Technical Documentation

Specifications for LED Floodlights — 450 W Model

MODEL	: KPC-450N
RATED POWER	: 450 W
TYPE	: LED Floodlight (Circular)
INSTALLATION	: Indoor & Outdoor
MAKER	: KPC Inc.
COUNTRY	: Republic of Korea

September 1, 2026

Korea Power Challenge Inc.

Ver.1.0

Specifications for LED Floodlights of 450 W Model

1. General

1.1 Scope

This specification covers LED floodlight luminaires using LEDs (Light Emitting Diodes) as the light source. It applies to the LED circular floodlight (KPC-450N), which adopts a heat-dissipation structure in which multiple heat pipes are arranged circumferentially on the aluminum heat transfer plate behind the LED module, and aluminum heat-sink fins—whose perimeters are radially cut and tilted—are press-fitted and stacked around them, so that the number of stacked fins can be varied according to the light output. The luminaire is intended for large indoor and outdoor spaces requiring high illuminance, such as industrial facilities, ports and wharves, shipyard cranes, sports facilities, the interiors and exteriors of factories and warehouses, and landscape lighting.

1.2 Features

1.2.1 Multiple nickel-plated copper heat pipes are arranged circumferentially on the aluminum heat transfer plate behind the LED module, transporting LED heat axially to the entire stacked-fin section by evaporation and condensation of the working fluid.

1.2.2 The perimeter of each aluminum disc-shaped fin is cut radially and each blade is tilted, increasing the heat-dissipating surface area for the same diameter and promoting turbulence of the air between fins during convective cooling.

1.2.3 The fins are press-fitted onto the heat pipes in sequence and stacked axially, without welding or adhesive.

1.2.4 All models use fins and heat pipes of identical specifications; only the number of stacked fins and the number and length of heat pipes are varied according to each model’s rated output, so that all models are built without separate tooling (molds) for each output.

1.2.5 The hollow circular stacked structure, with the fin centers left open, together with the hexagonal perforated housing, forms multi-directional natural convection paths through which outside air drawn in from the bottom and rear passes between the fins and is discharged outward.

1.2.6 The KPC-450N model is available in both separate and integrated converter (SMPS) configurations; in the separate configuration, the converter can be installed up to 150 m away from the luminaire.

2. Specifications

2.1 Specifications

No.	Item List No.	Model	Rated Power Consumption (W)	Dimensions (mm)	Application
1	39111611-26194012	KPC-450N	450	370 (D) × 270 (H)	High-illuminance floodlighting for large indoor/outdoor spaces

2.2 Quality Criteria

Test Item (Unit)	Declared Value (Max.)		Comparable Specification		Deliverable Specification	
	Value	Basis	Spec.	Basis	Spec.	Basis
Input power (W)	424.8	Test report (ICRT-TR-S260616-0A, ICR)	Within 450 W ±10%	High-Efficiency Energy Equipment certification criteria	425 or more	High-Efficiency Energy Equipment certification criteria
Input current (A)	1.948	Test report (ICRT-TR-S260616-0A, ICR)	Within 2.045 ±10%	High-Efficiency Energy Equipment certification criteria	1.948 or more	High-Efficiency Energy Equipment certification criteria
Luminous efficacy (lm/W)	116.9	Test report (ICRT-TR-S260616-0A, ICR)	115 or more	High-Efficiency Energy Equipment certification criteria	115 or more	High-Efficiency Energy Equipment certification criteria
Correlated color temperature (K)	5,735	Test report (ICRT-TR-S260616-0A, ICR)	5,665 ± 355	High-Efficiency Energy Equipment certification criteria	5,665 ± 355	High-Efficiency Energy Equipment certification criteria
Color rendering index	84.8	Test report (ICRT-TR-S260616-0A, ICR)	75 or more	High-Efficiency Energy Equipment certification criteria	75 or more	High-Efficiency Energy Equipment certification criteria
Power factor	0.989	Test report (ICRT-TR-S260616-0A, ICR)	0.9 or more	High-Efficiency Energy Equipment certification criteria	0.95 or more	High-Efficiency Energy Equipment certification criteria
Harmonic current (%)	5.272	Test report (ICRT-TR-S260616-0A, ICR)	27 or less	KS C 9610-3-2	5.272	High-Efficiency Energy Equipment certification criteria
Luminaire EMC	–	Conformity registration (under testing)	Pass	Radio Waves Act	Pass	Radio Waves Act
Converter safety certification	Pass	KC certificate (SU11324-23003A)	Pass	KC61341-1 (2022-02) KC61341-2-13 (2022-02)	Pass	KC61341-1 (2022-02) KC61341-2-13 (2022-02)
Converter EMC certification	Pass	Conformity registration (R-R-VEN-480S420BG)	Pass	Radio Waves Act	Pass	Radio Waves Act

Applicable product: KPC-450N. ※The product shall satisfy all requirements stated in this specification, including the above quality criteria. For any matters not stated herein, it shall satisfy the test criteria of all quality certifications held.

