72,5	26,33	22,01	20,77	20,49	20,65	21,21	21,64	21,77
75,0	16,19	15,41	15,55	15,53	15,79	16,02	16,12	16,35
77,5	10,53	10,53	10,74	10,82	10,88	11,05	11,32	11,41
80,0	5,69	5,55	5,60	5,75	6,15	6,59	6,88	6,95
82,5	2,21	2,16	2,20	2,25	2,39	2,59	2,90	3,24
85,0	0,54	0,56	0,58	0,60	0,63	0,67	0,76	0,85
87,5	0,15	0,15	0,16	0,16	0,16	0,17	0,17	0,18
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	60,0	62,5	65,0	67,5	70,0	72,5	75,0	77,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	347,37	347,83	348,17	348,71	349,03	349,38	349,48	349,93
5,0	368,12	369,27	369,95	370,58	371,23	371,82	372,13	372,81
7,5	386,89	388,17	389,19	390,14	390,78	391,49	391,80	392,59
10,0	403,46	405,08	406,11	407,27	407,90	408,73	408,92	409,84
12,5	418,25	419,78	421,03	422,07	422,59	423,54	423,62	424,65
15,0	431,72	433,05	434,19	435,22	435,74	436,58	436,44	437,47
17,5	443,54	444,87	445,91	446,60	447,00	447,75	447,37	448,30
20,0	453,70	454,71	455,31	455,66	455,84	456,15	455,55	456,26
22,5	462,20	462,78	462,94	462,73	462,35	462,45	461,63	461,90
25,0	468,82	468,97	468,58	467,59	466,88	466,43	465,27	465,10
27,5	473,79	473,06	471,78	470,14	468,76	467,75	465,94	465,43
30,0	476,22	474,72	472,45	469,80	467,55	465,76	463,17	461,90
32,5	476,00	473,17	469,68	465,83	462,58	459,68	456,32	454,16
35,0	471,80	467,53	462,50	457,32	452,63	448,63	444,28	441,23
37,5	462,97	456,92	450,00	443,40	437,17	432,05	426,60	422,55
40,0	448,73	440,67	431,87	423,40	415,41	408,51	401,63	396,13
42,5	427,20	416,25	404,45	393,57	383,49	374,91	366,50	359,77
45,0	395,06	381,43	367,41	354,23	342,07	331,58	321,75	313,57
47,5	353,77	337,11	320,53	305,06	290,82	278,64	267,39	258,19
50,0	301,43	281,62	262,81	245,62	229,96	216,63	204,85	195,19
52,5	239,60	217,96	197,91	179,99	164,13	150,54	139,11	130,09
55,0	172,25	149,77	129,69	113,25	100,62	91,63	85,08	80,57
57,5	104,67	86,76	74,63	67,07	62,41	59,13	57,01	55,60
60,0	58,74	53,05	50,09	48,51	47,83	47,64	47,84	48,08
62,5	42,84	42,55	42,57	42,87	43,41	43,99	44,42	44,87
65,0	36,66	37,47	38,15	38,56	38,99	39,35	39,67	39,90
67,5	31,91	32,50	33,17	33,81	34,13	34,15	34,25	34,37
70,0	27,27	27,63	27,75	27,84	28,39	28,30	28,06	27,96
72,5	21,75	21,77	21,78	21,77	21,87	21,88	21,77	21,44
75,0	16,67	16,69	16,47	16,02	15,79	15,58	15,25	14,70
77,5	11,33	11,25	11,20	10,89	10,50	10,05	9,52	9,01
80,0	6,88	6,84	6,69	6,45	6,15	5,76	5,36	5,10
82,5	3,41	3,40	3,29	3,10	2,89	2,68	2,53	2,44
85,0	0,87	0,86	0,84	0,85	0,84	0,81	0,78	0,76
87,5	0,18	0,19	0,19	0,19	0,20	0,20	0,20	0,21
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	80,0	82,5	85,0	87,5	90,0	92,5	95,0	97,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	350,07	350,20	350,25	350,31	350,23	350,13	350,01	349,93
5,0	372,98	373,14	373,33	373,34	373,29	373,00	372,99	373,04

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	80,0	82,5	85,0	87,5	90,0	92,5	95,0	97,5
7,5	392,92	392,98	393,43	393,37	393,14	392,77	392,89	392,85
10,0	410,10	410,19	410,66	410,65	410,43	409,67	409,93	409,79
12,5	424,64	424,74	425,35	425,26	425,18	424,14	424,33	424,21
15,0	437,42	437,42	438,05	437,88	437,82	436,51	436,75	436,75
17,5	447,88	447,90	448,44	448,18	448,13	446,67	447,08	447,10
20,0	455,59	455,62	456,06	455,71	455,55	453,96	454,45	454,58
22,5	460,99	460,80	461,03	460,58	460,54	458,71	459,17	459,31
25,0	463,85	463,44	463,35	462,90	462,76	460,70	461,26	461,73
27,5	463,63	462,78	462,58	462,02	461,87	459,59	460,38	460,96
30,0	459,56	458,26	457,72	456,93	456,77	454,51	455,44	456,34
32,5	451,19	449,44	448,44	447,40	447,35	445,23	446,20	447,32
35,0	437,53	435,11	433,75	432,46	432,38	430,43	431,80	433,12
37,5	418,25	415,26	413,53	411,97	411,87	410,00	411,46	413,20
40,0	390,60	386,70	384,37	382,41	382,27	380,51	382,55	384,81
42,5	353,37	348,66	345,83	343,55	343,25	341,85	344,41	347,07
45,0	306,34	300,80	297,34	294,84	294,35	293,47	296,37	299,53
47,5	250,38	244,13	240,34	237,71	237,15	236,70	239,87	243,52
50,0	187,04	180,83	176,95	174,27	173,62	173,41	176,44	180,25
52,5	123,04	117,87	114,76	112,71	112,20	112,22	114,55	117,85
55,0	77,00	74,54	73,01	72,08	71,84	71,79	72,77	74,28
57,5	54,53	53,92	53,57	53,37	53,44	53,35	53,54	54,03
60,0	48,14	48,41	48,49	48,72	48,78	48,60	48,48	48,31
62,5	44,94	45,10	45,18	45,28	45,34	45,18	45,18	45,12
65,0	39,99	40,03	40,09	40,19	40,13	40,09	40,01	39,94
67,5	34,26	34,18	34,24	34,21	34,15	34,13	34,08	34,11
70,0	27,76	27,57	27,28	27,24	27,16	27,17	27,26	27,51
72,5	21,04	20,62	20,21	20,04	19,96	20,10	20,34	20,80
75,0	14,10	13,67	13,14	12,84	12,86	12,92	13,30	13,87
77,5	8,55	8,30	8,14	8,05	8,06	8,10	8,21	8,41
80,0	4,91	4,84	4,80	4,76	4,77	4,80	4,87	4,96
82,5	2,39	2,36	2,35	2,35	2,35	2,37	2,40	2,44
85,0	0,76	0,77	0,77	0,78	0,79	0,79	0,80	0,81
87,5	0,21	0,21	0,21	0,21	0,21	0,21	0,22	0,22
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	100,0	102,5	105,0	107,5	110,0	112,5	115,0	117,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	349,73	349,62	349,30	348,97	348,63	348,22	347,62	347,23
5,0	372,41	372,19	371,45	371,01	370,44	369,72	368,75	367,97
7,5	391,79	391,46	390,73	390,07	389,39	388,35	387,12	386,06
10,0	408,86	408,53	407,59	406,82	406,02	405,00	403,41	402,27
12,5	423,28	422,84	422,03	421,15	420,23	419,34	417,61	416,39

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	100,0	102,5	105,0	107,5	110,0	112,5	115,0	117,5
15,0	435,73	435,40	434,59	433,71	432,79	431,91	430,04	429,08
17,5	446,08	445,75	445,17	444,29	443,37	442,71	440,93	440,00
20,0	453,57	453,35	452,99	452,22	451,52	451,20	449,74	449,04
22,5	458,74	458,63	458,61	458,17	457,80	457,82	456,56	456,32
25,0	461,27	461,49	461,81	461,70	461,76	462,34	461,62	461,84
27,5	460,72	461,49	462,14	462,47	463,08	464,33	464,15	465,26
30,0	456,54	457,75	458,94	460,04	461,43	463,44	464,15	466,14
32,5	448,06	449,82	451,78	453,76	456,03	459,14	460,85	463,82
35,0	434,41	436,83	439,55	442,52	446,01	450,21	453,37	457,65
37,5	415,25	418,33	422,03	426,00	430,70	436,32	441,04	446,95
40,0	387,94	392,23	397,24	402,86	409,11	416,36	422,89	430,62
42,5	350,94	356,00	362,31	369,47	377,49	387,03	396,26	406,91
45,0	304,36	310,53	318,01	326,82	336,74	348,11	359,61	372,49
47,5	249,08	256,24	264,90	275,14	286,73	300,03	314,06	329,36
50,0	185,99	193,58	202,97	214,43	227,47	242,36	258,38	275,98
52,5	123,00	129,72	138,51	149,64	162,70	178,19	195,43	214,98
55,0	76,86	80,16	85,07	92,01	101,23	113,79	129,63	148,80
57,5	54,95	55,94	57,52	59,83	63,12	68,25	76,37	88,57
60,0	48,23	48,01	47,93	47,93	48,25	49,18	51,06	54,60
62,5	45,15	45,04	44,74	44,30	43,73	43,33	43,03	43,24
65,0	40,08	39,97	39,78	39,56	39,32	39,14	38,95	38,39
67,5	34,25	34,25	34,38	34,38	34,37	34,29	33,67	33,31
70,0	27,75	27,97	28,32	28,43	28,53	28,34	28,28	28,35
72,5	21,14	21,58	21,82	22,04	22,03	22,16	22,23	22,50
75,0	14,43	14,98	15,43	15,87	16,08	16,54	16,95	17,21
77,5	8,72	9,23	9,81	10,38	10,92	11,35	11,66	11,91
80,0	5,09	5,29	5,61	6,05	6,48	6,85	7,10	7,38
82,5	2,50	2,57	2,69	2,88	3,10	3,36	3,57	3,78
85,0	0,83	0,85	0,88	0,94	1,01	1,05	1,08	1,14
87,5	0,22	0,22	0,22	0,23	0,23	0,23	0,23	0,23
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	120,0	122,5	125,0	127,5	130,0	132,5	135,0	137,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	346,66	346,11	345,47	344,81	344,03	343,46	342,65	341,81
5,0	366,82	365,85	364,66	363,57	362,33	360,87	359,58	358,01
7,5	384,56	383,26	381,76	380,34	378,65	376,63	374,96	372,88
10,0	400,65	399,13	397,31	395,68	393,54	391,18	389,12	386,55
12,5	414,54	412,80	410,99	409,14	406,99	404,29	402,18	399,22
15,0	427,10	425,26	423,34	421,50	419,23	416,41	414,13	411,23
17,5	438,12	436,50	434,70	432,97	430,59	427,65	425,52	422,47
20,0	447,48	446,20	444,52	442,90	440,73	437,90	435,92	432,83

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Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	120,0	122,5	125,0	127,5	130,0	132,5	135,0	137,5
22,5	455,09	454,25	452,90	451,62	449,88	447,26	445,66	442,63
25,0	461,15	460,86	459,96	459,12	457,82	455,75	454,62	452,00
27,5	465,22	465,71	465,59	465,52	464,77	463,35	462,81	460,82
30,0	466,99	468,36	469,23	470,05	470,50	469,96	470,22	469,08
32,5	465,99	468,58	470,77	472,70	474,36	475,14	476,64	476,46
35,0	461,26	465,49	469,34	472,92	476,12	478,45	481,51	482,74
37,5	452,44	458,55	464,37	470,05	475,24	479,44	484,39	487,59
40,0	438,23	446,42	454,56	462,77	470,39	477,12	484,39	489,91
42,5	417,40	428,45	439,56	450,30	460,91	470,73	480,96	489,46
45,0	385,89	400,57	415,73	430,99	445,25	458,61	472,33	484,40
47,5	345,56	363,09	381,87	401,09	420,33	439,11	457,28	473,60
50,0	294,98	315,36	337,64	360,59	384,27	408,03	432,27	454,20
52,5	236,14	259,03	284,14	310,39	337,96	366,05	394,21	419,16
55,0	170,79	195,21	222,70	251,35	280,51	309,41	339,22	368,70
57,5	106,11	128,53	155,64	184,05	213,03	243,74	277,93	314,04
60,0	61,27	72,97	91,11	115,42	145,44	178,95	215,75	255,09
62,5	43,86	45,96	52,39	65,54	87,00	116,14	151,58	192,28
65,0	37,91	37,92	38,61	41,38	49,73	66,22	91,72	126,17
67,5	33,06	32,85	32,87	33,21	34,51	39,45	51,67	72,51
70,0	28,32	28,11	28,02	27,81	27,79	28,65	32,31	40,00
72,5	22,70	22,93	22,83	22,73	22,38	22,26	22,68	24,46
75,0	17,30	17,31	17,32	17,10	17,09	17,08	17,15	17,08
77,5	12,07	12,16	12,17	12,07	12,06	11,96	11,97	11,85
80,0	7,55	7,58	7,62	7,53	7,27	6,98	6,86	6,82
82,5	3,87	3,82	3,58	3,27	3,03	2,89	2,83	2,81
85,0	1,20	1,19	1,09	0,99	0,94	0,92	0,91	0,90
87,5	0,23	0,24	0,23	0,23	0,23	0,23	0,23	0,23
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	-	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	140,0	142,5	145,0	147,5	150,0	152,5	155,0	157,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	340,92	340,15	339,26	338,38	337,39	336,27	335,29	334,29
5,0	356,33	354,79	353,24	351,47	349,72	347,70	345,84	343,85
7,5	370,65	368,45	366,34	363,80	361,39	358,47	355,74	353,08
10,0	384,08	381,44	378,78	375,90	372,83	369,24	365,75	362,31
12,5	396,53	393,55	390,45	387,01	383,51	379,35	375,32	371,32
15,0	408,20	405,00	401,46	397,80	394,08	389,35	384,88	380,56
17,5	419,32	415,91	412,35	408,36	404,32	399,35	394,45	389,68
20,0	429,56	426,15	422,48	418,27	414,11	408,91	403,69	398,58
22,5	439,58	436,28	432,39	428,17	423,91	418,58	413,14	407,70
25,0	449,27	446,08	442,40	438,29	433,93	428,58	422,93	417,15
27,5	458,52	455,66	452,20	448,20	444,06	438,47	432,83	426,82

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	140,0	142,5	145,0	147,5	150,0	152,5	155,0	157,5
30,0	467,33	465,02	462,00	458,43	454,29	448,80	443,05	436,82
32,5	475,59	474,05	471,68	468,66	464,97	459,57	453,83	447,59
35,0	483,19	482,97	481,48	479,34	476,09	471,11	465,49	459,24
37,5	489,68	490,90	490,73	489,79	487,54	483,08	477,91	471,66
40,0	494,20	497,39	498,87	499,59	498,43	495,06	490,67	484,62
42,5	496,40	502,13	505,92	508,72	509,22	507,26	503,87	498,36
45,0	494,64	503,45	510,21	515,76	518,36	518,25	515,96	510,67
47,5	487,92	500,47	510,32	517,96	522,10	522,54	520,58	515,17
50,0	472,95	488,03	499,31	508,06	513,84	516,38	516,84	513,63
52,5	441,45	460,28	475,98	489,46	501,08	509,46	516,18	517,92
55,0	397,41	424,16	449,01	470,53	489,19	503,63	515,63	522,10
57,5	350,39	384,74	416,87	445,56	470,25	489,79	506,83	518,36
60,0	295,99	336,07	374,27	408,25	438,55	463,85	485,83	502,65
62,5	234,77	276,94	319,89	358,95	393,53	423,63	450,64	472,10
65,0	167,38	210,43	254,83	296,78	335,30	367,92	396,98	420,01
67,5	103,29	142,16	184,49	222,50	256,92	287,37	314,83	339,24
70,0	54,51	78,51	112,94	150,32	184,49	215,83	243,69	267,37
72,5	29,73	40,19	59,44	88,03	117,23	140,88	161,87	180,00
75,0	18,06	20,92	27,74	40,94	62,19	82,97	97,98	108,68
77,5	11,94	12,55	14,27	18,23	26,87	39,47	48,86	51,43
80,0	6,94	7,22	7,77	8,79	10,64	13,58	16,32	15,98
82,5	2,85	3,02	3,37	3,78	4,23	4,58	4,45	3,87
85,0	0,89	0,90	0,92	0,96	0,94	0,88	0,78	0,70
87,5	0,23	0,23	0,23	0,23	0,23	0,22	0,22	0,21
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	160,0	162,5	165,0	167,5	170,0	172,5	175,0	177,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	333,19	332,09	331,10	330,01	328,91	327,81	326,60	325,72
5,0	341,75	339,68	337,80	335,61	333,41	331,10	328,91	326,92
7,5	350,21	347,15	344,39	341,32	337,92	334,61	331,43	328,24
10,0	358,66	354,62	350,99	347,04	342,64	338,24	333,96	329,78
12,5	366,79	362,20	357,80	352,97	347,59	342,08	336,82	331,75
15,0	375,25	370,01	364,83	359,24	353,08	346,47	340,23	334,27
17,5	383,92	378,14	372,30	365,83	358,80	351,20	343,85	336,69
20,0	392,27	385,94	379,44	372,42	364,51	355,92	347,59	339,43
22,5	400,94	394,18	387,02	379,46	370,78	361,08	351,65	342,50
25,0	410,06	402,64	394,93	386,82	377,37	366,79	356,27	345,90
27,5	419,28	411,33	402,95	394,29	384,07	372,61	360,99	349,52
30,0	429,06	420,67	411,74	402,20	391,43	378,98	366,05	353,58
32,5	439,60	430,78	421,18	410,89	399,46	385,90	371,87	358,08
35,0	451,02	441,88	431,51	420,45	408,03	393,59	378,36	363,24

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	160,0	162,5	165,0	167,5	170,0	172,5	175,0	177,5
37,5	463,32	453,85	442,82	430,78	417,37	401,82	385,28	368,72
40,0	476,28	466,60	454,80	441,88	427,37	410,61	392,53	374,43
42,5	490,23	480,34	467,98	453,85	437,92	419,83	400,12	380,24
45,0	502,09	491,44	477,76	461,99	444,18	424,12	402,42	380,79
47,5	506,15	495,06	480,39	463,63	444,62	423,02	400,34	377,06
50,0	506,92	498,03	485,01	469,02	450,01	427,63	403,96	379,25
52,5	515,04	508,69	496,98	481,22	461,55	437,51	411,66	384,85
55,0	522,62	518,58	508,19	492,54	472,21	446,74	418,69	389,35
57,5	523,39	522,87	514,56	500,23	479,79	453,33	423,41	391,65
60,0	513,18	517,15	512,47	500,56	481,55	455,30	424,07	389,90
62,5	488,03	497,59	497,86	489,35	472,43	447,29	416,60	381,45
65,0	436,31	446,38	448,21	441,88	427,70	406,43	379,79	347,77
67,5	360,75	377,15	386,47	388,25	380,34	364,16	343,41	316,17
70,0	288,16	304,18	313,64	317,15	313,08	301,12	284,73	264,17
72,5	196,46	210,55	219,05	222,20	220,11	212,39	200,77	187,27
75,0	116,30	122,09	123,48	120,11	114,40	107,18	100,11	95,55
77,5	49,70	46,21	41,48	37,73	35,39	35,09	35,95	36,97
80,0	13,20	10,48	9,05	8,40	8,56	9,54	10,91	11,95
82,5	3,24	2,78	2,43	2,17	1,96	1,92	2,16	2,58
85,0	0,64	0,59	0,54	0,50	0,47	0,45	0,43	0,42
87,5	0,20	0,20	0,19	0,19	0,18	0,17	0,17	0,16
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	180,0	182,5	185,0	187,5	190,0	192,5	195,0	197,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	324,51	323,18	322,20	321,11	320,12	318,80	317,71	316,51
5,0	324,62	322,19	320,01	317,71	315,39	312,88	310,59	308,28
7,5	324,73	321,19	318,03	314,42	310,77	307,17	303,57	299,95
10,0	325,17	320,42	315,94	311,24	306,27	301,36	296,45	291,50
12,5	325,94	319,98	314,18	308,17	302,09	295,65	289,43	283,06
15,0	327,15	319,87	312,87	305,54	298,03	290,27	282,41	274,61
17,5	328,46	320,09	311,77	303,02	294,07	284,67	275,29	265,95
20,0	329,89	320,42	310,67	300,60	290,00	279,08	268,05	257,06
22,5	331,76	320,97	309,79	298,19	286,16	273,48	260,92	248,18
25,0	334,06	321,97	309,24	296,11	282,42	267,99	253,80	239,08
27,5	336,37	322,96	308,80	293,91	278,58	262,51	246,34	229,65
30,0	339,11	324,29	308,47	292,05	274,95	256,91	238,67	220,00
32,5	342,30	326,17	308,47	290,18	271,21	251,31	231,00	210,13
35,0	345,92	328,27	308,91	288,65	267,70	245,61	223,21	200,26
37,5	349,87	330,48	309,24	287,22	264,18	239,90	215,32	190,28
40,0	353,93	333,13	309,79	285,69	260,55	234,08	207,31	180,30
42,5	357,99	335,34	310,23	283,93	256,71	227,83	198,98	170,54