3. Composition and Materials

Summary Table

Model	Materials	Components
KPC-450N	- Stainless steel - Nickel / copper - Aluminum - Polycarbonate (PC) - PMMA	(1) LED chip (LED package) (2) PCB (3) LED lens (4) Heat transfer plate (aluminum) (5) Heat pipe (6) Twisted Al heat-sink fin (7) Hexagonal perforated case (8) Glass plate (9) Glass plate support (10) Glass plate retaining ring (11) Mounting bracket (12) Converter (SMPS) (13) Cable

Bill of Main Materials

Model: KPC-450N | Dimensions: 370 (D) × 270 (H) mm

Item	Model (Part)	Specification / Material	Unit	Qty	Origin
LED chip	LH3535S2WC57A03 (3535 PKG)	Vf = 2.8–3.2 V, IF = 2,600 mA (max), 5700 K, LM-80 3.5 mm (L) × 3.5 mm (W)	pcs	92	Korea
PCB	–	Φ250 mm × 1.6 mm (t) Aluminum (5051)	pcs	1	Korea
LED lens	EXSCD	Φ14.38 × 6.21 mm (H) PMMA + PC	pcs	92	Korea
Heat transfer plate	–	Φ305 × 8 mm (t) Aluminum (6061)	pcs	1	Korea
Heat pipe	–	Φ8 × 310 mm (H) Copper + nickel plating (2.3 μm)	pcs	12	Taiwan
Twisted Al heat-sink fin	–	Φ320 × 0.5 mm (t) Aluminum (1050)	pcs	18	Korea
Hexagonal perforated case	–	Circumference 1168 × 240 (H) × 2 (t) mm Aluminum (3003) / painted	pcs	1	Korea
Glass plate	–	Ø263 × 4 (t) mm Tempered glass	pcs	1	Korea
Glass plate support	–	Ø285 × 20 (H) mm PC	pcs	1	Korea
Glass plate retaining ring	–	Ø336 × 30 (H) × 2 (t) mm Aluminum (1050) / painted	pcs	1	Korea
Mounting bracket	–	379 (W) × 352 (H) × 5 (t) mm Stainless steel / painted	pcs	1	Korea
Converter	EUM-480S140MG	AC 100–240 V, 50/60 Hz, max. 520 W, max. 5 A [Output: 190 V d.c. (max), Vout 57–152 V d.c., max. 4.2 A, max. 480 W] 263 (L) × 90 (W) × 43 (H) mm Aluminum (internal potting)	pcs	1	China
Cable	VCTF	2.5 mm² × 2C 300/500 V	m	5	Korea