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	180,0	182,5	185,0	187,5	190,0	192,5	195,0	197,5
45,0	356,90	333,02	306,06	278,12	249,23	219,05	189,23	160,34
47,5	351,96	326,94	298,15	268,69	238,47	206,76	176,51	147,72
50,0	352,61	325,84	294,96	263,54	231,43	198,31	166,97	137,96
52,5	355,91	327,27	293,97	260,25	226,27	191,50	159,51	130,51
55,0	358,21	327,16	291,44	255,53	219,89	184,15	151,84	123,05
57,5	358,21	324,84	287,16	248,95	212,31	175,92	143,84	115,59
60,0	354,37	319,10	279,69	240,50	202,75	166,26	134,52	107,37
62,5	343,94	307,27	266,95	227,34	189,89	154,30	123,99	98,48
65,0	312,22	277,11	238,60	201,35	166,71	134,44	107,77	85,87
67,5	283,89	250,37	213,78	178,76	146,82	117,10	92,42	72,60
70,0	238,77	210,59	178,84	148,38	120,99	95,59	74,77	58,23
72,5	171,37	152,92	130,29	108,02	87,36	67,93	52,18	39,81
75,0	91,67	86,62	77,01	64,70	52,20	40,28	30,26	22,81
77,5	37,53	37,48	34,67	29,51	23,74	18,10	13,95	11,31
80,0	12,45	12,41	11,46	9,80	8,08	6,68	5,82	5,34
82,5	2,80	2,78	2,55	2,32	2,16	2,06	1,99	1,91
85,0	0,40	0,38	0,35	0,32	0,30	0,28	0,26	0,24
87,5	0,15	0,14	0,12	0,11	0,10	0,09	0,08	0,08
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	200,0	202,5	205,0	207,5	210,0	212,5	215,0	217,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	315,62	314,42	313,33	312,26	311,36	310,27	309,28	308,40
5,0	306,19	303,89	301,37	299,24	297,10	294,82	292,73	290,76
7,5	296,65	293,04	289,31	285,78	282,52	279,04	275,63	272,45
10,0	286,77	281,85	276,70	271,89	267,28	262,61	257,88	253,27
12,5	276,90	270,55	264,08	257,66	251,72	245,63	239,47	233,55
15,0	266,92	259,04	251,03	243,00	235,49	227,88	220,40	212,94
17,5	256,60	247,08	237,54	227,90	218,72	209,48	200,45	191,57
20,0	246,07	234,80	223,62	212,15	201,39	190,63	180,06	169,76
22,5	235,32	222,19	209,25	196,17	183,63	171,35	159,46	148,28
25,0	224,35	209,25	194,44	179,54	165,54	151,96	139,41	127,68
27,5	212,94	195,98	179,31	162,80	147,67	133,22	120,66	109,49
30,0	201,20	182,27	163,85	146,17	130,24	115,80	104,01	94,36
32,5	189,24	168,56	148,82	130,20	114,24	100,68	90,53	83,29
35,0	177,40	155,18	134,34	115,43	100,09	88,30	80,66	76,28
37,5	165,66	142,24	120,86	102,19	88,25	79,10	74,42	72,22
40,0	154,47	130,29	108,68	90,81	79,26	72,97	70,47	69,37
42,5	143,72	119,10	97,82	81,40	72,47	68,80	67,62	66,85
45,0	133,40	109,23	88,50	73,85	67,64	65,63	64,88	64,33
47,5	121,66	98,70	79,73	67,73	63,81	62,67	62,14	61,81
50,0	112,23	89,71	71,83	62,36	59,97	59,38	59,18	59,07

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	200,0	202,5	205,0	207,5	210,0	212,5	215,0	217,5
52,5	104,88	82,80	65,91	58,10	56,35	55,87	55,78	55,89
55,0	97,97	76,55	60,87	54,49	53,06	52,48	52,50	52,50
57,5	91,28	70,63	56,26	50,88	49,55	49,19	49,10	48,77
60,0	84,04	64,60	51,76	46,94	45,83	45,25	44,93	45,15
62,5	76,79	58,78	46,94	42,67	41,33	40,87	40,99	41,32
65,0	67,47	51,87	41,45	37,42	36,51	36,26	36,39	36,93
67,5	56,28	42,88	34,44	31,51	31,03	31,11	31,34	31,67
70,0	44,65	34,00	27,75	25,71	25,33	25,31	25,21	25,65
72,5	30,28	24,13	20,62	19,48	19,08	19,28	19,62	19,84
75,0	18,21	15,35	13,93	13,57	13,48	13,59	13,81	14,14
77,5	9,79	9,10	8,72	8,53	8,47	8,50	8,65	8,80
80,0	5,02	4,80	4,65	4,52	4,44	4,37	4,34	4,31
82,5	1,83	1,77	1,71	1,64	1,57	1,47	1,33	1,22
85,0	0,22	0,21	0,19	0,18	0,17	0,16	0,15	0,14
87,5	0,07	0,06	0,05	0,05	0,04	0,04	0,03	0,03
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	220,0	222,5	225,0	227,5	230,0	232,5	235,0	237,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	307,40	306,45	305,62	304,78	303,90	303,35	302,58	302,01
5,0	288,65	286,63	284,85	283,07	281,21	279,78	278,14	276,76
7,5	269,24	266,05	263,10	260,16	257,20	254,89	252,37	250,08
10,0	248,95	244,37	240,14	236,15	232,20	228,80	225,18	221,98
12,5	227,89	222,03	216,52	211,26	206,22	201,50	196,90	192,66
15,0	205,74	198,39	191,70	185,17	178,92	173,22	167,52	162,48
17,5	182,93	174,41	166,43	158,86	151,84	145,37	139,12	133,82
20,0	159,90	150,54	141,82	133,86	126,63	120,27	114,46	109,67
22,5	137,85	128,21	119,63	112,04	105,80	100,53	96,04	92,54
25,0	117,46	108,39	101,07	95,05	90,45	86,72	83,87	81,90
27,5	100,35	92,95	87,55	83,54	80,80	78,94	77,73	77,07
30,0	87,41	82,22	79,21	77,29	76,19	75,43	74,88	74,65
32,5	78,85	76,20	75,03	74,11	73,56	73,02	72,69	72,56
35,0	74,14	72,92	72,28	71,70	71,26	71,04	70,82	70,92
37,5	71,18	70,29	69,87	69,51	69,40	69,29	69,29	69,60
40,0	68,76	67,99	67,78	67,53	67,53	67,64	67,97	68,50
42,5	66,35	65,80	65,69	65,67	65,78	66,11	66,66	67,41
45,0	64,05	63,61	63,72	63,92	64,35	64,79	65,45	66,42
47,5	61,63	61,42	61,74	62,05	62,71	63,48	64,24	65,21
50,0	59,11	59,12	59,54	60,08	60,85	61,50	62,38	63,34
52,5	56,15	56,49	57,01	57,45	58,32	59,53	60,63	61,92
55,0	52,64	52,88	53,72	54,93	56,24	57,56	58,76	60,38
57,5	48,91	49,38	50,42	51,75	53,39	55,04	56,79	58,73

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	220,0	222,5	225,0	227,5	230,0	232,5	235,0	237,5
60,0	45,51	46,20	47,13	48,35	49,99	51,86	54,05	56,32
62,5	41,89	42,59	43,61	44,62	46,05	47,36	49,22	51,93
65,0	37,51	38,32	39,11	39,80	41,22	42,98	44,95	46,66
67,5	32,13	32,95	33,95	35,08	35,96	37,60	39,69	41,83
70,0	26,65	27,26	28,23	29,49	30,48	31,90	33,77	35,79
72,5	20,40	20,91	21,86	23,13	24,23	25,65	26,64	28,10
75,0	14,59	15,11	15,60	16,34	16,88	17,76	18,86	19,76
77,5	9,09	9,30	9,63	9,98	10,38	10,80	11,04	11,29
80,0	4,40	4,45	4,59	4,79	5,01	5,15	5,15	5,00
82,5	1,18	1,17	1,22	1,31	1,36	1,38	1,32	1,18
85,0	0,13	0,12	0,11	0,09	0,07	0,05	0,04	0,04
87,5	0,02	0,02	0,02	0,01	0,01	0,01	0,01	0,01
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	240,0	242,5	245,0	247,5	250,0	252,5	255,0	257,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	301,27	300,76	300,16	299,71	299,15	298,83	298,51	298,18
5,0	275,18	274,04	272,86	271,72	270,72	269,86	269,11	268,45
7,5	247,77	245,77	243,79	241,98	240,42	239,02	237,73	236,75
10,0	218,83	216,08	213,20	210,71	208,69	206,65	204,93	203,51
12,5	188,57	184,96	181,39	178,22	175,54	172,96	170,70	168,95
15,0	157,65	153,40	149,15	145,52	142,39	139,48	137,13	135,16
17,5	128,82	124,59	120,42	117,10	114,17	111,61	109,49	107,73
20,0	105,47	102,05	98,81	96,24	94,19	92,29	90,73	89,52
22,5	89,46	87,20	85,10	83,62	82,45	81,54	80,74	80,20
25,0	80,25	79,40	78,52	78,14	77,83	77,48	77,23	77,12
27,5	76,52	76,32	75,89	75,72	75,64	75,50	75,37	75,37
30,0	74,22	74,23	74,03	73,97	74,10	74,08	74,05	74,16
32,5	72,36	72,58	72,49	72,65	72,89	72,98	73,17	73,28
35,0	70,93	71,26	71,28	71,66	71,91	72,21	72,52	72,74
37,5	69,73	70,27	70,52	70,89	71,36	71,77	72,19	72,52
40,0	68,74	69,50	69,86	70,56	71,14	71,66	72,08	72,41
42,5	67,97	68,84	69,42	70,13	70,70	71,22	71,64	72,08
45,0	67,20	68,18	68,65	69,36	69,82	70,35	70,87	71,20
47,5	65,78	66,64	67,23	68,15	68,94	69,80	70,65	71,31
50,0	64,13	65,43	66,46	67,82	68,94	70,02	70,98	71,86
52,5	63,04	64,55	65,91	67,49	69,05	70,46	71,75	72,95
55,0	61,83	63,78	65,58	67,60	69,49	71,33	73,06	74,49
57,5	60,52	62,79	64,81	67,16	69,49	71,33	72,30	73,72
60,0	58,32	59,71	62,07	64,75	67,41	69,91	72,30	74,16
62,5	54,71	57,51	60,21	62,88	64,33	66,83	69,11	71,09
65,0	49,44	52,78	55,71	58,82	61,59	63,76	64,73	66,26

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	240,0	242,5	245,0	247,5	250,0	252,5	255,0	257,5
67,5	43,20	46,19	49,79	52,90	55,55	57,29	58,14	59,35
70,0	37,06	39,37	41,78	44,56	45,78	47,19	48,60	49,81
72,5	29,71	30,57	31,91	32,59	33,81	35,01	35,54	34,78
75,0	20,61	20,89	21,39	20,85	20,53	20,74	19,97	19,64
77,5	11,60	11,49	11,01	10,06	8,89	7,48	6,65	5,20
80,0	4,57	3,93	3,29	2,61	1,84	1,13	0,60	0,27
82,5	1,03	0,85	0,64	0,41	0,24	0,13	0,07	0,03
85,0	0,03	0,03	0,03	0,02	0,02	0,02	0,01	0,01
87,5	0,01	0,01	0,01	0,01	0,00	0,00	0,00	0,00
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	260,0	262,5	265,0	267,5	270,0	272,5	275,0	277,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	297,94	297,82	297,65	297,68	297,52	297,50	297,74	297,87
5,0	267,95	267,61	267,27	267,22	266,90	266,97	267,23	267,60
7,5	235,89	235,20	234,80	234,56	234,30	234,45	234,85	235,35
10,0	202,28	201,36	200,67	200,36	200,04	200,39	200,92	201,55
12,5	167,36	166,10	165,34	164,84	164,46	164,90	165,45	166,33
15,0	133,54	132,05	131,21	130,75	130,31	130,62	131,19	131,98
17,5	106,41	105,24	104,46	104,03	103,65	103,94	104,31	104,79
20,0	88,62	87,77	87,40	86,98	86,69	86,86	87,02	87,29
22,5	79,95	79,64	79,48	79,29	79,09	79,14	79,09	79,04
25,0	77,09	77,01	77,05	76,98	76,78	76,94	76,89	76,72
27,5	75,44	75,47	75,62	75,55	75,45	75,62	75,68	75,51
30,0	74,35	74,48	74,63	74,67	74,57	74,73	74,79	74,63
32,5	73,58	73,71	73,97	74,12	74,02	74,29	74,35	74,19
35,0	73,14	73,38	73,75	73,79	73,80	74,07	74,13	73,86
37,5	73,03	73,38	73,75	73,90	73,91	74,07	74,13	73,97
40,0	72,92	73,27	73,64	73,79	73,69	73,96	74,02	73,86
42,5	72,48	72,83	73,20	73,35	73,25	73,41	73,47	73,31
45,0	71,71	72,17	72,54	72,69	72,59	72,75	72,70	72,43
47,5	71,93	72,61	72,98	73,24	73,03	73,19	73,03	72,65
50,0	72,70	73,38	73,97	74,23	74,02	74,18	73,80	73,31
52,5	74,13	75,03	75,84	76,10	76,01	76,06	75,56	74,85
55,0	75,99	77,12	78,05	78,41	78,21	78,26	77,66	76,61
57,5	75,33	76,57	77,50	77,86	77,66	77,71	77,00	75,95
60,0	75,99	77,34	78,49	78,74	78,54	78,48	77,77	76,61
62,5	72,81	74,15	75,18	75,55	75,34	75,29	74,57	73,42
65,0	67,87	68,99	70,01	70,16	70,06	69,99	69,40	68,25
67,5	60,62	61,63	62,41	62,57	62,46	62,39	61,69	60,65
70,0	50,74	50,86	50,42	50,03	49,68	49,60	49,24	48,76
72,5	34,48	34,71	34,89	34,75	34,48	34,50	34,26	33,79

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	260,0	262,5	265,0	267,5	270,0	272,5	275,0	277,5
75,0	19,44	19,33	18,60	17,81	17,29	17,42	17,51	17,72
77,5	3,93	3,09	2,58	2,27	2,10	2,13	2,25	2,73
80,0	0,13	0,07	0,06	0,04	0,04	0,04	0,04	0,07
82,5	0,02	0,01	0,01	0,01	0,00	0,01	0,01	0,01
85,0	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,01
87,5	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	280,0	282,5	285,0	287,5	290,0	292,5	295,0	297,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	298,04	298,30	298,59	299,02	299,35	299,87	300,39	300,97
5,0	268,15	268,68	269,25	270,00	270,88	272,03	273,06	274,33
7,5	236,05	236,86	237,92	239,11	240,65	242,30	243,96	245,92
10,0	202,52	203,60	205,16	206,78	208,76	211,15	213,43	216,19
12,5	167,55	168,92	170,86	173,01	175,55	178,55	181,56	185,13
15,0	133,25	134,78	136,89	139,36	142,01	145,41	149,03	153,08
17,5	105,89	107,03	108,76	110,78	113,21	116,35	119,71	123,57
20,0	88,02	88,75	89,79	91,25	92,91	95,02	97,59	100,47
22,5	79,20	79,28	79,64	80,11	80,77	81,87	83,42	85,33
25,0	76,88	76,75	76,77	76,80	76,91	77,12	77,34	77,70
27,5	75,67	75,43	75,56	75,58	75,58	75,58	75,68	75,60
30,0	74,79	74,66	74,67	74,59	74,48	74,47	74,46	74,39
32,5	74,23	74,00	74,01	73,82	73,71	73,70	73,58	73,39
35,0	73,90	73,67	73,57	73,38	73,16	73,03	72,91	72,62
37,5	74,01	73,67	73,46	73,27	72,93	72,59	72,36	71,95
40,0	73,90	73,56	73,35	73,16	72,71	72,37	71,92	71,29
42,5	73,35	73,01	72,91	72,60	72,27	71,93	71,58	70,85
45,0	72,36	71,91	71,70	71,39	71,06	70,82	70,48	69,96
47,5	72,25	71,69	71,15	70,51	69,73	69,17	68,60	67,97
50,0	72,80	71,91	71,15	70,18	69,29	68,39	67,38	66,32
52,5	73,90	72,68	71,59	70,29	68,85	67,51	66,27	64,88
55,0	75,45	73,89	72,36	70,73	68,85	67,07	65,28	63,55
57,5	74,56	72,79	71,15	69,96	68,30	66,07	64,06	62,01
60,0	75,12	73,12	71,03	68,52	65,98	63,31	60,96	58,47
62,5	71,92	69,92	67,84	65,43	62,67	60,66	58,53	55,82
65,0	66,84	65,08	63,09	61,24	59,58	56,90	53,99	50,73
67,5	59,34	57,81	56,14	54,40	53,18	50,94	47,58	43,99
70,0	48,64	48,01	46,88	45,24	43,36	40,88	39,17	37,14
72,5	33,31	32,81	32,87	32,99	31,56	29,94	28,99	28,18
75,0	18,31	18,72	18,86	18,32	18,65	19,11	18,92	18,68
77,5	3,61	4,77	5,47	6,60	7,94	8,64	9,42	9,38
80,0	0,14	0,28	0,60	1,06	1,58	2,00	2,63	3,04