4. Appearance

4.1 Overall Views

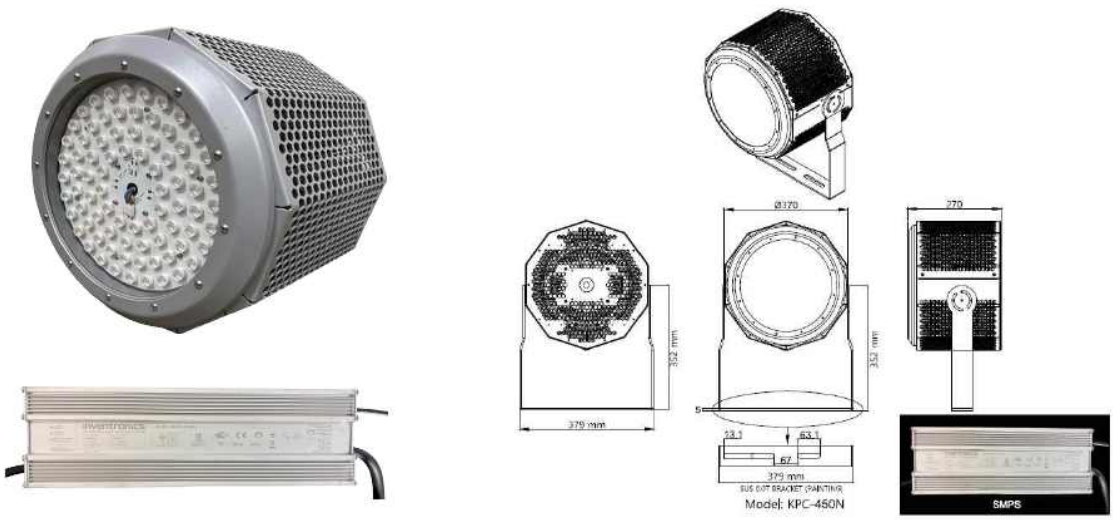


Figure 1. KPC-450N luminaire, separate converter (SMPS), and outline drawings

4.2 Product Structure

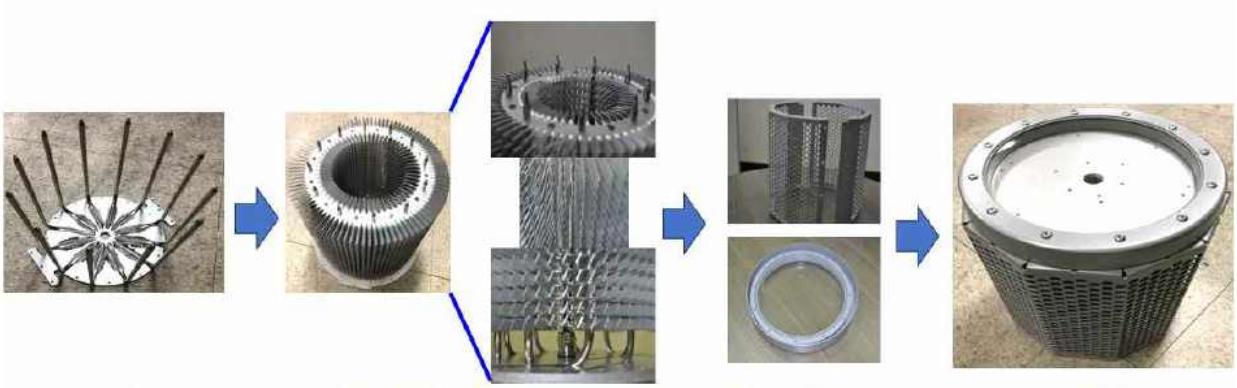


Figure 2. Assembly sequence: heat pipe mounting → twisted Al fin press-fitting/assembly → case and glass plate assembly → completed housing assembly

4.2.1 Multiple Heat Pipe Structure

Multiple heat pipes are fixed by molding to the aluminum heat transfer plate behind the LED module, arranged circumferentially, and supported by a rear ring plate. The rear ends of the heat pipes are sealed.

4.2.2 Twisted Al Heat-Sink Fin Structure

The fins—aluminum discs whose perimeters are cut radially and whose individual blades are tilted—are press-fitted onto the heat pipes through holes machined to match the heat pipe arrangement, and stacked axially (toward the PCB).

4.2.3 Hollow Circular Stacked Structure

The fin centers are left open to form a cylindrical air passage, which is enclosed by the hexagonal perforated housing so that outside air enters from the bottom and rear, passes between the fins, and is discharged outward.

4.2.4 Output-Dependent Configuration

The output of each model is accommodated by varying the fin diameter and number of stacked fins, and the heat pipe length, according to the model's rated output.

4.3 Finish and Appearance

4.3.1 All parts of the luminaire shall be free of visible flaws, deformation, cracks, dents, etc., and shall have a good finish.

4.3.2 Burrs shall be removed from the cut surfaces and tilted portions of the fins so that there are no sharp edges, and the stacking pitch shall be uniform.

4.3.3 There shall be no play or looseness at the press-fit joints between the fins and heat pipes.

4.3.4 The sealed portions of the heat pipes shall show no damage or signs of leakage.

4.3.5 The transparent plate and lenses shall be free of optical defects such as bubbles, scratches, and foreign matter.

4.3.6 Surface treatment shall be applied to the housing and other parts; painted surfaces shall be uniform, without stains or peeling.

5. Manufacturing and Processing

5.1 Machining and assembly of the luminaire shall conform to the approved drawings.

5.2 The fins shall be produced by radially cutting the perimeter of aluminum discs and then tilting the blades; separate tooling (molds) for each output shall not be used.

5.3 The specified number of fins for each model shall be press-fitted onto the heat pipes in sequence and stacked axially, without welding or adhesive.

5.4 The heat pipes shall be fixed by molding to the heat transfer plate behind the LED module, and their rear ends shall be supported by the rear ring plate.