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	280,0	282,5	285,0	287,5	290,0	292,5	295,0	297,5
82,5	0,02	0,03	0,05	0,07	0,12	0,19	0,30	0,42
85,0	0,01	0,01	0,01	0,01	0,02	0,02	0,02	0,02
87,5	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	300,0	302,5	305,0	307,5	310,0	312,5	315,0	317,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	301,55	302,18	302,86	303,74	304,40	305,18	306,12	306,94
5,0	275,61	277,08	278,56	280,31	281,86	283,53	285,75	287,48
7,5	247,91	250,32	252,72	255,45	257,99	260,67	264,15	266,92
10,0	219,10	222,35	225,77	229,49	233,13	236,70	241,44	245,48
12,5	188,86	193,05	197,38	202,20	207,06	211,74	217,74	223,16
15,0	157,51	162,53	167,89	173,58	179,66	185,56	192,93	199,61
17,5	128,04	133,23	138,95	145,29	151,81	158,83	167,35	175,41
20,0	103,98	108,46	113,43	119,44	126,29	133,54	142,65	151,53
22,5	87,75	90,88	94,55	99,00	104,63	111,00	119,50	128,43
25,0	78,37	79,83	81,96	84,86	88,83	93,44	100,34	107,88
27,5	75,61	75,96	76,32	77,23	79,11	81,73	86,50	92,07
30,0	74,39	74,41	74,45	74,69	75,02	75,66	77,97	81,02
32,5	73,18	73,30	73,23	73,25	73,37	73,45	74,21	74,94
35,0	72,30	72,20	72,13	72,04	72,04	71,79	72,32	72,29
37,5	71,52	71,31	71,02	70,71	70,60	70,36	70,66	70,52
40,0	70,86	70,43	69,92	69,50	69,28	68,92	69,11	68,86
42,5	70,09	69,55	68,81	68,28	67,84	67,38	67,45	67,09
45,0	69,21	68,44	67,60	66,85	66,29	65,72	65,79	65,10
47,5	67,44	67,00	66,16	65,41	64,64	63,95	63,79	63,11
50,0	65,34	64,68	63,84	63,20	62,54	61,85	61,58	60,79
52,5	63,69	62,69	61,74	60,77	59,78	58,98	58,70	57,92
55,0	61,92	60,59	59,20	58,23	57,12	55,89	54,82	53,83
57,5	60,05	58,38	56,66	55,02	53,59	52,13	51,17	50,18
60,0	56,84	55,28	53,02	51,05	49,50	48,27	47,51	46,53
62,5	53,09	50,31	47,72	45,96	45,30	44,18	43,42	42,44
65,0	47,24	44,67	43,19	41,54	40,00	38,77	38,10	37,58
67,5	41,28	39,47	37,89	36,02	34,47	33,25	32,56	31,61
70,0	34,88	32,95	31,81	30,05	28,51	27,50	26,36	25,20
72,5	26,60	25,65	24,08	22,76	21,55	20,43	19,94	19,12
75,0	17,77	16,92	15,79	15,25	14,58	14,03	13,51	12,93
77,5	9,40	9,24	8,97	8,64	8,38	8,07	7,77	7,57
80,0	3,41	3,77	3,85	3,85	3,69	3,49	3,32	3,23
82,5	0,54	0,68	0,80	0,86	0,85	0,78	0,72	0,68
85,0	0,03	0,03	0,03	0,03	0,04	0,04	0,05	0,05
87,5	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	300,0	302,5	305,0	307,5	310,0	312,5	315,0	317,5
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	320,0	322,5	325,0	327,5	330,0	332,5	335,0	337,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	307,80	308,81	309,81	310,91	312,00	313,01	314,11	315,10
5,0	289,21	291,35	293,68	295,87	298,27	300,41	302,71	305,04
7,5	270,18	273,45	277,00	280,50	284,32	287,59	291,43	294,97
10,0	250,05	254,66	259,54	264,36	269,59	274,44	279,70	284,79
12,5	229,03	234,98	241,20	247,67	254,43	260,62	267,42	274,17
15,0	207,01	214,42	222,31	230,31	238,59	246,37	254,92	263,21
17,5	184,22	193,09	202,53	212,29	222,21	231,67	241,97	252,04
20,0	161,54	171,65	182,64	194,04	205,71	216,97	228,92	240,75
22,5	138,74	149,88	162,31	175,25	188,55	201,71	215,64	229,25
25,0	117,61	128,65	141,54	155,68	170,84	185,91	201,70	217,41
27,5	100,02	109,86	122,20	136,55	152,68	169,55	187,43	205,13
30,0	86,52	94,39	105,19	118,64	135,07	152,97	172,71	192,51
32,5	77,67	82,67	91,04	102,94	118,69	137,28	158,22	179,79
35,0	73,13	75,27	80,66	89,89	103,96	122,24	144,05	167,18
37,5	70,81	71,40	73,81	80,05	91,45	108,54	130,67	154,79
40,0	69,04	69,19	69,94	73,19	81,49	96,82	118,39	143,06
42,5	67,16	67,20	67,40	68,77	73,96	86,76	107,54	132,11
45,0	65,17	65,10	65,08	65,68	68,42	78,36	97,92	122,04
47,5	62,95	62,78	62,76	62,91	64,33	71,29	88,62	110,97
50,0	60,63	60,24	59,89	59,71	60,45	65,43	80,88	102,79
52,5	57,53	56,92	56,57	56,50	57,24	61,23	74,90	95,93
55,0	53,66	53,50	53,37	53,51	54,14	57,58	69,81	89,62
57,5	49,90	49,63	49,83	50,09	50,71	53,83	64,84	83,42
60,0	46,14	45,65	45,52	45,77	46,83	49,85	59,75	77,01
62,5	41,93	41,45	41,21	41,24	41,85	44,98	53,88	69,37
65,0	37,06	36,47	36,13	36,04	36,43	38,57	46,14	59,41
67,5	30,87	30,51	30,16	29,96	30,23	31,83	37,62	48,68
70,0	24,67	24,21	23,98	24,10	24,25	25,20	28,88	35,96
72,5	18,59	18,24	17,90	17,80	17,71	18,24	20,03	23,57
75,0	12,61	12,38	12,15	12,05	11,96	12,16	12,61	14,05
77,5	7,41	7,25	7,10	7,09	7,11	7,16	7,40	7,73
80,0	3,20	3,21	3,25	3,33	3,39	3,45	3,53	3,64
82,5	0,68	0,69	0,74	0,83	0,90	0,94	0,96	0,97
85,0	0,06	0,06	0,07	0,08	0,08	0,09	0,10	0,11
87,5	0,01	0,01	0,01	0,02	0,02	0,02	0,02	0,02
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	320,0	322,5	325,0	327,5	330,0	332,5	335,0	337,5
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

G/C [cd/klm]	340,0	342,5	345,0	347,5	350,0	352,5	355,0	357,5
0,0	324,73	324,73	324,73	324,73	324,73	324,73	324,73	324,73
2,5	316,10	317,32	318,54	319,64	320,75	321,86	323,07	324,29
5,0	307,26	309,69	312,12	314,66	316,88	319,31	321,75	324,18
7,5	298,63	302,29	306,15	310,02	313,45	316,88	320,86	324,40
10,0	289,67	294,77	300,07	305,37	310,24	315,11	320,31	325,17
12,5	280,71	287,14	293,98	300,83	307,03	313,34	319,98	326,17
15,0	271,20	279,51	287,90	296,41	304,26	312,02	319,98	327,60
17,5	261,80	271,77	281,93	291,98	301,61	310,91	320,42	329,26
20,0	252,40	264,25	275,95	287,78	298,95	309,80	320,98	331,25
22,5	242,77	256,51	270,09	283,68	296,74	309,14	321,97	333,57
25,0	232,93	248,66	264,23	279,81	294,53	308,70	323,07	336,11
27,5	222,75	240,59	258,26	275,72	292,31	308,48	324,51	339,09
30,0	212,47	232,41	252,29	271,84	290,43	308,26	326,17	342,41
32,5	201,96	224,23	246,31	268,08	288,77	308,48	328,27	346,17
35,0	191,45	215,93	240,23	264,32	287,11	308,92	330,70	350,25
37,5	180,95	207,64	234,26	260,67	285,79	309,58	333,35	354,78
40,0	170,44	199,13	227,95	256,80	284,35	310,25	336,11	359,31
42,5	159,93	190,28	221,32	252,48	282,13	310,25	337,98	363,07
45,0	149,54	179,78	211,47	243,96	275,16	304,72	333,79	360,20
47,5	137,48	167,17	199,42	233,12	266,09	297,31	327,71	355,23
50,0	128,85	158,66	191,68	227,03	261,89	295,32	327,71	357,21
52,5	121,44	150,59	183,93	220,40	257,24	292,78	327,38	358,76
55,0	114,25	142,74	175,64	212,54	251,15	288,47	324,95	358,32
57,5	106,73	134,12	166,24	203,03	242,30	281,39	319,65	354,67
60,0	98,77	124,28	154,84	190,52	229,47	269,34	308,49	344,84
62,5	89,04	111,89	139,47	172,05	208,34	246,01	283,53	318,32
65,0	76,43	96,63	121,55	151,47	185,10	220,91	256,58	289,71
67,5	63,15	80,38	101,98	128,34	158,55	190,73	223,11	253,24
70,0	46,67	60,04	77,53	99,02	123,59	149,48	175,62	199,43
72,5	29,64	39,25	52,09	67,82	85,75	103,27	118,96	132,37
75,0	16,48	20,79	27,54	36,51	46,36	55,28	61,74	65,08
77,5	8,31	9,54	11,58	14,69	18,54	21,99	24,20	25,20
80,0	3,79	4,05	4,40	4,96	5,79	6,68	7,39	7,72
82,5	1,00	1,03	1,07	1,10	1,15	1,24	1,35	1,43
85,0	0,12	0,12	0,13	0,14	0,16	0,17	0,18	0,19
87,5	0,03	0,03	0,03	0,03	0,04	0,04	0,05	0,06
90,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
91,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
92,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
93,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
94,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
95,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

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Intensity [cd/klm] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd/klm]	340,0	342,5	345,0	347,5	350,0	352,5	355,0	357,5
100,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
110,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
120,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
130,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
140,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
150,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
160,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
170,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
180,0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

PHOTOMETRIC RESULTS

Sample Number	776-QL20-S01	Report Number	776-QL20-R01
Date:	11/06/2020 10.40.21	Manufacturer	RELCO
Flux:	22785 lm	Efficacy:	143 lm/W
Av. Voltage:	230,01 V	Av. Current:	0,698 A
Av. Power Factor:	0,9910	Av. Power:	159,0 W

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	0,0	2,5	5,0	7,5	10,0	12,5	15,0	17,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	7414,0	7439,3	7464,4	7489,5	7514,8	7539,9	7567,8	7590,3
5,0	7439,2	7489,7	7540,0	7592,7	7645,7	7696,0	7744,2	7791,8
7,5	7469,3	7550,1	7630,6	7706,0	7784,3	7857,1	7928,2	7995,8
10,0	7512,1	7620,7	7726,3	7829,3	7925,3	8023,3	8117,2	8204,8
12,5	7559,8	7698,8	7832,1	7957,6	8078,9	8197,0	8311,2	8418,9
15,0	7620,2	7787,0	7942,9	8091,0	8240,1	8380,8	8515,3	8638,0
17,5	7690,6	7885,3	8068,8	8239,5	8408,8	8572,1	8724,5	8864,6
20,0	7761,0	7983,6	8197,3	8390,5	8580,1	8760,9	8931,1	9078,7
22,5	7841,4	8094,5	8335,8	8549,1	8758,9	8959,8	9145,4	9305,3
25,0	7931,9	8218,0	8476,8	8715,1	8947,7	9166,2	9364,6	9539,6
27,5	8030,0	8344,0	8632,9	8888,8	9144,2	9380,2	9593,9	9781,3
30,0	8135,6	8480,1	8796,6	9075,0	9353,2	9609,3	9835,9	10038,2
32,5	8253,7	8631,3	8972,9	9276,4	9577,3	9853,5	10098,0	10312,7
35,0	8381,9	8792,5	9161,8	9492,8	9821,6	10115,3	10377,7	10607,3
37,5	8522,7	8969,0	9370,8	9731,9	10083,5	10397,3	10677,6	10922,1
40,0	8666,0	9147,9	9582,4	9976,0	10358,0	10696,9	10997,6	11254,6
42,5	8784,2	9304,1	9778,8	10212,6	10630,0	11004,0	11330,3	11599,6
45,0	8751,5	9306,6	9821,6	10300,6	10758,4	11177,7	11542,0	11843,9
47,5	8666,0	9251,2	9781,3	10283,0	10761,0	11197,9	11574,7	11884,1
50,0	8751,5	9369,6	9934,9	10464,2	10949,8	11379,1	11731,0	11977,3
52,5	8834,5	9503,2	10126,3	10698,3	11219,3	11668,6	12013,2	12221,6
55,0	8874,7	9593,9	10269,9	10889,5	11440,9	11892,7	12219,9	12382,8
57,5	8837,0	9611,6	10332,8	10980,1	11536,6	11968,2	12252,6	12350,0
60,0	8640,9	9465,4	10224,5	10897,1	11438,4	11827,2	12038,4	12045,3
62,5	8027,5	8845,5	9597,5	10235,2	10730,7	11087,1	11272,3	11234,4
65,0	7343,6	8109,6	8771,5	9266,3	9630,2	9830,9	9856,0	9678,1
67,5	6446,1	7131,8	7673,4	8048,2	8323,2	8433,6	8384,3	8162,0
70,0	5053,3	5544,2	5915,6	6180,9	6361,4	6412,1	6348,1	6170,0
72,5	3296,0	3548,3	3775,0	3978,8	4132,6	4214,3	4198,4	4082,3
75,0	1521,0	1554,9	1591,6	1648,4	1742,7	1870,5	1985,8	2055,0
77,5	571,5	551,6	520,8	488,2	472,7	499,5	570,5	666,9
80,0	173,7	161,5	141,3	117,8	107,5	110,5	122,0	145,8
82,5	32,5	29,8	25,5	24,3	26,0	29,3	33,8	38,9
85,0	4,6	4,8	5,1	5,3	5,6	5,8	6,0	6,3
87,5	1,4	1,6	1,7	1,9	2,1	2,2	2,4	2,5
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	0,0	2,5	5,0	7,5	10,0	12,5	15,0	17,5
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

G/C [cd]	20,0	22,5	25,0	27,5	30,0	32,5	35,0	37,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	7612,9	7635,5	7660,6	7680,6	7703,3	7723,3	7743,0	7760,6
5,0	7834,5	7879,6	7924,7	7967,3	8007,6	8047,6	8084,6	8117,2
7,5	8061,0	8126,3	8191,4	8249,0	8306,8	8361,8	8413,6	8463,8
10,0	8290,1	8372,9	8458,1	8528,1	8598,6	8668,6	8730,0	8790,3
12,5	8516,7	8617,0	8712,2	8797,2	8880,2	8960,2	9028,9	9099,2
15,0	8753,4	8863,6	8971,3	9066,3	9159,4	9244,3	9320,3	9395,6
17,5	8987,5	9107,7	9225,4	9327,9	9426,0	9518,3	9599,0	9679,4
20,0	9216,6	9346,8	9474,5	9581,9	9687,5	9782,3	9865,3	9950,6
22,5	9450,7	9590,9	9726,1	9838,4	9949,1	10043,8	10123,9	10211,8
25,0	9697,4	9842,6	9985,2	10102,5	10213,2	10310,3	10387,7	10470,5
27,5	9951,7	10104,3	10249,3	10371,6	10482,3	10579,3	10648,9	10721,7
30,0	10213,5	10373,6	10523,6	10645,7	10751,4	10843,2	10905,0	10967,8
32,5	10495,5	10660,5	10810,4	10927,4	11025,5	11107,2	11153,7	11201,4
35,0	10800,1	10970,1	11117,3	11224,2	11312,2	11376,2	11404,8	11424,9
37,5	11122,3	11294,7	11434,3	11533,5	11603,9	11645,2	11643,4	11628,3
40,0	11457,2	11624,4	11756,3	11840,3	11888,1	11896,6	11856,9	11801,6
42,5	11807,1	11966,7	12078,3	12134,6	12149,7	12115,4	12030,2	11917,2
45,0	12071,4	12243,5	12357,6	12388,6	12365,9	12286,3	12130,7	11947,3
47,5	12121,8	12301,4	12412,9	12446,4	12411,2	12301,4	12098,0	11844,3
50,0	12149,5	12251,0	12287,1	12257,8	12159,7	12007,3	11771,5	11482,7
52,5	12333,3	12341,6	12251,9	12079,2	11825,2	11532,1	11166,2	10746,8
55,0	12436,5	12359,3	12166,4	11878,0	11498,3	11051,9	10490,6	9872,8
57,5	12320,7	12140,3	11844,3	11450,5	10957,6	10365,6	9671,9	8908,4
60,0	11915,3	11624,4	11225,5	10721,2	10097,5	9395,1	8591,9	7712,9
62,5	11059,4	10731,0	10259,4	9654,8	8950,7	8153,2	7238,2	6253,7
65,0	9400,4	9027,2	8561,2	8035,2	7391,4	6594,4	5648,4	4646,3
67,5	7837,0	7393,9	6853,0	6237,0	5510,2	4688,8	3840,1	2988,7
70,0	5893,5	5531,6	5092,0	4536,9	3855,4	3114,9	2330,7	1627,5
72,5	3869,4	3598,8	3250,4	2796,6	2271,0	1689,5	1150,3	801,2
75,0	2059,3	1973,1	1811,4	1531,6	1139,3	771,8	535,0	416,9
77,5	767,1	835,5	801,3	649,6	460,5	339,4	276,8	249,6
80,0	184,5	231,0	253,1	224,6	188,1	161,7	145,4	135,9
82,5	45,0	53,8	63,8	70,4	70,4	65,7	58,6	53,3
85,0	6,6	7,1	7,7	8,7	10,0	11,1	11,8	12,0
87,5	2,6	2,7	2,8	2,9	3,0	3,1	3,2	3,3
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	40,0	42,5	45,0	47,5	50,0	52,5	55,0	57,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	7780,4	7800,1	7814,1	7833,1	7851,8	7872,1	7884,5	7902,4
5,0	8154,4	8188,7	8219,1	8249,8	8284,5	8315,0	8339,9	8368,2
7,5	8513,3	8557,3	8598,8	8641,3	8682,0	8720,2	8752,4	8788,6
10,0	8849,6	8900,8	8950,6	8995,2	9044,3	9087,6	9122,3	9163,7
12,5	9160,8	9219,2	9274,6	9321,5	9373,8	9419,8	9459,4	9498,5
15,0	9462,0	9520,1	9580,9	9627,7	9680,8	9729,4	9766,3	9808,2
17,5	9745,6	9805,9	9869,5	9916,3	9965,1	10011,2	10045,6	10082,6
20,0	10014,2	10071,7	10135,3	10172,3	10221,7	10262,9	10292,1	10319,3
22,5	10267,7	10319,9	10385,9	10413,2	10453,1	10484,4	10503,4	10520,7
25,0	10516,1	10558,1	10616,2	10629,1	10659,4	10678,1	10684,6	10689,3
27,5	10759,6	10786,3	10831,4	10827,4	10843,1	10846,8	10835,5	10817,7
30,0	10993,0	10996,9	11028,8	11000,5	10994,0	10975,1	10938,7	10895,8
32,5	11208,8	11192,4	11200,9	11141,1	11104,7	11058,1	10996,5	10923,5
35,0	11407,1	11352,9	11335,1	11239,0	11170,1	11083,3	10981,4	10870,6
37,5	11572,8	11478,3	11421,2	11276,6	11162,6	11025,4	10875,8	10714,5
40,0	11695,8	11546,0	11438,9	11234,0	11061,9	10859,3	10654,4	10442,6
42,5	11748,5	11535,9	11368,0	11085,9	10840,6	10567,4	10299,7	10019,7
45,0	11705,8	11408,1	11157,9	10789,7	10460,7	10096,8	9728,6	9360,1
47,5	11520,1	11124,7	10780,7	10300,3	9851,8	9382,1	8928,5	8489,0
50,0	11105,9	10615,8	10145,4	9544,8	8991,4	8423,2	7884,5	7366,2
52,5	10262,7	9723,2	9211,3	8540,9	7889,5	7232,8	6611,5	6021,9
55,0	9216,1	8524,7	7895,1	7188,1	6518,4	5813,5	5134,7	4503,8
57,5	8094,2	7241,0	6452,2	5629,5	4898,2	4215,4	3562,4	2927,9
60,0	6774,0	5804,3	4958,8	4098,5	3320,8	2604,7	2017,7	1601,1
62,5	5248,0	4297,5	3437,5	2615,2	1932,1	1434,5	1137,1	1012,0
65,0	3674,4	2773,0	2027,6	1443,1	1069,2	885,9	840,3	833,3
67,5	2181,0	1549,5	1116,3	840,8	729,6	709,7	706,9	717,5
70,0	1129,4	822,4	663,2	597,3	591,2	596,4	606,3	614,3
72,5	599,8	501,5	473,4	466,8	470,5	483,2	493,1	495,9
75,0	368,9	351,0	354,4	353,9	359,8	364,9	367,3	372,6
77,5	239,9	239,9	244,8	246,5	247,8	251,7	257,9	260,1
80,0	129,8	126,4	127,6	131,0	140,1	150,2	156,7	158,4
82,5	50,2	49,2	50,2	51,4	54,4	59,0	66,1	73,8
85,0	12,3	12,7	13,3	13,8	14,4	15,3	17,2	19,3
87,5	3,4	3,5	3,6	3,7	3,7	3,9	4,0	4,1
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

G/C [cd]	60,0	62,5	65,0	67,5	70,0	72,5	75,0	77,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	7914,7	7925,3	7933,0	7945,2	7952,6	7960,5	7962,9	7973,1
5,0	8387,6	8413,8	8429,3	8443,7	8458,5	8471,8	8479,0	8494,4
7,5	8815,3	8844,5	8867,6	8889,3	8903,9	8920,0	8927,1	8945,2
10,0	9192,7	9229,8	9253,1	9279,5	9294,0	9312,9	9317,3	9338,1

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	60,0	62,5	65,0	67,5	70,0	72,5	75,0	77,5
12,5	9529,8	9564,7	9593,2	9616,9	9628,7	9650,4	9652,1	9675,5
15,0	9836,7	9866,9	9893,0	9916,4	9928,2	9947,5	9944,1	9967,7
17,5	10105,9	10136,4	10160,0	10175,8	10184,9	10201,9	10193,4	10214,5
20,0	10337,4	10360,5	10374,1	10382,2	10386,2	10393,3	10379,7	10395,8
22,5	10531,1	10544,4	10548,0	10543,3	10534,7	10536,8	10518,1	10524,2
25,0	10682,1	10685,4	10676,4	10654,1	10637,9	10627,5	10601,2	10597,3
27,5	10795,3	10778,6	10749,5	10712,0	10680,7	10657,7	10616,3	10604,8
30,0	10850,6	10816,4	10764,6	10704,4	10653,0	10612,4	10553,4	10524,2
32,5	10845,6	10781,1	10701,6	10613,8	10539,7	10473,9	10397,3	10347,9
35,0	10750,0	10652,7	10537,9	10420,0	10313,2	10222,0	10122,9	10053,3
37,5	10548,7	10410,9	10253,2	10102,7	9960,9	9844,3	9720,1	9627,7
40,0	10224,2	10040,7	9840,1	9647,1	9465,1	9307,9	9151,1	9025,8
42,5	9733,6	9484,1	9215,3	8967,3	8737,8	8542,3	8350,6	8197,3
45,0	9001,5	8690,9	8371,4	8071,1	7794,1	7555,1	7331,0	7144,6
47,5	8060,6	7681,0	7303,2	6950,8	6626,3	6348,8	6092,4	5882,9
50,0	6868,1	6416,8	5988,2	5596,4	5239,7	4936,0	4667,5	4447,4
52,5	5459,3	4966,2	4509,4	4101,0	3739,7	3430,0	3169,5	2964,1
55,0	3924,6	3412,4	2955,0	2580,4	2292,7	2087,7	1938,5	1835,9
57,5	2385,0	1976,9	1700,5	1528,1	1421,9	1347,3	1299,0	1266,7
60,0	1338,4	1208,8	1141,2	1105,2	1089,7	1085,4	1090,1	1095,5
62,5	976,1	969,6	969,9	976,8	989,0	1002,3	1012,0	1022,5
65,0	835,2	853,7	869,1	878,6	888,4	896,5	903,8	909,1
67,5	727,1	740,4	755,8	770,4	777,6	778,2	780,4	783,2
70,0	621,4	629,6	632,3	634,4	646,8	644,7	639,4	637,1
72,5	495,6	496,1	496,3	495,9	498,3	498,6	495,9	488,6
75,0	379,9	380,3	375,4	365,0	359,9	355,1	347,4	334,9
77,5	258,1	256,4	255,2	248,2	239,3	228,9	217,0	205,2
80,0	156,7	155,9	152,4	147,0	140,2	131,2	122,1	116,1
82,5	77,7	77,4	75,0	70,7	65,8	61,1	57,6	55,6
85,0	19,9	19,6	19,2	19,3	19,1	18,4	17,7	17,4
87,5	4,2	4,3	4,4	4,4	4,5	4,6	4,7	4,7
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

G/C [cd]	80,0	82,5	85,0	87,5	90,0	92,5	95,0	97,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	7976,2	7979,3	7980,3	7981,7	7979,9	7977,8	7975,0	7973,1
5,0	8498,2	8501,9	8506,3	8506,4	8505,4	8498,7	8498,5	8499,6
7,5	8952,5	8954,1	8964,3	8963,0	8957,5	8949,2	8951,9	8950,9
10,0	9344,1	9346,0	9356,9	9356,5	9351,6	9334,2	9340,1	9337,1
12,5	9675,3	9677,7	9691,6	9689,5	9687,6	9663,9	9668,2	9665,5
15,0	9966,5	9966,6	9981,0	9977,1	9975,6	9945,8	9951,3	9951,3
17,5	10204,9	10205,3	10217,6	10211,7	10210,5	10177,3	10186,7	10187,0
20,0	10380,6	10381,1	10391,2	10383,3	10379,7	10343,4	10354,5	10357,5
22,5	10503,6	10499,2	10504,5	10494,2	10493,4	10451,6	10462,2	10465,3

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	80,0	82,5	85,0	87,5	90,0	92,5	95,0	97,5
25,0	10568,8	10559,5	10557,3	10547,2	10543,9	10496,9	10509,8	10520,5
27,5	10563,8	10544,4	10539,7	10527,0	10523,7	10471,8	10489,8	10502,9
30,0	10471,0	10441,4	10429,0	10411,0	10407,5	10356,0	10377,1	10397,6
32,5	10280,2	10240,4	10217,6	10194,1	10192,8	10144,6	10166,7	10192,0
35,0	9969,0	9913,8	9882,9	9853,5	9851,8	9807,4	9838,5	9868,6
37,5	9529,8	9461,6	9422,3	9386,8	9384,5	9341,8	9375,2	9414,8
40,0	8899,8	8810,9	8757,9	8713,2	8710,0	8669,9	8716,4	8767,9
42,5	8051,5	7944,1	7879,6	7827,8	7820,8	7789,0	7847,3	7907,9
45,0	6979,8	6853,8	6774,8	6717,8	6706,8	6686,7	6752,7	6824,8
47,5	5704,8	5562,4	5476,2	5416,1	5403,3	5393,2	5465,3	5548,6
50,0	4261,7	4120,3	4031,7	3970,7	3955,9	3951,1	4020,1	4106,9
52,5	2803,5	2685,7	2614,8	2568,1	2556,4	2556,9	2609,9	2685,3
55,0	1754,4	1698,4	1663,5	1642,2	1636,9	1635,8	1658,1	1692,4
57,5	1242,4	1228,6	1220,6	1215,9	1217,6	1215,5	1219,8	1231,1
60,0	1096,8	1102,9	1104,8	1110,0	1111,5	1107,3	1104,6	1100,7
62,5	1024,0	1027,6	1029,3	1031,8	1033,2	1029,3	1029,4	1028,0
65,0	911,1	912,0	913,5	915,7	914,4	913,5	911,7	910,1
67,5	780,6	778,8	780,2	779,5	778,0	777,6	776,5	777,3
70,0	632,5	628,1	621,6	620,6	618,9	619,1	621,2	626,8
72,5	479,4	469,8	460,5	456,6	454,7	458,0	463,4	473,9
75,0	321,3	311,5	299,5	292,6	293,0	294,4	303,1	315,9
77,5	194,8	189,2	185,5	183,4	183,6	184,5	187,1	191,6
80,0	111,9	110,3	109,5	108,5	108,6	109,5	111,0	113,1
82,5	54,4	53,8	53,6	53,6	53,6	54,1	54,7	55,6
85,0	17,4	17,5	17,6	17,8	17,9	18,1	18,2	18,5
87,5	4,7	4,8	4,8	4,8	4,9	4,9	4,9	5,0
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

G/C [cd]	100,0	102,5	105,0	107,5	110,0	112,5	115,0	117,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	7968,5	7966,0	7958,8	7951,3	7943,6	7934,1	7920,5	7911,6
5,0	8485,3	8480,3	8463,5	8453,4	8440,5	8424,0	8401,8	8384,1
7,5	8926,9	8919,4	8902,8	8887,8	8872,2	8848,6	8820,6	8796,3
10,0	9315,8	9308,3	9287,0	9269,4	9251,2	9228,0	9191,6	9165,7
12,5	9644,5	9634,4	9615,9	9595,8	9575,0	9554,6	9515,1	9487,4
15,0	9928,0	9920,5	9902,1	9882,0	9861,1	9841,0	9798,4	9776,5
17,5	10163,8	10156,3	10143,1	10123,0	10102,0	10087,2	10046,6	10025,3
20,0	10334,4	10329,4	10321,4	10303,8	10287,8	10280,6	10247,2	10231,4
22,5	10452,4	10449,9	10449,4	10439,4	10430,8	10431,4	10402,7	10397,2
25,0	10510,1	10515,1	10522,2	10519,7	10521,2	10534,4	10518,0	10522,9
27,5	10497,5	10515,1	10529,8	10537,3	10551,3	10579,6	10575,7	10600,8
30,0	10402,2	10429,8	10456,9	10482,0	10513,6	10559,5	10575,7	10620,9
32,5	10209,0	10249,1	10293,8	10338,9	10390,6	10461,5	10500,4	10568,1
35,0	9897,9	9953,1	10015,1	10082,9	10162,3	10258,0	10329,9	10427,4

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	100,0	102,5	105,0	107,5	110,0	112,5	115,0	117,5
37,5	9461,3	9531,6	9615,9	9706,2	9813,4	9941,5	10049,1	10183,6
40,0	8839,1	8936,9	9051,0	9179,0	9321,5	9486,7	9635,4	9811,6
42,5	7996,1	8111,5	8255,1	8418,3	8601,1	8818,4	9028,7	9271,3
45,0	6934,8	7075,3	7245,8	7446,6	7672,5	7931,6	8193,7	8487,2
47,5	5675,3	5838,4	6035,7	6269,1	6533,1	6836,2	7155,7	7504,5
50,0	4237,6	4410,8	4624,7	4885,8	5182,8	5522,2	5887,1	6288,1
52,5	2802,5	2955,6	3155,9	3409,5	3707,0	4060,0	4452,9	4898,3
55,0	1751,3	1826,5	1938,2	2096,4	2306,5	2592,8	2953,6	3390,3
57,5	1252,0	1274,6	1310,6	1363,3	1438,1	1555,2	1740,0	2018,1
60,0	1098,9	1093,9	1092,1	1092,1	1099,3	1120,5	1163,4	1244,0
62,5	1028,7	1026,2	1019,3	1009,3	996,4	987,4	980,3	985,2
65,0	913,3	910,8	906,4	901,3	896,0	891,9	887,6	874,6
67,5	780,3	780,3	783,3	783,3	783,1	781,3	767,2	759,0
70,0	632,3	637,3	645,2	647,8	650,0	645,7	644,4	645,9
72,5	481,7	491,8	497,1	502,1	502,0	505,0	506,5	512,7
75,0	328,7	341,2	351,5	361,5	366,4	376,9	386,1	392,1
77,5	198,7	210,3	223,4	236,5	248,7	258,5	265,8	271,4
80,0	115,9	120,4	127,8	137,8	147,6	156,0	161,7	168,1
82,5	57,0	58,6	61,3	65,6	70,7	76,7	81,4	86,0
85,0	18,9	19,3	20,1	21,5	22,9	23,9	24,5	26,0
87,5	5,0	5,1	5,1	5,1	5,2	5,2	5,2	5,3
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

G/C [cd]	120,0	122,5	125,0	127,5	130,0	132,5	135,0	137,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	7898,6	7886,2	7871,4	7856,5	7838,6	7825,8	7807,3	7788,1
5,0	8358,0	8335,7	8308,7	8283,9	8255,7	8222,4	8193,0	8157,2
7,5	8762,2	8732,6	8698,3	8666,0	8627,5	8581,5	8543,4	8496,1
10,0	9128,8	9094,2	9052,6	9015,5	8966,7	8912,9	8866,1	8807,4
12,5	9445,1	9405,6	9364,3	9322,2	9273,2	9211,6	9163,6	9096,2
15,0	9731,4	9689,5	9645,8	9603,8	9552,0	9487,8	9435,9	9369,8
17,5	9982,4	9945,6	9904,6	9865,3	9810,8	9743,9	9695,5	9625,9
20,0	10195,8	10166,6	10128,3	10091,5	10042,0	9977,4	9932,5	9861,9
22,5	10369,1	10350,0	10319,3	10290,1	10250,5	10190,8	10154,3	10085,4
25,0	10507,2	10500,7	10480,2	10461,1	10431,4	10384,1	10358,5	10298,8
27,5	10600,0	10611,2	10608,3	10606,9	10589,7	10557,4	10545,1	10499,6
30,0	10640,2	10671,5	10691,3	10710,0	10720,3	10708,0	10714,0	10687,9
32,5	10617,6	10676,5	10726,5	10770,3	10808,2	10826,0	10860,2	10856,1
35,0	10509,7	10606,2	10693,8	10775,4	10848,4	10901,3	10971,1	10999,3
37,5	10308,8	10447,9	10580,7	10710,0	10828,3	10923,9	11036,7	11109,7
40,0	9984,9	10171,7	10357,0	10544,1	10717,8	10871,2	11036,7	11162,4
42,5	9510,4	9762,3	10015,2	10260,0	10501,7	10725,6	10958,5	11152,4
45,0	8792,4	9126,9	9472,4	9820,0	10145,0	10449,4	10761,9	11036,9
47,5	7873,5	8273,0	8700,8	9138,7	9577,2	10005,0	10419,0	10790,9

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	120,0	122,5	125,0	127,5	130,0	132,5	135,0	137,5
50,0	6721,1	7185,5	7693,0	8216,0	8755,6	9297,0	9849,3	10349,0
52,5	5380,4	5902,1	6474,1	7072,1	7700,4	8340,4	8982,1	9550,6
55,0	3891,5	4447,9	5074,2	5727,1	6391,5	7050,0	7729,2	8400,7
57,5	2417,8	2928,4	3546,2	4193,5	4853,9	5553,6	6332,6	7155,4
60,0	1395,9	1662,6	2075,9	2629,7	3313,8	4077,3	4915,8	5812,2
62,5	999,2	1047,3	1193,8	1493,4	1982,3	2646,2	3453,7	4381,1
65,0	863,7	864,0	879,6	942,8	1133,1	1508,9	2089,9	2874,7
67,5	753,2	748,4	748,9	756,7	786,4	898,8	1177,3	1652,0
70,0	645,2	640,4	638,4	633,5	633,1	652,8	736,1	911,4
72,5	517,2	522,4	520,2	517,9	510,0	507,2	516,8	557,4
75,0	394,2	394,3	394,6	389,7	389,4	389,2	390,7	389,2
77,5	274,9	277,0	277,2	275,0	274,9	272,4	272,8	269,9
80,0	172,0	172,8	173,7	171,5	165,6	158,9	156,3	155,4
82,5	88,1	87,1	81,5	74,5	69,1	65,8	64,5	64,0
85,0	27,4	27,0	24,9	22,6	21,4	21,0	20,8	20,5
87,5	5,3	5,4	5,4	5,3	5,3	5,3	5,3	5,3
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	-	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

G/C [cd]	140,0	142,5	145,0	147,5	150,0	152,5	155,0	157,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	7767,8	7750,2	7730,0	7709,8	7687,4	7661,9	7639,5	7616,8
5,0	8119,0	8083,9	8048,5	8008,2	7968,3	7922,3	7880,0	7834,6
7,5	8445,2	8395,0	8347,0	8289,0	8234,1	8167,6	8105,5	8044,9
10,0	8751,3	8691,1	8630,4	8564,8	8495,0	8413,0	8333,5	8255,3
12,5	9034,8	8967,0	8896,3	8818,1	8738,3	8643,4	8551,5	8460,6
15,0	9300,7	9228,0	9147,1	9063,8	8979,1	8871,2	8769,5	8670,9
17,5	9554,1	9476,4	9395,4	9304,5	9212,3	9099,1	8987,5	8878,7
20,0	9787,5	9709,7	9626,2	9530,1	9435,5	9316,9	9197,9	9081,5
22,5	10015,8	9940,5	9851,9	9755,8	9658,8	9537,3	9413,4	9289,4
25,0	10236,6	10163,8	10080,1	9986,4	9887,0	9765,1	9636,4	9504,7
27,5	10447,3	10382,1	10303,3	10212,1	10117,7	9990,5	9861,9	9725,0
30,0	10648,1	10595,4	10526,6	10445,3	10351,0	10225,8	10094,9	9952,9
32,5	10836,2	10801,1	10747,3	10678,5	10594,3	10471,2	10340,5	10198,3
35,0	11009,4	11004,3	10970,5	10921,7	10847,6	10734,1	10606,1	10463,7
37,5	11157,4	11185,0	11181,2	11159,8	11108,5	11007,0	10889,2	10746,6
40,0	11260,2	11333,0	11366,8	11383,0	11356,8	11279,9	11179,9	11042,1
42,5	11310,4	11440,9	11527,3	11591,1	11602,5	11557,9	11480,5	11355,1
45,0	11270,3	11471,0	11625,1	11751,6	11810,7	11808,3	11756,1	11635,5
47,5	11117,2	11403,3	11627,6	11801,7	11896,0	11905,9	11861,4	11738,2
50,0	10776,0	11119,7	11376,8	11576,1	11707,9	11765,7	11776,2	11703,1
52,5	10058,5	10487,5	10845,1	11152,3	11416,9	11608,0	11761,1	11800,8
55,0	9054,9	9664,5	10230,6	10721,1	11146,1	11475,2	11748,6	11895,9
57,5	7983,5	8766,3	9498,2	10151,9	10714,7	11159,8	11548,2	11810,8
60,0	6744,1	7657,4	8527,6	9302,0	9992,3	10568,8	11069,6	11452,7

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	140,0	142,5	145,0	147,5	150,0	152,5	155,0	157,5
62,5	5349,1	6310,1	7288,6	8178,7	8966,5	9652,4	10267,8	10756,6
65,0	3813,6	4794,6	5806,3	6762,1	7639,7	8383,0	9045,1	9569,8
67,5	2353,4	3239,1	4203,6	5069,7	5853,9	6547,6	7173,4	7729,5
70,0	1241,9	1788,9	2573,3	3424,9	4203,6	4917,6	5552,3	6091,9
72,5	677,4	915,8	1354,4	2005,8	2671,1	3210,0	3688,2	4101,3
75,0	411,5	476,7	632,0	932,7	1417,1	1890,4	2232,5	2476,3
77,5	272,0	286,0	325,1	415,5	612,2	899,4	1113,2	1171,8
80,0	158,1	164,6	177,1	200,3	242,5	309,5	371,8	364,1
82,5	64,9	68,9	76,9	86,2	96,4	104,4	101,4	88,2
85,0	20,3	20,5	21,0	21,9	21,4	20,0	17,8	16,0
87,5	5,3	5,3	5,3	5,3	5,2	5,0	4,9	4,8
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

G/C [cd]	160,0	162,5	165,0	167,5	170,0	172,5	175,0	177,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	7591,6	7566,7	7544,1	7519,1	7494,1	7469,0	7441,5	7421,4
5,0	7786,8	7739,5	7696,8	7646,8	7596,8	7544,1	7494,1	7448,9
7,5	7979,4	7909,7	7847,0	7777,0	7699,4	7624,1	7551,7	7478,9
10,0	8172,1	8080,0	7997,2	7907,2	7807,1	7706,7	7609,3	7513,9
12,5	8357,3	8252,8	8152,4	8042,4	7919,7	7794,3	7674,4	7558,9
15,0	8549,9	8430,5	8312,5	8185,2	8044,9	7894,4	7752,0	7616,4
17,5	8747,6	8615,8	8482,8	8335,4	8175,1	8002,0	7834,6	7671,4
20,0	8937,8	8793,6	8645,4	8485,6	8305,3	8109,6	7919,7	7733,9
22,5	9135,5	8981,4	8818,2	8645,9	8448,1	8227,2	8012,4	7803,9
25,0	9343,1	9174,2	8998,4	8813,6	8598,3	8357,3	8117,6	7881,4
27,5	9553,3	9372,0	9181,1	8983,9	8751,0	8489,9	8225,2	7963,9
30,0	9776,0	9584,8	9381,3	9164,2	8918,8	8635,0	8340,4	8056,3
32,5	10016,2	9815,2	9596,6	9362,0	9101,6	8792,7	8473,1	8158,8
35,0	10276,5	10068,1	9831,9	9579,8	9296,9	8967,8	8620,8	8276,3
37,5	10556,7	10341,0	10089,7	9815,2	9509,7	9155,5	8778,6	8401,3
40,0	10852,0	10631,4	10362,5	10068,1	9737,6	9355,6	8943,8	8531,3
42,5	11169,7	10944,4	10662,9	10341,0	9977,9	9565,8	9116,6	8663,8
45,0	11440,0	11197,3	10885,7	10526,3	10120,7	9663,4	9169,2	8676,3
47,5	11532,5	11279,9	10945,7	10563,8	10130,7	9638,4	9121,6	8591,3
50,0	11550,1	11347,6	11050,9	10686,5	10253,4	9743,5	9204,2	8641,3
52,5	11735,2	11590,4	11323,7	10964,5	10516,3	9968,7	9379,5	8768,7
55,0	11907,9	11815,8	11579,0	11222,4	10759,1	10178,9	9539,8	8871,2
57,5	11925,4	11913,4	11724,2	11397,6	10931,9	10329,0	9647,4	8923,7
60,0	11692,7	11783,2	11676,6	11405,1	10972,0	10374,0	9662,4	8883,7
62,5	11119,7	11337,5	11343,7	11149,7	10764,2	10191,4	9492,2	8691,3
65,0	9941,2	10170,7	10212,3	10068,1	9745,1	9260,6	8653,4	7923,9
67,5	8219,7	8593,3	8805,6	8846,2	8665,9	8297,2	7824,6	7204,0
70,0	6565,7	6930,7	7146,1	7226,2	7133,5	6861,0	6487,5	6019,1
72,5	4476,4	4797,4	4991,0	5062,8	5015,3	4839,2	4574,6	4266,9