5.5 The LED module shall be manufactured by SMT-mounting LED chips with LM-80 test reports onto the PCB, and assembled in close contact with the heat transfer plate.

5.6 After wiring, lighting, insulation resistance, and dielectric strength tests shall be performed.

<Manufacturing QC Process Chart>

Process	Symbol	Activity	Category		Inspection / Control Item	Quality Standard	Inspection / Control Method
			Insp.	Ctrl.			
Material receipt	▽	Material receipt		○	Quantity check	Same as the transaction statement	At receipt
Incoming inspection	◇	Incoming inspection	○		1. PCB	Per I-005 (Material & Incoming Inspection Standard)	Attribute sampling inspection and receipt/management of supplier test reports
			○		2. Lens	Per I-010 (Material & Incoming Inspection Standard)	
			○		3. LED chip	Per I-001 (Material & Incoming Inspection Standard)	
			○		4. Converter	Per I-009 (Material & Incoming Inspection Standard)	
			○		5. LED PCB	Per I-005 (Material & Incoming Inspection Standard)	
			○		6. Housing (integrated: heat transfer plate, heat pipes, twisted Al fins, hexagonal perforated case, glass plate, glass plate support, glass plate retaining ring)	Per I-011 (Material & Incoming Inspection Standard)	
			○		7. Support bracket	Per I-012 (Material & Incoming Inspection Standard)	
Parts assembly	◇	In-process inspection	○		1. Appearance 2. Assembly condition 3. Dimensions 4. Short circuit	Per W-006 (Work Standard) and TK-001 (In-Process Inspection Standard)	100% inspection
Lighting	◇	In-process inspection	○		1. Lighting on/off 2. Product output adjustment	Per W-006 (Work Standard) and TK-001 (In-Process Inspection Standard)	100% inspection
Product inspection	◇	Product inspection	○		1. Appearance 2. Dielectric strength, insulation resistance, leakage current tests 3. Markings	Per PK-001 (Product Inspection Standard)	100% inspection
Aging	◇	Product inspection	○		1. Lighting on/off 2. Product output	Per W-008 (Work Standard)	100% inspection
Packing / shipping	▽	–		○	–	Per Common-008 (Shipping Control Regulation)	–

6. Functions and Performance

6.1 Functions

6.1.1 Patent No. 10-2907608, “Lighting Device Having Horizontal Heat-Dissipating Blades of PLPP Structure Corresponding to Lighting Output”

1) Technical Description

A high-output LED lighting device in which a large volume of antifreeze heat-conducting liquid fills the interior of a heat conductor beneath the PCB, and twisted heat-dissipating plates of PLPP structure are coupled to heat-dissipating rods, so that the number of plates can be adjusted according to the lighting output.

2) Detailed Technical Specifications

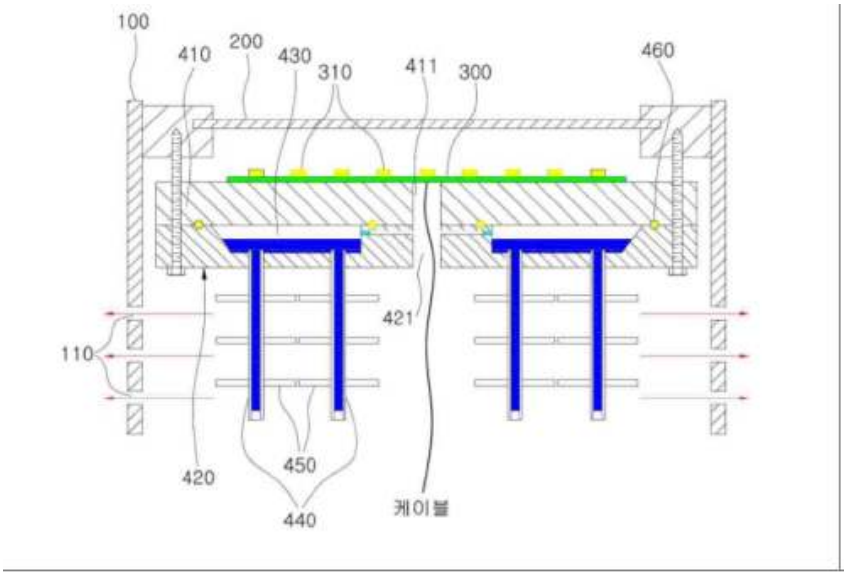


Figure 3. Configuration diagram of the registered patent (label “케이블” = cable)