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	160,0	162,5	165,0	167,5	170,0	172,5	175,0	177,5
75,0	2649,8	2781,8	2813,4	2736,7	2606,5	2442,1	2281,0	2177,2
77,5	1132,5	1052,9	945,1	859,6	806,2	799,4	819,0	842,4
80,0	300,8	238,9	206,2	191,3	195,1	217,4	248,6	272,2
82,5	73,9	63,2	55,3	49,4	44,7	43,7	49,2	58,8
85,0	14,7	13,4	12,3	11,5	10,8	10,2	9,8	9,5
87,5	4,6	4,5	4,3	4,2	4,1	4,0	3,8	3,6
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

G/C [cd]	180,0	182,5	185,0	187,5	190,0	192,5	195,0	197,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	7393,9	7363,7	7341,4	7316,5	7293,8	7263,9	7239,1	7211,5
5,0	7396,4	7341,0	7291,3	7239,0	7186,1	7128,9	7076,7	7024,1
7,5	7398,9	7318,4	7246,3	7164,1	7081,0	6998,9	6916,8	6834,2
10,0	7408,9	7300,8	7198,7	7091,6	6978,3	6866,3	6754,5	6641,8
12,5	7426,5	7290,7	7158,7	7021,6	6883,1	6736,3	6594,6	6449,4
15,0	7454,0	7288,2	7128,6	6961,7	6790,5	6613,8	6434,7	6257,0
17,5	7484,0	7293,2	7103,6	6904,2	6700,4	6486,3	6272,4	6059,6
20,0	7516,5	7300,8	7078,6	6849,2	6607,7	6358,7	6107,5	5857,2
22,5	7559,0	7313,3	7058,5	6794,2	6520,1	6231,2	5945,1	5654,8
25,0	7611,6	7336,0	7046,0	6746,8	6435,0	6106,2	5782,8	5447,4
27,5	7664,1	7358,7	7036,0	6696,8	6347,3	5981,2	5612,9	5232,5
30,0	7726,6	7388,9	7028,5	6654,3	6264,7	5853,6	5438,0	5012,6
32,5	7799,2	7431,7	7028,5	6611,8	6179,6	5726,1	5263,2	4787,7
35,0	7881,7	7479,5	7038,5	6576,8	6099,4	5596,1	5085,8	4562,8
37,5	7971,7	7529,9	7046,0	6544,4	6019,3	5466,1	4906,0	4335,4
40,0	8064,3	7590,3	7058,5	6509,4	5936,7	5333,5	4723,6	4108,0
42,5	8156,8	7640,6	7068,5	6469,4	5849,0	5191,0	4533,8	3885,6
45,0	8131,8	7587,8	6973,4	6337,0	5678,8	4991,0	4311,5	3653,2
47,5	8019,3	7449,3	6793,2	6122,1	5433,4	4710,9	4021,7	3365,9
50,0	8034,3	7424,1	6720,6	6004,6	5273,2	4518,4	3804,4	3143,5
52,5	8109,3	7456,8	6698,1	5929,7	5155,5	4363,4	3634,5	2973,6
55,0	8161,9	7454,3	6640,5	5822,2	5010,3	4195,8	3459,7	2803,7
57,5	8161,9	7401,5	6542,9	5672,3	4837,5	4008,3	3277,3	2633,7
60,0	8074,3	7270,5	6372,7	5479,9	4619,6	3788,2	3065,0	2446,3
62,5	7836,7	7001,2	6082,4	5180,0	4326,7	3515,7	2825,2	2243,9
65,0	7113,8	6313,9	5436,6	4587,8	3798,4	3063,1	2455,5	1956,6
67,5	6468,4	5704,7	4870,9	4073,0	3345,2	2668,0	2105,8	1654,2
70,0	5440,4	4798,4	4074,9	3380,9	2756,8	2177,9	1703,6	1326,9
72,5	3904,6	3484,2	2968,6	2461,3	1990,6	1547,8	1189,0	907,1
75,0	2088,6	1973,7	1754,6	1474,3	1189,3	917,7	689,4	519,8
77,5	855,2	853,9	790,0	672,4	540,8	412,3	317,7	257,6
80,0	283,7	282,7	261,1	223,4	184,0	152,3	132,6	121,7
82,5	63,7	63,3	58,0	52,9	49,3	46,9	45,4	43,6
85,0	9,1	8,6	7,9	7,3	6,8	6,3	5,8	5,4

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	180,0	182,5	185,0	187,5	190,0	192,5	195,0	197,5
87,5	3,4	3,1	2,8	2,6	2,4	2,1	1,9	1,7
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

G/C [cd]	200,0	202,5	205,0	207,5	210,0	212,5	215,0	217,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	7191,5	7164,1	7139,1	7114,8	7094,2	7069,4	7046,9	7026,9
5,0	6976,5	6924,2	6866,7	6818,1	6769,5	6717,5	6669,8	6624,8
7,5	6759,0	6676,8	6591,8	6511,5	6437,2	6358,0	6280,2	6207,8
10,0	6534,1	6421,9	6304,5	6194,9	6090,0	5983,6	5875,7	5770,8
12,5	6309,1	6164,5	6017,1	5870,8	5735,3	5596,6	5456,2	5321,3
15,0	6081,6	5902,2	5719,8	5536,7	5365,6	5192,2	5021,7	4851,9
17,5	5846,7	5629,8	5412,4	5192,7	4983,4	4772,9	4567,2	4365,0
20,0	5606,7	5349,9	5095,1	4833,7	4588,7	4343,5	4102,8	3868,0
22,5	5361,7	5062,6	4767,7	4469,8	4184,1	3904,2	3633,3	3378,6
25,0	5111,8	4767,7	4430,4	4090,9	3771,9	3462,3	3176,3	2909,1
27,5	4851,8	4465,4	4085,5	3709,4	3364,7	3035,5	2749,3	2494,6
30,0	4584,3	4153,0	3733,2	3330,5	2967,6	2638,6	2369,8	2150,0
32,5	4311,9	3840,7	3390,9	2966,6	2602,9	2294,1	2062,6	1897,8
35,0	4041,9	3535,8	3061,0	2630,0	2280,6	2012,0	1837,9	1738,0
37,5	3774,5	3240,9	2753,7	2328,4	2010,9	1802,3	1695,5	1645,6
40,0	3519,5	2968,6	2476,3	2069,1	1806,0	1662,5	1605,6	1580,7
42,5	3274,5	2713,7	2228,9	1854,7	1651,1	1567,7	1540,7	1523,2
45,0	3039,6	2488,8	2016,5	1682,7	1541,2	1495,3	1478,3	1465,8
47,5	2772,1	2248,9	1816,6	1543,1	1453,8	1427,9	1415,9	1408,4
50,0	2557,1	2044,0	1636,7	1421,0	1366,4	1353,0	1348,4	1345,9
52,5	2389,7	1886,6	1501,8	1323,7	1283,9	1273,1	1271,0	1273,5
55,0	2232,2	1744,2	1386,8	1241,5	1209,0	1195,7	1196,1	1196,1
57,5	2079,7	1609,2	1281,9	1159,2	1129,1	1120,8	1118,7	1111,2
60,0	1914,7	1471,8	1179,4	1069,5	1044,1	1031,0	1023,8	1028,8
62,5	1749,8	1339,4	1069,5	972,2	941,7	931,1	933,9	941,4
65,0	1537,3	1181,9	944,5	852,6	831,8	826,3	829,0	841,5
67,5	1282,3	977,0	784,6	718,0	706,9	708,9	714,2	721,7
70,0	1017,4	774,6	632,2	585,8	577,0	576,6	574,3	584,3
72,5	689,9	549,7	469,8	443,7	434,6	439,3	447,0	452,0
75,0	414,9	349,8	317,3	309,1	307,2	309,5	314,6	322,1
77,5	223,0	207,4	198,7	194,4	193,1	193,7	197,0	200,5
80,0	114,5	109,4	105,9	103,0	101,2	99,6	98,9	98,1
82,5	41,7	40,2	39,0	37,3	35,7	33,5	30,2	27,8
85,0	5,0	4,7	4,4	4,2	3,9	3,7	3,4	3,2
87,5	1,5	1,4	1,2	1,1	0,9	0,8	0,7	0,6
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	200,0	202,5	205,0	207,5	210,0	212,5	215,0	217,5
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

G/C [cd]	220,0	222,5	225,0	227,5	230,0	232,5	235,0	237,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	7004,1	6982,3	6963,4	6944,3	6924,3	6911,8	6894,4	6881,2
5,0	6576,8	6530,8	6490,3	6449,7	6407,3	6374,8	6337,3	6305,9
7,5	6134,6	6061,8	5994,7	5927,6	5860,2	5807,7	5750,3	5698,0
10,0	5672,3	5567,9	5471,6	5380,6	5290,7	5213,2	5130,8	5057,7
12,5	5192,5	5059,0	4933,5	4813,6	4698,7	4591,2	4486,3	4389,8
15,0	4687,7	4520,2	4367,8	4219,0	4076,7	3946,8	3816,9	3702,0
17,5	4168,0	3973,9	3792,1	3619,5	3459,7	3312,3	3169,9	3049,1
20,0	3643,2	3430,1	3231,4	3050,0	2885,1	2740,3	2607,9	2498,8
22,5	3141,0	2921,2	2725,8	2552,9	2410,5	2290,6	2188,2	2108,6
25,0	2676,2	2469,6	2302,8	2165,7	2060,8	1975,9	1910,9	1866,0
27,5	2286,4	2117,9	1994,9	1903,4	1841,0	1798,5	1771,1	1755,9
30,0	1991,5	1873,4	1804,7	1761,1	1736,1	1718,6	1706,1	1700,9
32,5	1796,6	1736,2	1709,6	1688,6	1676,1	1663,6	1656,1	1653,4
35,0	1689,2	1661,4	1647,0	1633,7	1623,7	1618,7	1613,7	1615,9
37,5	1621,7	1601,5	1591,9	1583,7	1581,2	1578,7	1578,7	1585,8
40,0	1566,7	1549,1	1544,4	1538,7	1538,7	1541,2	1548,7	1560,8
42,5	1511,8	1499,2	1496,8	1496,3	1498,8	1506,3	1518,8	1535,8
45,0	1459,3	1449,4	1451,8	1456,3	1466,3	1476,3	1491,3	1513,3
47,5	1404,3	1399,5	1406,7	1413,8	1428,8	1446,3	1463,8	1485,8
50,0	1346,9	1347,1	1356,6	1368,9	1386,4	1401,4	1421,3	1443,3
52,5	1279,4	1287,2	1299,1	1308,9	1328,9	1356,4	1381,4	1410,8
55,0	1199,4	1204,9	1224,0	1251,5	1281,5	1311,4	1338,9	1375,7
57,5	1114,5	1125,1	1148,9	1179,0	1216,5	1254,0	1293,9	1338,2
60,0	1037,0	1052,7	1073,8	1101,6	1139,1	1181,5	1231,5	1283,2
62,5	954,5	970,4	993,7	1016,7	1049,1	1079,1	1121,6	1183,1
65,0	854,6	873,1	891,1	906,8	939,2	979,2	1024,2	1063,1
67,5	732,1	750,9	773,4	799,3	819,3	856,8	904,3	953,0
70,0	607,2	621,2	643,3	671,9	694,4	726,9	769,4	815,4
72,5	464,8	476,5	498,1	527,1	552,0	584,5	607,0	640,3
75,0	332,3	344,3	355,4	372,2	384,7	404,7	429,6	450,2
77,5	207,2	211,8	219,5	227,3	236,6	246,0	251,5	257,1
80,0	100,2	101,3	104,6	109,2	114,2	117,4	117,4	113,8
82,5	26,8	26,6	27,7	29,8	31,1	31,4	30,0	26,8
85,0	3,0	2,7	2,4	2,0	1,5	1,1	0,9	0,9
87,5	0,5	0,4	0,4	0,3	0,2	0,2	0,2	0,2
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	220,0	222,5	225,0	227,5	230,0	232,5	235,0	237,5
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

G/C [cd]	240,0	242,5	245,0	247,5	250,0	252,5	255,0	257,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	6864,4	6852,7	6839,2	6828,8	6816,1	6808,8	6801,5	6794,0
5,0	6269,9	6243,9	6217,0	6191,2	6168,3	6148,7	6131,6	6116,6
7,5	5645,4	5599,9	5554,8	5513,6	5477,9	5446,1	5416,7	5394,2
10,0	4985,9	4923,4	4857,7	4800,9	4755,0	4708,4	4669,3	4636,8
12,5	4296,5	4214,4	4133,0	4060,8	3999,6	3940,8	3889,4	3849,4
15,0	3592,1	3495,3	3398,4	3315,6	3244,2	3178,1	3124,6	3079,6
17,5	2935,1	2838,8	2743,7	2668,0	2601,4	2543,0	2494,6	2454,6
20,0	2403,0	2325,2	2251,4	2192,9	2146,1	2102,9	2067,2	2039,7
22,5	2038,3	1986,9	1939,1	1905,4	1878,5	1857,9	1839,7	1827,2
25,0	1828,5	1809,0	1789,1	1780,3	1773,4	1765,3	1759,7	1757,2
27,5	1743,6	1738,9	1729,2	1725,3	1723,4	1720,3	1717,3	1717,3
30,0	1691,1	1691,3	1686,7	1685,3	1688,4	1687,8	1687,3	1689,8
32,5	1648,7	1653,7	1651,7	1655,3	1660,9	1662,8	1667,3	1669,8
35,0	1616,2	1623,6	1624,2	1632,8	1638,4	1645,3	1652,3	1657,3
37,5	1588,7	1601,1	1606,7	1615,3	1625,9	1635,3	1644,8	1652,3
40,0	1566,2	1583,5	1591,7	1607,8	1620,9	1632,8	1642,3	1649,8
42,5	1548,7	1568,5	1581,7	1597,8	1610,9	1622,8	1632,3	1642,3
45,0	1531,2	1553,5	1564,2	1580,3	1590,8	1602,8	1614,8	1622,3
47,5	1498,8	1518,4	1531,8	1552,8	1570,8	1590,3	1609,8	1624,8
50,0	1461,3	1490,8	1514,3	1545,3	1570,8	1595,3	1617,3	1637,3
52,5	1436,3	1470,8	1501,8	1537,8	1573,3	1605,3	1634,8	1662,3
55,0	1408,8	1453,2	1494,3	1540,3	1583,3	1625,3	1664,8	1697,3
57,5	1378,9	1430,7	1476,8	1530,3	1583,3	1625,3	1647,3	1679,8
60,0	1328,9	1360,5	1414,3	1475,3	1535,8	1592,8	1647,3	1689,8
62,5	1246,5	1310,4	1371,8	1432,8	1465,8	1522,8	1574,8	1619,8
65,0	1126,6	1202,7	1269,4	1340,3	1403,2	1452,8	1474,8	1509,8
67,5	984,2	1052,3	1134,5	1205,2	1265,7	1305,3	1324,8	1352,3
70,0	844,3	897,0	952,0	1015,2	1043,1	1075,2	1107,3	1134,8
72,5	676,9	696,5	727,2	742,6	770,4	797,7	809,9	792,4
75,0	469,6	476,1	487,3	475,1	467,7	472,6	454,9	447,4
77,5	264,3	261,8	250,9	229,3	202,6	170,5	151,5	118,5
80,0	104,2	89,4	75,0	59,5	42,0	25,8	13,7	6,2
82,5	23,6	19,4	14,5	9,3	5,4	3,0	1,5	0,8
85,0	0,8	0,7	0,6	0,5	0,4	0,4	0,3	0,2
87,5	0,2	0,2	0,1	0,1	0,1	0,1	0,1	0,1
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	240,0	242,5	245,0	247,5	250,0	252,5	255,0	257,5
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

G/C [cd]	260,0	262,5	265,0	267,5	270,0	272,5	275,0	277,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	6788,4	6785,7	6781,9	6782,6	6779,0	6778,6	6784,0	6787,0
5,0	6105,3	6097,4	6089,7	6088,5	6081,3	6082,9	6088,8	6097,2
7,5	5374,7	5359,0	5349,8	5344,4	5338,4	5342,0	5350,9	5362,4
10,0	4609,0	4588,0	4572,3	4565,1	4557,8	4565,9	4577,9	4592,4
12,5	3813,3	3784,6	3767,2	3755,8	3747,2	3757,2	3769,7	3789,8
15,0	3042,7	3008,6	2989,7	2979,1	2969,1	2976,2	2989,2	3007,2
17,5	2424,6	2397,9	2380,2	2370,3	2361,7	2368,4	2376,8	2387,7
20,0	2019,3	1999,9	1991,4	1981,9	1975,2	1979,1	1982,8	1988,9
22,5	1821,6	1814,7	1810,9	1806,5	1802,0	1803,3	1802,0	1800,8
25,0	1756,5	1754,6	1755,7	1753,9	1749,3	1753,0	1751,9	1748,2
27,5	1719,0	1719,6	1723,1	1721,3	1719,2	1722,9	1724,2	1720,6
30,0	1694,0	1697,1	1700,5	1701,3	1699,1	1702,8	1704,2	1700,5
32,5	1676,5	1679,5	1685,5	1688,8	1686,6	1692,8	1694,1	1690,5
35,0	1666,5	1672,0	1680,4	1681,2	1681,6	1687,7	1689,1	1682,9
37,5	1663,9	1672,0	1680,4	1683,7	1684,1	1687,7	1689,1	1685,5
40,0	1661,4	1669,5	1677,9	1681,2	1679,1	1685,2	1686,6	1682,9
42,5	1651,4	1659,5	1667,9	1671,2	1669,0	1672,7	1674,0	1670,4
45,0	1633,9	1644,5	1652,8	1656,2	1654,0	1657,6	1656,5	1650,3
47,5	1638,9	1654,5	1662,9	1668,7	1664,0	1667,7	1664,0	1655,4
50,0	1656,4	1672,0	1685,5	1691,3	1686,6	1690,3	1681,6	1670,4
52,5	1689,0	1709,6	1728,1	1733,9	1731,8	1733,0	1721,7	1705,5
55,0	1731,5	1757,1	1778,3	1786,5	1782,0	1783,2	1769,4	1745,6
57,5	1716,5	1744,6	1765,7	1773,9	1769,4	1770,6	1754,4	1730,6
60,0	1731,5	1762,1	1788,3	1794,0	1789,5	1788,2	1771,9	1745,6
62,5	1658,9	1689,5	1713,0	1721,3	1716,7	1715,4	1699,1	1672,9
65,0	1546,3	1571,9	1595,2	1598,6	1596,2	1594,8	1581,2	1555,0
67,5	1381,2	1404,2	1422,1	1425,7	1423,1	1421,5	1405,5	1382,0
70,0	1156,0	1158,9	1148,7	1140,0	1131,9	1130,2	1121,9	1111,1
72,5	785,7	791,0	795,1	791,8	785,6	786,1	780,6	770,0
75,0	442,9	440,5	423,9	405,9	394,0	396,8	399,1	403,8
77,5	89,6	70,3	58,7	51,6	47,9	48,5	51,2	62,2
80,0	3,0	1,5	1,3	1,0	1,0	1,0	1,0	1,5
82,5	0,4	0,3	0,2	0,1	0,1	0,1	0,2	0,2
85,0	0,2	0,1	0,1	0,1	0,1	0,1	0,1	0,1
87,5	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

G/C [cd]	280,0	282,5	285,0	287,5	290,0	292,5	295,0	297,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	6790,7	6796,8	6803,3	6813,2	6820,7	6832,5	6844,3	6857,5

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	280,0	282,5	285,0	287,5	290,0	292,5	295,0	297,5
5,0	6109,7	6121,9	6134,8	6152,0	6172,1	6198,1	6221,7	6250,6
7,5	5378,3	5396,8	5421,0	5448,0	5483,2	5520,9	5558,7	5603,4
10,0	4614,3	4639,1	4674,6	4711,4	4756,6	4810,9	4862,9	4925,9
12,5	3817,6	3848,8	3893,0	3942,1	3999,9	4068,3	4136,9	4218,3
15,0	3036,0	3071,0	3118,9	3175,3	3235,6	3313,0	3395,7	3487,9
17,5	2412,7	2438,7	2478,0	2524,1	2579,4	2650,9	2727,7	2815,5
20,0	2005,6	2022,2	2045,8	2079,1	2116,9	2165,1	2223,5	2289,2
22,5	1804,5	1806,5	1814,6	1825,2	1840,3	1865,5	1900,8	1944,2
25,0	1751,7	1748,8	1749,2	1749,8	1752,3	1757,2	1762,1	1770,4
27,5	1724,1	1718,6	1721,6	1722,1	1722,1	1722,0	1724,3	1722,6
30,0	1704,0	1701,1	1701,5	1699,5	1697,0	1696,8	1696,6	1694,9
32,5	1691,4	1686,0	1686,4	1681,9	1679,4	1679,2	1676,4	1672,2
35,0	1683,9	1678,5	1676,3	1671,9	1666,8	1664,1	1661,3	1654,6
37,5	1686,4	1678,5	1673,8	1669,4	1661,8	1654,0	1648,7	1639,5
40,0	1683,9	1676,0	1671,3	1666,8	1656,8	1649,0	1638,6	1624,3
42,5	1671,3	1663,4	1661,2	1654,3	1646,7	1638,9	1631,0	1614,3
45,0	1648,7	1638,4	1633,6	1626,6	1619,1	1613,7	1605,8	1594,1
47,5	1646,2	1633,3	1621,0	1606,5	1588,9	1576,0	1563,0	1548,8
50,0	1658,7	1638,4	1621,0	1599,0	1578,8	1558,3	1535,2	1511,0
52,5	1683,9	1655,9	1631,1	1601,5	1568,8	1538,2	1510,0	1478,3
55,0	1719,0	1683,5	1648,7	1611,5	1568,8	1528,1	1487,4	1448,1
57,5	1698,9	1658,4	1621,0	1593,9	1556,2	1505,5	1459,6	1412,8
60,0	1711,5	1666,0	1618,5	1561,2	1503,4	1442,5	1389,0	1332,2
62,5	1638,6	1593,2	1545,6	1490,9	1428,0	1382,1	1333,6	1271,8
65,0	1523,0	1482,8	1437,6	1395,3	1357,6	1296,5	1230,2	1155,9
67,5	1352,1	1317,2	1279,2	1239,4	1211,8	1160,6	1084,0	1002,3
70,0	1108,3	1093,9	1068,1	1030,8	988,0	931,5	892,4	846,2
72,5	759,0	747,7	748,9	751,7	719,0	682,2	660,5	642,2
75,0	417,2	426,5	429,8	417,3	424,9	435,5	431,1	425,6
77,5	82,2	108,6	124,7	150,3	181,0	196,9	214,5	213,8
80,0	3,3	6,3	13,6	24,1	36,0	45,6	60,0	69,3
82,5	0,4	0,6	1,1	1,6	2,6	4,3	6,8	9,5
85,0	0,2	0,2	0,2	0,3	0,4	0,4	0,5	0,5
87,5	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

G/C [cd]	300,0	302,5	305,0	307,5	310,0	312,5	315,0	317,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	6870,8	6885,0	6900,6	6920,6	6935,7	6953,5	6975,0	6993,5
5,0	6279,8	6313,2	6347,0	6386,9	6422,2	6460,2	6510,7	6550,3
7,5	5648,5	5703,5	5758,1	5820,5	5878,4	5939,3	6018,6	6081,8
10,0	4992,1	5066,1	5144,0	5228,9	5311,9	5393,2	5501,3	5593,3
12,5	4303,1	4398,6	4497,2	4607,0	4717,8	4824,4	4961,2	5084,6
15,0	3588,8	3703,3	3825,3	3955,0	4093,5	4228,0	4396,0	4548,2

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	300,0	302,5	305,0	307,5	310,0	312,5	315,0	317,5
17,5	2917,3	3035,7	3165,9	3310,5	3459,1	3618,9	3813,0	3996,6
20,0	2369,1	2471,4	2584,6	2721,4	2877,5	3042,6	3250,3	3452,7
22,5	1999,4	2070,8	2154,3	2255,7	2384,1	2529,2	2722,9	2926,3
25,0	1785,6	1818,9	1867,4	1933,4	2024,1	2129,1	2286,3	2457,9
27,5	1722,7	1730,7	1739,0	1759,7	1802,5	1862,3	1970,9	2097,8
30,0	1695,1	1695,4	1696,2	1701,8	1709,4	1723,9	1776,6	1846,0
32,5	1667,4	1670,2	1668,5	1669,1	1671,6	1673,6	1690,8	1707,4
35,0	1647,3	1645,0	1643,4	1641,4	1641,4	1635,8	1647,9	1647,0
37,5	1629,7	1624,9	1618,2	1611,2	1608,7	1603,1	1610,0	1606,7
40,0	1614,6	1604,7	1593,0	1583,5	1578,5	1570,4	1574,7	1568,9
42,5	1597,0	1584,6	1567,9	1555,8	1545,7	1535,2	1536,8	1528,6
45,0	1576,9	1559,4	1540,2	1523,1	1510,5	1497,4	1499,0	1483,3
47,5	1536,6	1526,6	1507,5	1490,4	1472,7	1457,1	1453,5	1438,0
50,0	1488,8	1473,7	1454,6	1440,0	1424,9	1409,3	1403,1	1385,1
52,5	1451,1	1428,4	1406,8	1384,6	1362,0	1343,9	1337,5	1319,6
55,0	1410,9	1380,5	1348,9	1326,7	1301,5	1273,4	1249,1	1226,4
57,5	1368,1	1330,1	1291,0	1253,7	1221,0	1187,9	1165,9	1143,3
60,0	1295,2	1259,6	1208,0	1163,1	1127,8	1099,8	1082,6	1060,2
62,5	1209,7	1146,2	1087,2	1047,3	1032,2	1006,7	989,2	967,1
65,0	1076,4	1017,8	984,0	946,6	911,3	883,3	868,1	856,2
67,5	940,6	899,4	863,2	820,7	785,5	757,5	741,9	720,3
70,0	794,7	750,7	724,8	684,8	649,5	626,6	600,6	574,2
72,5	606,1	584,5	548,6	518,6	490,9	465,6	454,2	435,7
75,0	404,9	385,4	359,9	347,4	332,3	319,6	307,9	294,6
77,5	214,3	210,6	204,4	196,9	190,8	184,0	177,2	172,5
80,0	77,7	85,9	87,8	87,6	84,1	79,5	75,7	73,5
82,5	12,4	15,4	18,1	19,5	19,3	17,7	16,3	15,6
85,0	0,6	0,7	0,7	0,8	0,9	1,0	1,1	1,2
87,5	0,1	0,1	0,1	0,1	0,1	0,2	0,2	0,2
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

G/C [cd]	320,0	322,5	325,0	327,5	330,0	332,5	335,0	337,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	7013,2	7036,3	7059,1	7084,0	7108,8	7132,0	7156,9	7179,6
5,0	6589,7	6638,4	6691,5	6741,4	6796,0	6844,9	6897,3	6950,2
7,5	6156,1	6230,4	6311,4	6391,3	6478,2	6552,8	6640,1	6720,8
10,0	5697,3	5802,3	5913,6	6023,5	6142,7	6253,1	6372,9	6488,9
12,5	5218,3	5354,0	5495,7	5643,0	5797,1	5938,3	6093,1	6246,9
15,0	4716,7	4885,6	5065,2	5247,5	5436,3	5613,4	5808,2	5997,3
17,5	4197,4	4399,6	4614,6	4836,9	5063,0	5278,5	5513,3	5742,7
20,0	3680,6	3911,0	4161,4	4421,2	4687,1	4943,5	5215,8	5485,6
22,5	3161,3	3414,9	3698,2	3993,0	4296,1	4596,0	4913,3	5223,4
25,0	2679,8	2931,4	3224,9	3547,1	3892,5	4235,9	4595,7	4953,6
27,5	2278,9	2503,3	2784,4	3111,2	3478,7	3863,2	4270,5	4673,8

Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	320,0	322,5	325,0	327,5	330,0	332,5	335,0	337,5
30,0	1971,4	2150,7	2396,7	2703,1	3077,6	3485,4	3935,2	4386,4
32,5	1769,7	1883,7	2074,4	2345,4	2704,3	3127,8	3604,9	4096,5
35,0	1666,3	1715,0	1837,8	2048,1	2368,8	2785,3	3282,3	3809,1
37,5	1613,4	1626,9	1681,7	1823,9	2083,7	2473,0	2977,2	3526,8
40,0	1573,1	1576,5	1593,6	1667,7	1856,7	2206,1	2697,4	3259,6
42,5	1530,2	1531,2	1535,7	1567,0	1685,1	1976,9	2450,3	3010,0
45,0	1484,8	1483,3	1482,8	1496,4	1559,0	1785,5	2231,0	2780,6
47,5	1434,4	1430,4	1429,9	1433,4	1465,7	1624,3	2019,3	2528,5
50,0	1381,5	1372,5	1364,5	1360,4	1377,4	1490,9	1842,8	2341,9
52,5	1310,9	1297,0	1289,0	1287,3	1304,2	1395,2	1706,7	2185,7
55,0	1222,7	1218,9	1216,0	1219,3	1233,6	1312,1	1590,7	2042,0
57,5	1136,9	1130,7	1135,4	1141,2	1155,4	1226,4	1477,3	1900,8
60,0	1051,2	1040,1	1037,2	1043,0	1067,1	1135,8	1361,3	1754,6
62,5	955,4	944,4	939,0	939,7	953,6	1025,0	1227,7	1580,6
65,0	844,5	831,1	823,2	821,3	830,0	878,9	1051,2	1353,7
67,5	703,3	695,1	687,3	682,7	688,7	725,3	857,1	1109,2
70,0	562,2	551,5	546,3	549,2	552,5	574,2	658,0	819,3
72,5	423,5	415,5	407,8	405,6	403,6	415,5	456,3	537,0
75,0	287,4	282,1	276,9	274,6	272,4	277,0	287,4	320,2
77,5	168,9	165,2	161,9	161,5	162,0	163,2	168,7	176,2
80,0	72,9	73,0	74,0	75,8	77,2	78,6	80,4	82,9
82,5	15,4	15,6	16,8	18,8	20,5	21,3	22,0	22,2
85,0	1,3	1,5	1,6	1,7	1,9	2,1	2,2	2,4
87,5	0,3	0,3	0,3	0,4	0,4	0,4	0,5	0,5
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0



G/C [cd]	340,0	342,5	345,0	347,5	350,0	352,5	355,0	357,5
0,0	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9	7398,9
2,5	7202,4	7230,2	7257,8	7283,0	7308,2	7333,4	7361,2	7388,9
5,0	7000,8	7056,3	7111,7	7169,5	7220,0	7275,5	7331,0	7386,4
7,5	6804,2	6887,5	6975,6	7063,7	7141,8	7220,1	7310,9	7391,4
10,0	6600,1	6716,2	6837,0	6957,8	7068,7	7179,8	7298,3	7409,0
12,5	6396,0	6542,4	6698,4	6854,4	6995,6	7139,5	7290,7	7431,7
15,0	6179,2	6368,6	6559,8	6753,6	6932,6	7109,2	7290,7	7464,4
17,5	5965,0	6192,2	6423,7	6652,7	6872,1	7084,0	7300,8	7502,2
20,0	5750,8	6020,9	6287,6	6557,0	6811,6	7058,8	7313,4	7547,5
22,5	5531,6	5844,6	6154,0	6463,7	6761,1	7043,7	7336,0	7600,3
25,0	5307,3	5665,7	6020,5	6375,4	6710,7	7033,7	7361,2	7658,2
27,5	5075,4	5481,8	5884,4	6282,2	6660,3	7028,6	7393,9	7726,2
30,0	4841,1	5295,4	5748,3	6193,9	6617,5	7023,6	7431,7	7801,7
32,5	4601,7	5109,0	5612,2	6108,2	6579,6	7028,6	7479,5	7887,3
35,0	4362,3	4920,0	5473,6	6022,5	6541,8	7038,7	7534,8	7980,5
37,5	4122,8	4731,1	5337,5	5939,3	6511,6	7053,8	7595,2	8083,7
40,0	3883,4	4537,1	5193,9	5851,1	6478,8	7068,9	7658,2	8186,9

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Intensity [cd] RELCO 776-QL20-S01 / C0 to C357.5 in 2.5 - Gamma 0 to 110

G/C [cd]	340,0	342,5	345,0	347,5	350,0	352,5	355,0	357,5
42,5	3644,0	4335,6	5042,7	5752,8	6428,4	7068,9	7700,9	8272,5
45,0	3407,1	4096,2	4818,4	5558,7	6269,6	6943,0	7605,3	8207,1
47,5	3132,5	3809,1	4543,7	5311,6	6062,8	6774,2	7466,9	8093,8
50,0	2935,9	3615,1	4367,3	5173,0	5967,1	6728,8	7466,9	8139,1
52,5	2767,0	3431,2	4190,9	5021,7	5861,2	6670,9	7459,3	8174,3
55,0	2603,2	3252,3	4001,9	4842,7	5722,5	6572,6	7404,0	8164,3
57,5	2431,9	3055,8	3787,7	4625,9	5520,8	6411,4	7283,2	8081,2
60,0	2250,4	2831,6	3528,1	4341,0	5228,4	6136,8	7029,0	7857,1
62,5	2028,7	2549,4	3177,8	3920,1	4746,9	5605,3	6460,2	7252,9
65,0	1741,4	2201,8	2769,6	3451,2	4217,5	5033,4	5846,2	6600,9
67,5	1439,0	1831,5	2323,5	2924,3	3612,5	4345,7	5083,6	5770,1
70,0	1063,5	1367,9	1766,6	2256,2	2815,9	3406,0	4001,5	4544,1
72,5	675,4	894,3	1187,0	1545,3	1953,7	2352,9	2710,4	3016,0
75,0	375,5	473,6	627,5	831,9	1056,3	1259,6	1406,8	1482,8
77,5	189,3	217,4	263,9	334,8	422,5	501,1	551,4	574,2
80,0	86,4	92,2	100,3	112,9	131,8	152,2	168,4	176,0
82,5	22,8	23,5	24,3	25,0	26,3	28,2	30,7	32,5
85,0	2,6	2,8	3,0	3,3	3,6	3,8	4,1	4,3
87,5	0,6	0,6	0,7	0,8	0,9	1,0	1,1	1,3
90,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
91,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
92,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
93,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
94,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
95,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
100,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
110,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
120,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
130,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
140,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
150,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
160,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
170,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
180,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

	Test report	776-QL20-R02 ver. 0	 LAB N° 1235 L Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC Signatory of EA, IAF and ILAC Mutual Recognition Agreements
	Applicant	Relco Srl Via delle Azalee, 6/A 20090 - Buccinasco - Milano - Italy	
	Type	LED SEMPIONE	



TEST REPORT Nr. 776-QL20-R02 ver. 0

Addresses Indirizzi		
Applicant Richiedente	Relco Srl – Via delle Azalee, 6/A – 20090 - Buccinasco - Milano - Italy	
Manufacturer Produttore	Same as applicant / Come il richiedente	
Dates and authorization Date e autorizzazioni		
Report Date Data emissione rapporto di prova	18/06/2020	
Written by Preparato da	Marco Zanfabro	
Authorized by Autorizzato da	Ing. Michele Peschiera	 
Sample under test (data declared by the applicant and under applicant's responsibility) Dispositivo sottoposto a prova (Dati forniti dal richiedente e sotto la sua responsabilità)		
Sample description Descrizione dispositivo	LED luminaire / Apparecchio di illuminazione a LED	
Type Modello	LED SEMPIONE	
Light source Sorgente luminosa	N° 320 LED 3030 LUXEON Code L130-4070HA30000B1 4000 K	
Secondary optic Ottica secondaria:	LENTE STRAD. LED 3030 (DK5050-157x77-OUT-OFF-11-5-16H1 (alt.LT-20201)	
Power supply Alimentazione	AC 230 V, 50 Hz	
Driver model Modello alimentatore	LED DRIVER Xi LP 165 W 0,2-0,7 A S1 0-10 V 230 V C170 sXt (9290015354)	
Output power supply current Corrente in uscita dall'alimentatore	660 mA	
Single led supply current Corrente sul singolo led	165 mA	
LM80 test report	LUMILEDS LM-80 test report number: S2f0d, 17-01-2020 (accreditation Singapore Accreditation Council LA-2016-0634-E)	
Applicable standards Norme applicabili		
IES LM-82-12, ANSI/UL 1598:2008, IES TM-21-11		

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I risultati e le osservazioni indicate in questo rapporto di prova sono riferite esclusivamente ai campioni testati. Non è permesso utilizzare i risultati e le osservazioni di questo rapporto di prova per altri sistemi o configurazioni. Non è permessa la pubblicazione o la duplicazione completa o parziale di questo rapporto di prova e dei suoi allegati senza un consenso scritto da parte del laboratorio di prova. Il laboratorio di prova non si assume responsabilità nei confronti di terzi per danni o eventuali costi derivanti dall'utilizzo dei dati presenti in questo rapporto di prova. Ogni uso del nome del laboratorio di prova e dei suoi marchi per la vendita o per pubblicizzare il prodotto testato deve essere prima approvato in forma scritta dal laboratorio di prova. In caso di rapporti di prova con più lingue, la versione inglese è da considerarsi quella ufficiale.

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	Test report	776-QL20-R02 ver. 0	 <small>LAB N° 1235 L</small> <small>Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC</small> <small>Signatory of EA, IAF and ILAC Mutual Recognition Agreements</small>
	Applicant	Relco Srl Via delle Azalee, 6/A 20090 - Buccinasco - Milano - Italy	
	Type	LED SEMPIONE	

Test Name Identificazione prova	Result Esito
IES LM-79-19 Test result	See test report QUALILAB 776-QL20-R01
IES LM-82-12, ANSI/UL 1598:2008 par 19.7 (ISTMT)	See annex I
IES TM-21-11 Energy Star TM21 Calculator Rev 06-18-2018 (from calculation)	See annex II

Uncertainty Incertezza	
Photometric parameter Parametri fotometrici	Luminous flux and intensity: 2,5 % Luminous efficacy: 2,8 % Flusso e intensità luminosa, Efficacia luminosa
Sample mounting precision Precisione montaggio dispositivo	$\pm 0,5^\circ$
Average chromaticity coordin. Coordinate cromatiche medie	$x = \pm 0,0007; y = \pm 0,0009$
Correlated colour temperature Temperatura colore	± 21 K
Colour rendering index (R_a) Indice di resa cromatica	1
Angular colour uniform. $\Delta u'v'$ Uniformità angolare del colore	$\pm 0,0009$
Temperature measurement Misure di temperatura	$\pm 2,0$ °C
Electrical parameter Parametri elettrici	Wattage: 0,24 %, Voltage: 0,06 %, Current: 0,17 % Potenza, Tensione, Corrente
Statement Dichiarazione	The measured value (y) and the associated expanded uncertainty (U) represent the interval ($y \pm U$) which contains the value of the measured quantity with a probability of approximately 95 % and a coverage factor $k = 2$. Il valore misurato (y) e l'incertezza estesa associata (U) rappresentano l'intervallo ($y \pm U$) che contiene il valore della grandezza misurata con una probabilità di circa il 95 % e un fattore di copertura $k = 2$.