Component	Detailed Description
(1) First heat conductor (410)	Aluminum plate in contact with the underside of the PCB that first receives the heat generated by the LEDs
(2) Second heat conductor (420)	Coupled with the first heat conductor to form the liquid-holding space; discharges only expanded air through the air outlet (425)
(3) Heat-conducting liquid (430)	Antifreeze liquid filling the holding space and the interior of the heat-dissipating rods
(4) Heat-dissipating rod (440)	Aluminum rod passing vertically through the second heat conductor, with a thread (441) formed on its surface
(5) Heat-dissipating plate (450)	Horizontal heat-dissipating blade of PLPP structure screwed onto the heat-dissipating rod
(6) O-ring (460)	Installed at the contact area of the heat conductors to prevent liquid leakage

3) Technical Effects

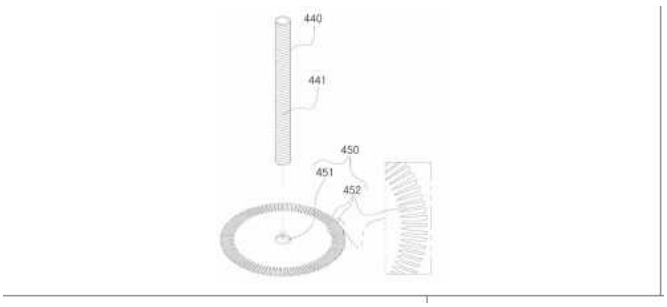


Figure 4. Heat-dissipating rod (440, thread 441) and PLPP heat-dissipating plate (450) with twisted fins (452)

Output-responsive PLPP heat-dissipating plates: The number of plates is increased or decreased according to output (e.g., per heat-dissipating rod: 10 plates for 100 W, 20 for 200 W, 30 for 300 W). Owing to the cut surfaces of the twisted fins (452) and the turbulence effect, both the heat-dissipating area and the

cooling performance increase even for the same diameter.



Figure 5. Left: LED module (heat source) and hexagonal perforated housing. Center: heat flow from the LED heat source through the twisted Al fins to the heat pipe ends. Right: cool air inflow (blue) and hot air discharge (orange).

4) Additional Description of the Core Technology

The registered patent is a structure in which antifreeze heat-conducting liquid fills the space between two aluminum plates and heat-dissipating rods pass through and are coupled to transfer heat. The technology of this application replaces this liquid-holding structure with commercial heat pipes as the heat-transfer path, and combines them with the PLPP heat-dissipating plates (twisted fin structure) of the registered patent to improve cooling performance.

This is not a technology separate from the registered patent, but an embodiment of the technical concept presented in it. The patent specification describes the heat-dissipating rod (440) as corresponding to a conventional heat-dissipation pipe and the heat-dissipating plate (450) as corresponding to conventional heat-sink fins [0095], and the PLPP heat-dissipating plate structure is protected by a separate claim (Claim 4).

Category	Registered Patent	Technology of This Application
Heat-transfer path	Al heat conductor + liquid + heat-dissipating rod	Heat pipe
Heat-transfer method	Conduction and convection of the liquid	Evaporation and condensation (phase change) of the working fluid
Sealing structure	Requires O-ring and gas–liquid selective permeation means	Sealed off-the-shelf part; no separate structure required
Heat-dissipating plate	PLPP heat-dissipating plate	PLPP heat-dissipating plate (same application)

[Improvement Effects]

(1) Phase-change heat transport by heat pipes delivers LED heat to the heat-dissipating plates more quickly.

(2) No components for managing liquid leakage or expanded air are required, simplifying the structure and improving long-term reliability.

(3) The use of standardized heat pipes secures mass-producibility and uniform quality.

(4) The concept of adjusting the number of PLPP heat-dissipating plates is retained, enabling heat dissipation matched to the lighting output.

6.1.2 Multiple Heat Pipe Heat Transport Function

Heat generated in the LED module is transferred through the PCB and heat transfer plate to the heat pipes, and is transported axially to the entire stacked-fin section by evaporation and condensation of the working fluid inside the heat pipes.

6.1.3 Heat Dissipation Function of the Twisted Fins

The side faces of the cut fin blades act as additional heat-dissipating surfaces, increasing the heat-dissipating area for the same diameter, and the turbulence of the air passing between the twisted blades increases, promoting convective heat dissipation.

6.1.4 Natural Convection Function

Through the hollow circular stacked structure and the hexagonal perforated housing, outside air enters from

the bottom and rear without a fan, and air heated between the fins is discharged upward.