Test report	776-QL20-R02 ver. 0
Applicant	Relco Srl Via delle Azalee, 6/A 20090 - Buccinasco - Milano - Italy
Type	LED SEMPIONE

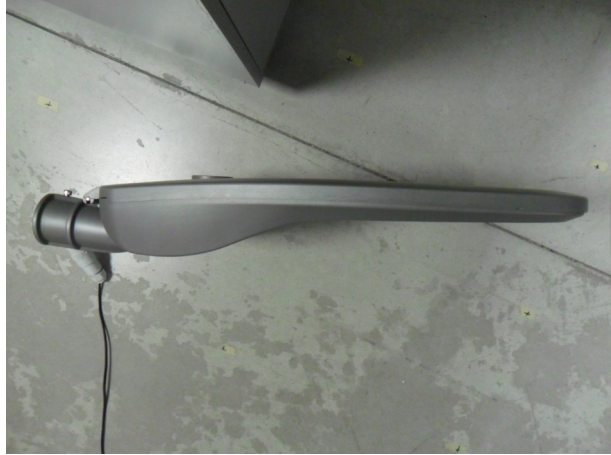




LAB N° 1235 L

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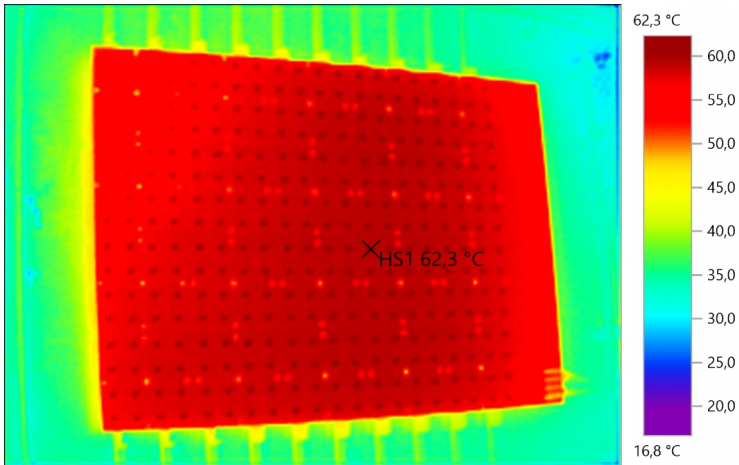
Photographs

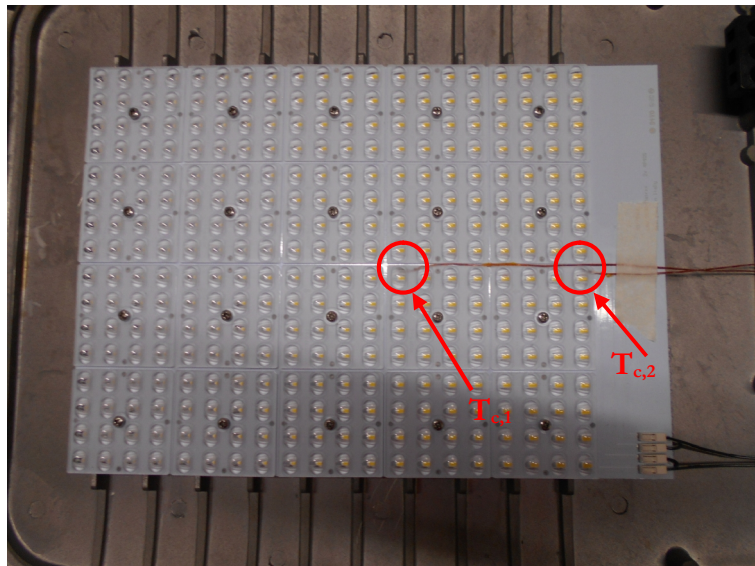
Foto



	Test report	776-QL20-R02 ver. 0	 <small>LAB N° 1235 L</small> <small>Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC</small> <small>Signatory of EA, IAF and ILAC Mutual Recognition Agreements</small>
	Applicant	Relco Srl Via delle Azalee, 6/A 20090 - Buccinasco - Milano - Italy	
	Type	LED SEMPIONE	

ANNEX I Electrical And Photometric Properties As A Function Of Temperature

Standards	IES LM-82-12, ANSI/UL 1598:2008 par 19.7 (ISTMT)
Sample number	776-QL20-S01
Place of testing	Qualilab Srl - Via Trento, 87 - 25020 - Capriano del Colle (BS) - Italy
Date of testing	From 15/06/2020 to 16/06/2020
Environmental conditions	-
Instruments	<p>Illuminance transmitter Delta OHM HD2021T QL-IN-202 Powermeter Hioki 3333 QL-IN-186 Datalogger HIOKI 8400/20LR QL-IN-096 Termocouple TERSID T HF-D-30-TT QL-IN-197 Thermal chamber QUALILAB QL-IN-196 AC power source Chroma 6415 QL-IN-011 Thermal imager camera TESTO 865 QL-IN-253</p>
Test procedure	<p>IES LM-82-12 §6 Directional measurement method used. T_b: according to applicant's request the air temperature of the chamber was taken $T_{d,1}$: driver temperature central power supply $T_{c,1}$: Led module (see figure) $T_{c,2}$: Led module (see figure)</p> <p>Temperature setup $T_{b,0} = 25,0 \text{ °C}$ $T_{b,1} = T_{b,0} + 10 \text{ °C} = 35,0 \text{ °C}$ $T_{b,2} = T_{b,0} + 25 \text{ °C} = 50,0 \text{ °C}$ According to applicant's requirement the test was performed on a luminaire Stabilization time at each temperature >5 h</p> <div style="text-align: center;">  </div> <p>Only for the evaluation of the hot point position - Temperature value not validated</p>



Test Measurement

$T_{b,x}$ [°C]	$T_{d,1}$ [°C]	$T_{c,1}$ [°C]	$T_{c,2}$ [°C]	Flux [lm]	Input Power [W]	Input Voltage [V]	Input Current [A]	Luminous efficacy [lm/W]
25,0	66,8	68,8	64,5	22785	159,0	230,0	0,698	143
35,0	73,8	77,2	72,7	22255	158,0	230,0	0,694	141
50,0	84,8	87,9	83,6	21748	156,9	230,0	0,689	139



Test report 776-QL20-R02 ver. 0
 Applicant Relco Srl
 Via delle Azalee, 6/A
 20090 - Buccinasco - Milano - Italy
 Type LED SEMPIONE



LM-80 Test Inputs

Description of LED Light Source Tested (manufacturer, model, catalog number)	Test Data for 115°C Case Temperature		Tested Case Temperature 2		Tested Case Temperature 3	
	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
LED 3030 LUXEON Code L130-4070HA30000B1 4000 K	0	100.00%				
	1000	99.49%				
	2000	99.17%				
	3000	98.87%				
	4000	98.49%				
	5000	98.16%				
	6000	97.84%				
	7000	97.53%				
	8000	97.24%				
	9000	96.92%				
	10000	96.59%				

LM-80 Testing Details	
Total number of units tested per case temperature	25
Number of failures:	0
Number of units measured:	25
Test duration (hours):	10000
Tested drive current (mA):	180
Tested case temperature 1 (T _c , °C):	115
Tested case temperature 2 (T _c , °C):	
Tested case temperature 3 (T _c , °C):	

In-Situ Inputs	
Drive current for each LED package/array/module (mA):	165
In-situ case temperature (T _c , °C):	87.9
Percentage of initial lumens to project to (e.g. for L ₇₀ , enter 70):	80

Results	
Time (t) at which to estimate lumen maintenance (hours):	100,000
Lumen maintenance at time (t) (%):	72.44%
Reported L80 (hours):	>60000

L80 at T_{b,2} (50 °C)



Test report 776-QL20-R02 ver. 0
 Applicant Relco Srl
 Via delle Azalee, 6/A
 20090 - Buccinasco - Milano - Italy
 Type LED SEMPIONE



LM-80 Test Inputs

Description of LED Light Source Tested (manufacturer, model, catalog number)	Test Data for 115°C Case Temperature		Tested Case Temperature 2		Tested Case Temperature 3	
	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
LED 3030 LUXEON Code L130-4070HA30000B1 4000 K	0	100.00%				
	1000	99.49%				
	2000	99.17%				
	3000	98.87%				
	4000	98.49%				
	5000	98.16%				
	6000	97.84%				
	7000	97.53%				
	8000	97.24%				
	9000	96.92%				
	10000	96.59%				

LM-80 Testing Details	
Total number of units tested per case temperature	25
Number of failures:	0
Number of units measured:	25
Test duration (hours):	10000
Tested drive current (mA):	180
Tested case temperature 1 (T _c , °C):	115
Tested case temperature 2 (T _c , °C):	
Tested case temperature 3 (T _c , °C):	

In-Situ Inputs	
Drive current for each LED package/array/module (mA):	165
In-situ case temperature (T _c , °C):	87.9
Percentage of initial lumens to project to (e.g. for L ₇₀ , enter 70):	90

Results	
Time (t) at which to estimate lumen maintenance (hours):	100.000
Lumen maintenance at time (t) (%):	72.44%
Reported L90 (hours):	32.000

L90 at T_{b,2} (50 °C)



Rapporto di Prova n. 63464 Rev.1

Test report n.

Avigliana, 06/05/2020

Committente: <i>Customer</i>	RELCO S.R.L. VIA DELLE AZALEE 6/A 20090 BUCCINASCO (MI)
Numero campione: <i>Identification number</i>	63464
Data ricevimento: <i>Arrival date</i>	07/02/2020
Descrizione campione: <i>Sample description</i>	LED SEMPIONE CELL ST IP66 RAL9007 CL2
Descrizione fornita da cliente: <i>Sample declared description by customer</i>	LED SEMPIONE CELL ST IP66 RAL9007 CL2
Matrice Campione <i>Type of sample</i>	MATERIALI METALLICI METALLICS MATERIALS
Quantità campione: <i>Sample amount</i>	2
Restituzione resti di prova: <i>Test leftovers restitution</i>	No
Procedura campionamento: <i>Sampling procedure</i>	Campionamento eseguito a cura del Cliente Sampling delivered from customer
Eventuale documentazione aggiuntiva: <i>Any additional documentation</i>	Conclusioni riferite al rapporto di prova 63464 Conclusions referred to test report 63464

Responsabile delle Prove
Responsible of the Test
Dott. Carlo Chiampo

Responsabile del Laboratorio
Head of Laboratory
Paolo Pollacino

Il presente Rapporto di Prova riguarda esclusivamente il campione sottoposto a prova. Esso non può essere riprodotto parzialmente, se non previa approvazione scritta da parte di questo Laboratorio. Il periodo di conservazione dei campioni non restituiti al Cliente è di 30 giorni dalla data di emissione del presente rapporto. Le incertezze di misura dichiarate sono espresse come incertezza estesa, ottenuta moltiplicando l'incertezza tipo per il fattore di copertura K corrispondente ad un livello di fiducia generalmente pari a circa il 95% (K=2). Eventuali giudizi sono formulati senza tenere conto dell'incertezza associata alle misure; il livello di rischio correlato a tale regola decisionale è riferito ad un livello di fiducia pari al 50%. Se non diversamente specificato le prove sono eseguite a temperatura ambiente (10°÷35°C). Le prove contrassegnate da * non sono accreditate ACCREDIA. Giudizi e interpretazioni non sono oggetto di accreditamento ACCREDIA. In caso di modifiche riferite alla descrizione del campione o che possono comprometterne la rintracciabilità, il Laboratorio emetterà un Rapporto di Prova riportante la dicitura "Rev" e la motivazione della modifica.

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LAB N° 0707 L

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Rapporto di Prova n. 63464 Rev.1

Test report n.

Il presente Rapporto di Prova N. 63464 Rev.1 del 06/05/2020 annulla e sostituisce il Rapporto di Prova n. 63464 del 30/04/2020.
Lista delle modifiche:

- pag. 1 di 17: modificate voci "Descrizione campione" e "Descrizione fornita da cliente" da "LED SEMPIONE CELL ST 120W 4K IP66 RAL9007 CL2" a "LED SEMPIONE CELL ST IP66 RAL9007 CL2".

This Test Report No. 63464 Rev.1 of 06/05/2020 cancels and replaces the Test Report no. 63464 of 04/30/2020.

List of changes:

- pag. 1 of 17: modified items "Sample description" and "Sample declared description by customer" from "LED SEMPIONE CELL ST 120W 4K IP66 RAL9007 CL2" to "LED SEMPIONE CELL ST IP66 RAL9007 CL2".

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Rapporto di Prova n. 63464 Rev.1

Test report n.

Tipo di Prova: LAY-OUT PER IDENTIFICAZIONE PUNTI DI PRELIEVO SAGGI *

*Type of test: lay-out for sampling identification **

Metodo di Prova: MMTc-PGQ05

Standard

Data di Esecuzione: 30/04/2020

Date of execution

LAY-OUT:



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Rapporto di Prova n. 63464 Rev.1

Test report n.

Tipo di Prova: -PROVE DI CORROSIONE IN ATMOSFERE ARTIFICIALI, PROVE DI NEBBIA SALINA-

Type of test: Corrosion tests in artificial atmospheres, salt spray tests

Strumento: Camera Nebbia Salina ID.402

Equipment: Salt spray chamber ID.402

Metodo di Prova: UNI EN ISO 9227:2017

Standard

Data di Esecuzione: 30/04/2020

Date of execution

PUREZZA DEL SALE / LOTTO:

Salt purity / batch

Lotto n. V9D059059I – V9I115179N (Ph.Eur USP)

Batch no. V9D059059I – V9I115179N (Ph.Eur USP)

CONDUTTIVITA' DELL'ACQUA:

Water conductivity

17 ÷ 19 µS/cm

DIMENSIONI E FORMA DEL

CAMPIONE:

Size and shape of sample

Complessa

Complex

PREPARAZIONE E PULIZIA DEL

CAMPIONE IN PROVA:

Preparation and cleaning of sample

Pulizia con acqua e asciugatura con carta assorbente

Cleaning with water and drying with paper towel

CARATTERISTICHE DEL

RIVESTIMENTO:

Coating type

Verniciatura

Painting

ANGOLO DI INCLINAZIONE DEI

CAMPIONI:

Angle of sample inclination

20°

INIZIO PROVA:

Test start

07/02/2020

FINE PROVA:

Test end

30/04/2020

DURATA PROVA:

Test length

2000 ore

2000 hours

CARATTERISTICHE DEI CAMPIONI

DI RIFERIMENTO:

Type of reference sample

ISO 3574 grado CR4 sp. 1 mm

ISO 3574 grade CR4 thk. 1 mm

TEMPERATURA DI PROVA DELLA

CAMERA:

Temperature of test chamber

35°C

VOLUME DELLA SOLUZIONE

RACCOLTA NEL

PLUVIOMETRO(ml/h):

Volume of solution collected in rain gauge

1,20 ÷ 1,25 ml/h

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Rapporto di Prova n. 63464 Rev.1

Test report n.

PH DELLA SOLUZIONE PREPARATA: **6,6÷7,0**
pH of solution prepared

PH DELLA SOLUZIONE RACCOLTA
NEL PLUVIOMETRO: **6,8÷7,0**
*pH of solution collected in rain
gauge*

CONCENTRAZIONE DELLA
SOLUZIONE SALINA: **50 g/l**
Concentration of saline solution

PERDITA DI PESO DEI CAMPIONI
DI RIFERIMENTO (g/m²): **61±5 g/m²**
Weight loss of reference sample

FOTOGRAFIA:
Photo



Step 1 (100 ore)
Step 1 (100 hours)

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Rapporto di Prova n. 63464 Rev.1

Test report n.

FOTOGRAFIA:
Photo



Step 2 (200 ore)
Step 2 (200 hours)

FOTOGRAFIA:
Photo



Step 3 (300 ore)
Step 3 (300 hours)

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Rapporto di Prova n. 63464 Rev.1

Test report n.

FOTOGRAFIA:
Photo



Step 4 (400 ore)
Step 4 (400 hours)

FOTOGRAFIA:
Photo



Step 5 (500 ore)
Step 5 (500 hours)

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Rapporto di Prova n. 63464 Rev.1

Test report n.

FOTOGRAFIA:
Photo



Step 6 (600 ore)
Step 6 (600 hours)

FOTOGRAFIA:
Photo



Step 7 (700 ore)
Step 7 (700 hours)

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Rapporto di Prova n. 63464 Rev.1

Test report n.

FOTOGRAFIA:
Photo



Step 8 (800 ore)
Step 8 (800 hours)

FOTOGRAFIA:
Photo



Step 9 (900 ore)
Step 9 (900 hours)

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Test report n.

FOTOGRAFIA:
Photo



Step 10 (1000 ore)
Step 10 (1000 hours)

FOTOGRAFIA:
Photo



Step 11 (1100 ore)
Step 11 (1100 hours)

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Test report n.

FOTOGRAFIA:
Photo



Step 12 (1200 ore)
Step 12 (1200 hours)

FOTOGRAFIA:
Photo



Step 13 (1300 ore)
Step 13 (1300 hours)

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Test report n.

FOTOGRAFIA:
Photo



Step 14 (1400 ore)
Step 14 (1400 hours)

FOTOGRAFIA:
Photo



Step 15 (1500 ore)
Step 15 (1500 hours)

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Test report n.

FOTOGRAFIA:
Photo



Step 16 (1600 ore)
Step 16 (1600 hours)

FOTOGRAFIA:
Photo



Step 17 (1700 ore)
Step 17 (1700 hours)

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Test report n.

FOTOGRAFIA:
Photo



Step 18 (1800 ore)
Step 18 (1800 hours)

FOTOGRAFIA:
Photo



Step 19 (1900 ore)
Step 19 (1900 hours)

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FOTOGRAFIA:
Photo



Fine prova (2000 ore)
Test end (2000 hours)

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Rapporto di Prova n. 63464 Rev.1

Test report n.

Dettagli fotografici 63464-1 fine prova (2000 ore)

Test end 63464-1 (2000 hours) photographic details



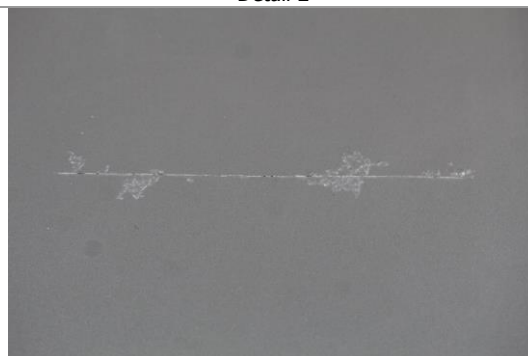
Dettaglio 1
Detail 1



Dettaglio 2
Detail 2



Dettaglio 3
Detail 3



Dettaglio incisione
Scribe detail

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Rapporto di Prova n. 63464 Rev.1

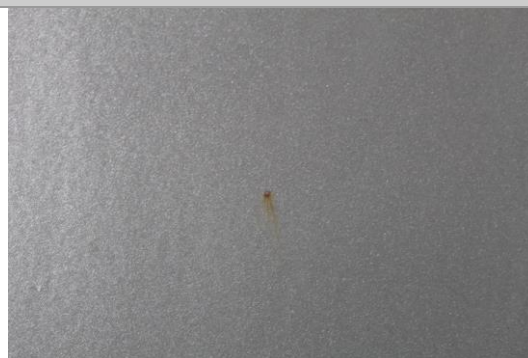
Test report n.

Dettagli fotografici 63464-2 fine prova (2000 ore)

Test end 63464-2 (2000 hours) photographic details



Dettaglio 1
Detail 1



Dettaglio 2
Detail 2



Dettaglio 3
Detail 3



Dettaglio incisione
Scribe setail

FINE CERTIFICATO DI PROVA

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Conclusioni riferite al Rapporto di Prova n. 63464

Conclusions referred to Test report n.

CONCLUSIONI CONCLUSIONS

Prova (Metodo)	Riscontrato	Richiesto	Esito
Prova di corrosione in nebbia salina neutra (NSS) (UNI EN ISO 9227:2017)	Step 1 (100 ore): I campioni forniti non presentano alcun tipo di difettosità.	Non è ammessa la comparsa di corrosione rossa.	Conforme secondo le richieste fornite da cliente.
	Step 2 (200 ore): 63464-1: Non si osserva nessuna difettosità. Non si nota la comparsa di corrosione sottopellicolare. 63464-2: Non si osservano difettosità. Corrosione sottopellicolare: <0,30 mm		Conforme secondo le richieste fornite da cliente.
	Step 3 (300 ore): 63464-1: Non si osserva nessuna difettosità. Non si nota la comparsa di corrosione sottopellicolare. 63464-2: Non si osservano difettosità. Corrosione sottopellicolare: 0,35 mm		Conforme secondo le richieste fornite da cliente.
	Step 4 (400 ore): 63464-1: Non si osserva nessuna difettosità. Non si nota la comparsa di corrosione sottopellicolare. 63464-2: Non si osservano difettosità. Corrosione sottopellicolare: 0,35 mm		Conforme secondo le richieste fornite da cliente.
	Step 5 (500 ore): 63464-1: Sul campione fornito si nota la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura. Corrosione sottopellicolare <0,30mm 63464-2: Sul campione fornito si può notare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura. Corrosione sottopellicolare: 0,40 mm		Conforme secondo le richieste fornite da cliente.



Conclusioni riferite al Rapporto di Prova n. 63464

Conclusions referred to Test report n.

Prova (Metodo)	Riscontrato	Richiesto	Esito
Prova di corrosione in nebbia salina neutra (NSS) (UNI EN ISO 9227:2017)	Step 6 (600 ore): 63464-1: Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura. Corrosione sottopellicolare <0,30mm 63464-2: Sul campione fornito si osserva la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura. Corrosione sottopellicolare: 0,40 mm	Non è ammessa la comparsa di corrosione rossa.	Conforme secondo le richieste fornite da cliente.
	Step 7 (700 ore): 63464-1: Sul campione fornito si nota la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura Corrosione sottopellicolare <0,50mm 63464-2: Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura inoltre è possibile osservare qualche colatura di corrosione bianca, il rivestimento non mostra segni di corrosione rossa. Corrosione sottopellicolare: 0,45 mm		Conforme secondo le richieste fornite da cliente.
	Step 8 (800 ore): 63464-1: Sul campione fornito si nota la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura. Corrosione sottopellicolare <0,65mm 63464-2: Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura inoltre possiamo osservare qualche colatura di corrosione bianca, il rivestimento non mostra segni di corrosione rossa. Corrosione sottopellicolare: <0,60 mm		Conforme secondo le richieste fornite da cliente.