6.1.5 Separate Converter Installation Function

The converter (SMPS) can be installed separately from the luminaire at a distance of up to 150 m, so that at high-mounting sites the converter can be inspected and replaced from the ground. The KPC-270N is a separate-converter model; the KPC-450N and KPC-600N models are also available with an integrated converter.

6.2 Performance and Test Methods

The product shall satisfy the test methods and quality criteria according to KC safety certification, electromagnetic compatibility certification, High-Efficiency Energy Equipment certification criteria, KS C 7712, and the company's own specifications.

Applicable Item	Test Item (Unit)	Test Result	Quality Criterion	Test Method
Finished product (KPC-450N)	Luminous efficacy (lm/W)	116.9	115 or more	High-Efficiency Energy Equipment certification test method
	Power factor	0.989	0.95 or more	KS C 7712
	Correlated color temperature (K)	5,735	5,665 ± 355 K	High-Efficiency Energy Equipment certification test method
	Color rendering (CRI)	84.8	75 or more	High-Efficiency Energy Equipment certification test method
	Electromagnetic compatibility	Pass	Pass	EMC criteria under the Radio Waves Act
	Insulation resistance	500 MΩ	2 MΩ or more	KS C IEC 60598-2-5, 5.14
	Dielectric strength	Withstood	Withstand AC 1,440 V for 1 minute	KS C IEC 60598-2-5, 5.14
	Leakage current	1.5 mA	3.5 mA or less	KS C IEC 60598-1, 10.3
	Max. temperature of heat sink (°C)	48 °C	50 °C or less	Per clause 6.2.1

※ The product shall satisfy all requirements stated in this specification, including the above quality criteria. For any matters not stated herein, it shall satisfy the test criteria of all quality certifications held.

6.2.1 Heat Sink Temperature Test

In a room at an ambient temperature of approximately 26 °C, the rated voltage is applied and the luminaire is operated continuously for 1 hour; the surface temperature of the hottest zone of the heat-sink fins is then measured with a non-contact infrared thermometer.

7. Warranty

7.1 The warranty period of the product is 1 year from the date of delivery and installation.

7.2 Defects arising during the warranty period from errors in the manufacturer's design or manufacturing process shall be repaired or replaced immediately at the manufacturer's expense. Defects caused by user error shall be at the user's expense.

8. Packaging and Marking

8.1 Packaging

Each luminaire shall be packed in an individual corrugated box with cushioning material to prevent deformation of the heat-sink fins, and the separate converter (SMPS) shall be packed separately and enclosed. To prevent damage and moisture ingress during transport and stacking, the product shall be additionally wrapped with protective plastic film or similar before delivery to the site.

8.2 Marking

In addition to the markings required by the “Electrical Appliances and Consumer Products Safety Control Act,” a nameplate shall be attached to the luminaire in an easily visible location, showing the following:

1) Manufacturer’s name or abbreviation
2) Rated voltage (V)
3) Rated current (A)
4) Rated power (W)
5) Rated frequency (Hz)
6) Rated luminous flux (lm)
7) Color temperature (K)
8) Rated lifetime (hours)
9) Power factor
10) Luminous efficacy (lm/W)
11) Beam angle (°)
12) Approval number
13) Earth (ground) symbol
14) IP rating (if obtained)
15) Ta (°C)
16) Where necessary for safety, indication of the location and purpose of connections; where wires are connected, a clearly marked wiring diagram
17) After-sales service contact
18) Country of origin
19) KC certification mark
20) High-efficiency certification number
21) EMC registration number

9. Referenced Documents

The following documents are indispensable for the application of this specification. For dated references, only the edition cited applies. For undated references, the latest edition applies.

9.1 KS C 7712, LED floodlight luminaires

9.2 KC 60598-1, Luminaires – Part 1: General requirements

9.3 KC 60598-2-5, Luminaires – Part 2-5: Floodlights

9.4 KC 61347-2-13, Lamp controlgear – d.c. or a.c. supplied electronic controlgear for LED modules

9.5 EMC criteria under the Radio Waves Act (Notice of the National Radio Research Agency)

9.6 Regulations on the Promotion of High-Efficiency Energy Equipment (Notice of the Ministry of Trade, Industry and Energy)

9.7 IES LM-80, Measuring luminous flux maintenance of LED light sources

9.8 Patent No. 10-2907608, “Lighting Device Having Horizontal Heat-Dissipating Blades of PLPP Structure Corresponding to Lighting Output” (Korean Intellectual Property Office)