Conclusioni riferite al Rapporto di Prova n. 63464

Conclusions referred to Test report n.

Prova (Metodo)	Riscontrato	Richiesto	Esito
Prova di corrosione in nebbia salina neutra (NSS) (UNI EN ISO 9227:2017)	Step 9 (900 ore): 63464-1: Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del rivestimento. Corrosione sottopellicolare <0,75mm 63464-2: Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del materiale. Inoltre si nota qualche colatura di corrosione bianca dalle viti di fissaggio, il rivestimento non mostra segni di corrosione rossa. Corrosione sottopellicolare: <0,70 mm	Non è ammessa la comparsa di corrosione rossa.	Conforme secondo le richieste fornite da cliente.
	Step 10 (1000 ore): 63464-1: -Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del rivestimento. -Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. -Il rivestimento non mostra segni di corrosione rossa. Corrosione sottopellicolare <0,75mm 63464-2: -Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del materiale -Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa Il rivestimento non mostra segni di corrosione rossa. Corrosione sottopellicolare: <0,70 mm		Conforme secondo le richieste fornite da cliente.

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Conclusioni riferite al Rapporto di Prova n. 63464

Conclusions referred to Test report n.

Prova (Metodo)	Riscontrato	Richiesto	Esito
Prova di corrosione in nebbia salina neutra (NSS) (UNI EN ISO 9227:2017)	Step 11 (1100 ore): 63464-1: -Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del rivestimento. -Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. -Il rivestimento non mostra segni di corrosione rossa. Corrosione sottopellicolare <0,75mm 63464-2: -Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del materiale. -Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. Il rivestimento non mostra segni di corrosione rossa. Corrosione sottopellicolare: <0,70 mm	Non è ammessa la comparsa di corrosione rossa.	Conforme secondo le richieste fornite da cliente.
	Step 12 (1200 ore): 63464-1: -Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del rivestimento. -Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. -Il rivestimento non mostra segni di corrosione rossa. Corrosione sottopellicolare <0,75mm 63464-2: -Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del materiale. -Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. Il rivestimento non mostra segni di corrosione rossa. Corrosione sottopellicolare: <0,70 mm		Conforme secondo le richieste fornite da cliente.

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Conclusioni riferite al Rapporto di Prova n. 63464

Conclusions referred to Test report n.

Prova (Metodo)	Riscontrato	Richiesto	Esito
Prova di corrosione in nebbia salina neutra (NSS) (UNI EN ISO 9227:2017)	Step 13 (1300 ore): 63464-1: -Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del rivestimento. -Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. -Il rivestimento non mostra segni di corrosione rossa. Corrosione sottopellicolare <0,75mm 63464-2: -Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del materiale. -Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. Il rivestimento non mostra segni di corrosione rossa. Corrosione sottopellicolare: <0,70	Non è ammessa la comparsa di corrosione rossa.	Conforme secondo le richieste fornite da cliente.
	Step 14 (1400 ore): 63464-1: -Sul campione si può osservare la presenza di alcuni piccoli focolai isolati di corrosione rossa. -Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del rivestimento. -Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. Corrosione sottopellicolare <0,75mm 63464-2: -Sul campione si può osservare la presenza di alcuni piccoli focolai isolati di corrosione rossa. -Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del materiale. -Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. Corrosione sottopellicolare: <0,70		Non conforme secondo le richieste fornite da cliente.



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Conclusioni riferite al Rapporto di Prova n. 63464

Conclusions referred to Test report n.

Prova (Metodo)	Riscontrato	Richiesto	Esito
Prova di corrosione in nebbia salina neutra (NSS) (UNI EN ISO 9227:2017)	<p>Step 15 (1500 ore):</p> <p>63464-1:</p> <ul style="list-style-type: none">-Sul campione si può osservare la presenza di alcuni piccoli focolai isolati di corrosione rossa.-Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del rivestimento.-Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. <p>Corrosione sottopellicolare <2mm</p> <p>63464-2:</p> <ul style="list-style-type: none">-Sul campione si può osservare la presenza di alcuni piccoli focolai isolati di corrosione rossa.-Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del materiale.-Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. <p>Corrosione sottopellicolare: <1mm</p>	Non è ammessa la comparsa di corrosione rossa.	Non conforme secondo le richieste fornite da cliente.

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Conclusioni riferite al Rapporto di Prova n. 63464

Conclusions referred to Test report n.

Prova (Metodo)	Riscontrato	Richiesto	Esito
Prova di corrosione in nebbia salina neutra (NSS) (UNI EN ISO 9227:2017)	Step 16 (1600 ore): 63464-1: -Sul campione si può osservare la presenza di alcuni piccoli focolai isolati di corrosione rossa. -Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del rivestimento. -Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. Corrosione sottopellicolare <2mm 63464-2: -Sul campione si può osservare la presenza di alcuni piccoli focolai isolati di corrosione rossa. -Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del materiale. -Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. Corrosione sottopellicolare: <1mm	Non è ammessa la comparsa di corrosione rossa.	Non conforme secondo le richieste fornite da cliente.

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Conclusioni riferite al Rapporto di Prova n. 63464

Conclusions referred to Test report n.

Prova (Metodo)	Riscontrato	Richiesto	Esito
Prova di corrosione in nebbia salina neutra (NSS) (UNI EN ISO 9227:2017)	<p>Step 17 (1700 ore):</p> <p>63464-1:</p> <ul style="list-style-type: none">-Sul campione si può osservare la presenza di alcuni piccoli focolai isolati di corrosione rossa.-Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del rivestimento.-Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. <p>Corrosione sottopellicolare <2mm</p> <p>63464-2:</p> <ul style="list-style-type: none">-Sul campione si può osservare la presenza di alcuni piccoli focolai isolati di corrosione rossa.-Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del materiale.-Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. <p>Corrosione sottopellicolare: <1mm</p>	Non è ammessa la comparsa di corrosione rossa.	Non conforme secondo le richieste fornite da cliente.

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Prova (Metodo)	Riscontrato	Richiesto	Esito
Prova di corrosione in nebbia salina neutra (NSS) (UNI EN ISO 9227:2017)	<p>Step 18 (1800 ore):</p> <p>63464-1:</p> <ul style="list-style-type: none">-Sul campione si può osservare la presenza di alcuni piccoli focolai isolati di corrosione rossa.-Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del rivestimento.-Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. <p>Corrosione sottopellicolare <2mm</p> <p>63464-2:</p> <ul style="list-style-type: none">-Sul campione si può osservare la presenza di alcuni piccoli focolai isolati di corrosione rossa.-Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del materiale.-Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. <p>Corrosione sottopellicolare: <2,5mm</p>	Non è ammessa la comparsa di corrosione rossa.	Non conforme secondo le richieste fornite da cliente.

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Conclusions referred to Test report n.

Prova (Metodo)	Riscontrato	Richiesto	Esito
Prova di corrosione in nebbia salina neutra (NSS) (UNI EN ISO 9227:2017)	Step 19 (1900 ore): 63464-1: -Sul campione si può osservare la presenza di alcuni piccoli focolai isolati di corrosione rossa. -Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del rivestimento. -Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. Corrosione sottopellicolare <2mm 63464-2: -Sul campione si può osservare la presenza di alcuni piccoli focolai isolati di corrosione rossa. -Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del materiale. -Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. Corrosione sottopellicolare: <2,5mm	Non è ammessa la comparsa di corrosione rossa.	Non conforme secondo le richieste fornite da cliente.

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Conclusioni riferite al Rapporto di Prova n. 63464

Conclusions referred to Test report n.

Prova (Metodo)	Riscontrato	Richiesto	Esito
Prova di corrosione in nebbia salina neutra (NSS) (UNI EN ISO 9227:2017)	<p>Fine prova (2000 ore): 63464-1:</p> <ul style="list-style-type: none">-Sul campione si può osservare la presenza di alcuni piccoli focolai isolati di corrosione rossa.-Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del rivestimento.-Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. <p>Corrosione sottopellicolare 1,76mm</p> <p>63464-2:</p> <ul style="list-style-type: none">-Sul campione si può osservare la presenza di alcuni piccoli focolai isolati di corrosione rossa.-Sul campione fornito si può osservare la presenza di vescicature in prossimità della staffa di supporto e sui ganci di chiusura con un principio di sfogliamento del materiale.-Si nota la comparsa di corrosione bianca in prossimità delle viti di fissaggio della staffa. <p>Corrosione sottopellicolare: 2,13mm</p>	Non è ammessa la comparsa di corrosione rossa.	Non conforme secondo le richieste fornite da cliente.

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Conclusioni riferite al Rapporto di Prova n. 63464

Conclusions referred to Test report n.

Test (Method)	Observed	Required	Result
Neutral salt spray corrosion test (NSS) (UNI EN ISO 9227:2017)	Step 1 (100 hours): The samples supplied do not present any type of defect.	The appearance of red corrosion is not allowed.	Compliant to standard provided by customer.
	Step 2 (200 hours): 63464-1: No defects are observed. The appearance of scribe corrosion is not known. 63464-2: No defects are observed. Scribe corrosion: <0,30 mm		Compliant to standard provided by customer.
	Step 3 (300 hours): 63464-1: No defects are observed. The appearance of scribe corrosion is not known. 63464-2: No defects are observed. Scribe corrosion: 0,35 mm		Compliant to standard provided by customer.
	Step 4 (400 hours): 63464-1: No defects are observed. The appearance of scribe corrosion is not known. 63464-2: No defects are observed. Scribe corrosion: 0,35 mm		Compliant to standard provided by customer.
	Step 5 (500 hours): 63464-1: The sample supplied shows the presence of blistering near the support bracket and on the closing hooks. Scribe corrosion: <0,30mm 63464-2: On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks. Scribe corrosion: 0,40 mm		Compliant to standard provided by customer.

**Conclusioni riferite al Rapporto di Prova n. 63464***Conclusions referred to Test report n.*

Test (Method)	Observed	Required	Result
<i>Neutral salt spray corrosion test (NSS) (UNI EN ISO 9227:2017)</i>	<i>Step 6 (600 hours): 63464-1: On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks. Scribe corrosion: <0,30mm 63464-2: The sample supplied shows the presence of blistering near the support bracket and on the closing hooks. Scribe corrosion: 0,40 mm</i>	<i>The appearance of red corrosion is not allowed.</i>	<i>Compliant to standard provided by customer.</i>
	<i>Step 7 (700 hours): 63464-1: The sample supplied shows the presence of blistering near the support bracket and on the closing hooks Scribe corrosion: <0,50mm 63464-2: On the supplied sample it is possible to observe the presence of blistering near the support bracket and on the closing hooks it is also possible to observe some dripping of white corrosion, the coating does not show signs of red corrosion. Scribe corrosion: 0,45 mm</i>		<i>Compliant to standard provided by customer.</i>
	<i>Step 8 (800 hours): 63464-1: The sample supplied shows the presence of blistering near the support bracket and on the closing hooks. Scribe corrosion: <0,65mm 63464-2: On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks we can also observe some dripping of white corrosion, the coating shows no signs of red corrosion. Scribe corrosion: <0,60 mm</i>		<i>Compliant to standard provided by customer.</i>

**Conclusioni riferite al Rapporto di Prova n. 63464***Conclusions referred to Test report n.*

Test (Method)	Observed	Required	Result
Neutral salt spray corrosion test (NSS) (UNI EN ISO 9227:2017)	<p><i>Step 9 (900 hours):</i> 63464-1: <i>On the sample supplied it can be observed the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the coating.</i> <i>Scribe corrosion: <0,75mm</i></p> <p>63464-2: <i>On the supplied sample it can be observed the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the material.</i> <i>In addition there is some dripping of white corrosion from the fixing screws, the coating shows no signs of red corrosion.</i> <i>Scribe corrosion: <0,70 mm</i></p>	<i>The appearance of red corrosion is not allowed.</i>	<i>Compliant to standard provided by customer.</i>
	<p><i>Step 10 (1000 hours):</i> 63464-1: <i>-On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the coating.</i> <i>-The appearance of white corrosion near the fixing screws of the bracket is noted.</i> <i>-The coating shows no signs of red corrosion.</i> <i>Scribe corrosion: <0,75mm</i></p> <p>63464-2: <i>-On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the material</i> <i>-The appearance of white corrosion near the fixing screws of the bracket is noted.</i> <i>The coating shows no signs of red corrosion.</i> <i>Scribe corrosion: <0,70 mm</i></p>		<i>Compliant to standard provided by customer.</i>

**Conclusioni riferite al Rapporto di Prova n. 63464***Conclusions referred to Test report n.*

Test (Method)	Observed	Required	Result
Neutral salt spray corrosion test (NSS) (UNI EN ISO 9227:2017)	<p>Step 11 (1100 hours): 63464-1: -On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the coating. -The appearance of white corrosion near the fixing screws of the bracket is noted. -The coating shows no signs of red corrosion. Scribe corrosion: <0,75mm</p> <p>63464-2: -On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the material. -The appearance of white corrosion near the fixing screws of the bracket is noted. The coating shows no signs of red corrosion. Scribe corrosion: <0,70 mm</p>	The appearance of red corrosion is not allowed.	Compliant to standard provided by customer.
	<p>Step 12 (1200 hours): 63464-1: -On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the coating. -The appearance of white corrosion near the fixing screws of the bracket is noted. -The coating shows no signs of red corrosion. Scribe corrosion: <0,75mm</p> <p>63464-2: -On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the material. -The appearance of white corrosion near the fixing screws of the bracket is noted. The coating shows no signs of red corrosion. Scribe corrosion: <0,70 mm</p>		Compliant to standard provided by customer.



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Test (Method)	Observed	Required	Result
Neutral salt spray corrosion test (NSS) (UNI EN ISO 9227:2017)	<p>Step 13 (1300 hours): 63464-1:</p> <ul style="list-style-type: none"> -On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the coating. -The appearance of white corrosion near the fixing screws of the bracket is noted. -The coating shows no signs of red corrosion. <p>Scribe corrosion: <0,75mm</p> <p>63464-2:</p> <ul style="list-style-type: none"> -On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the material. -The appearance of white corrosion near the fixing screws of the bracket is noted. The coating shows no signs of red corrosion. <p>Scribe corrosion: <0,70 mm</p>	The appearance of red corrosion is not allowed.	Compliant to standard provided by customer.
	<p>Step 14 (1400 hours): 63464-1:</p> <ul style="list-style-type: none"> -On the sample we can observe the presence of some small isolated outbreaks of red corrosion. -On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the coating. -The appearance of white corrosion near the fixing screws of the bracket is noted. <p>Scribe corrosion: <0,75mm</p> <p>63464-2:</p> <ul style="list-style-type: none"> -On the sample we can observe the presence of some small isolated outbreaks of red corrosion. -On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the material. -We note the appearance of white corrosion near the fixing screws of the bracket. <p>Scribe corrosion: <0,70 mm</p>		Not compliant to standard provided by customer.



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Conclusions referred to Test report n.

Test (Method)	Observed	Required	Result
Neutral salt spray corrosion test (NSS) (UNI EN ISO 9227:2017)	<p>Step 15 (1500 hours):</p> <p>63464-1:</p> <ul style="list-style-type: none">-On the sample we can observe the presence of some small isolated outbreaks of red corrosion.-On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the coating.-The appearance of white corrosion near the fixing screws of the bracket is noted. <p>Scribe corrosion: <2mm</p> <p>63464-2:</p> <ul style="list-style-type: none">-On the sample we can observe the presence of some small isolated outbreaks of red corrosion.-On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the material.-The appearance of white corrosion near the fixing screws of the bracket is noted. <p>Scribe corrosion: <1mm</p>	<p>The appearance of red corrosion is not allowed.</p>	<p>Not compliant to standard provided by customer.</p>

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Conclusioni riferite al Rapporto di Prova n. 63464

Conclusions referred to Test report n.

Test (Method)	Observed	Required	Result
Neutral salt spray corrosion test (NSS) (UNI EN ISO 9227:2017)	<p>Step 16 (1600 hours):</p> <p>63464-1:</p> <ul style="list-style-type: none">-On the sample we can observe the presence of some small isolated outbreaks of red corrosion.-On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the coating.-The appearance of white corrosion near the fixing screws of the bracket is noted. <p>Scribe corrosion: <2mm</p> <p>63464-2:</p> <ul style="list-style-type: none">-On the sample we can observe the presence of some small isolated outbreaks of red corrosion.-On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the material.-The appearance of white corrosion near the fixing screws of the bracket is noted. <p>Scribe corrosion: <1mm</p>	<p>The appearance of red corrosion is not allowed.</p>	<p>Not compliant to standard provided by customer.</p>

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Conclusioni riferite al Rapporto di Prova n. 63464

Conclusions referred to Test report n.

Test (Method)	Observed	Required	Result
Neutral salt spray corrosion test (NSS) (UNI EN ISO 9227:2017)	<p>Step 17 (1700 hours): 63464-1:</p> <ul style="list-style-type: none">-On the sample we can observe the presence of some small isolated outbreaks of red corrosion.-On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the coating.-The appearance of white corrosion near the fixing screws of the bracket is noted. <p>Scribe corrosion: <2mm</p> <p>63464-2:</p> <ul style="list-style-type: none">-On the sample we can observe the presence of some small isolated outbreaks of red corrosion.-On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the material.-The appearance of white corrosion near the fixing screws of the bracket is noted. <p>Scribe corrosion: <1mm</p>	<p>The appearance of red corrosion is not allowed.</p>	<p>Not compliant to standard provided by customer.</p>



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Conclusioni riferite al Rapporto di Prova n. 63464

Conclusions referred to Test report n.

Test (Method)	Observed	Required	Result
Neutral salt spray corrosion test (NSS) (UNI EN ISO 9227:2017)	<p>Step 18 (1800 hours): 63464-1:</p> <ul style="list-style-type: none">-On the sample we can observe the presence of some small isolated outbreaks of red corrosion.-On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the coating.-The appearance of white corrosion near the fixing screws of the bracket is noted. <p>Scribe corrosion: <2mm</p> <p>63464-2:</p> <ul style="list-style-type: none">-On the sample we can observe the presence of some small isolated outbreaks of red corrosion.-On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the material.-The appearance of white corrosion near the fixing screws of the bracket is noted. <p>Scribe corrosion: <2,5mm</p>	<p>The appearance of red corrosion is not allowed.</p>	<p>Not compliant to standard provided by customer.</p>

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Conclusioni riferite al Rapporto di Prova n. 63464

Conclusions referred to Test report n.

Test (Method)	Observed	Required	Result
Neutral salt spray corrosion test (NSS) (UNI EN ISO 9227:2017)	<p>Step 19 (1900 hours): 63464-1:</p> <ul style="list-style-type: none">-On the sample we can observe the presence of some small isolated outbreaks of red corrosion.-On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the coating.-The appearance of white corrosion near the fixing screws of the bracket is noted. <p>Scribe corrosion: <2mm</p> <p>63464-2:</p> <ul style="list-style-type: none">-On the sample we can observe the presence of some small isolated outbreaks of red corrosion.-On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the material.-The appearance of white corrosion near the fixing screws of the bracket is noted. <p>Scribe corrosion: <2,5mm</p>	<p>The appearance of red corrosion is not allowed.</p>	<p>Not compliant to standard provided by customer.</p>



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Conclusioni riferite al Rapporto di Prova n. 63464

Conclusions referred to Test report n.

Test (Method)	Observed	Required	Result
Neutral salt spray corrosion test (NSS) (UNI EN ISO 9227:2017)	<p>Test end (2000 hours): 63464-1:</p> <ul style="list-style-type: none">-On the sample we can observe the presence of some small isolated outbreaks of red corrosion.-On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the coating.-The appearance of white corrosion near the fixing screws of the bracket is noted. Scribe corrosion: 1,76mm <p>63464-2:</p> <ul style="list-style-type: none">-On the sample we can observe the presence of some small isolated outbreaks of red corrosion.-On the sample supplied you can see the presence of blistering near the support bracket and on the closing hooks with a principle of peeling the material.-The appearance of white corrosion near the fixing screws of the bracket is noted. Scribe corrosion: 2,13mm	<p>The appearance of red corrosion is not allowed.</p>	<p>Not compliant to standard provided by customer.</p>

Avigliana, 30/04/2020

Responsabile delle Prove
Responsible of the Test
Dott. Carlo Chiampo

Responsabile del Laboratorio
Head of Laboratory
Paolo Pollacino

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