JAN 2 7 2022	Republic of t DEPARTMENT OF PUBLIC CENTRA Ma	he Philippines C WORKS AND HIGHWAYS L OFFICE nila	097: 13 DPNH 01: 27: 2022
DEPARTMENT ORDER) SUBJECT:	Amendment to DPWH Specification for Item Internally Illuminated Pavement Levelled Mar Flush Type	Standard 607(3) – d (Solar) kers/Studs
In order to ensure unifo	ormity in the application/	adoption of the Pay Items o	f Work to be

used/adopted by those who are involved in the preparation of the Pay Items of Work to be used/adopted by those who are involved in the preparation of the Design Plans and Quantities, Program of Works (POW) and Approved Budget for the Contract (ABC) for Infrastructure Projects Nationwide, the attached amended DPWH Standard Specification for **Item 607(3)** – **Internally Illuminated (Solar) Pavement Levelled Markers/Studs Flush Type** is hereby prescribed for adoption in Government infrastructure projects that require the utilization of such in the Program of Works.

This Standard Specification shall form part of the DPWH Standard Specifications for Highways, Bridges and Airports, Volume II and is now included in the Project and Contract Management Application (PCMA).

This supersedes Memorandum 097.7_050719 (Standard Specification for Item 607(3) – Internally Illuminated (Solar) Pavement Levelled Markers/Studs Flush Type for Inclusion in the DPWH Standard Specification for Item 607 – Reflective Pavement Studs) issued on May 7, 2019 and shall take effect immediately.

ROGER G. MERCADO Acting Secretary

14.1.2 MLL/RPF



Amendment to DPWH Standard Specification for ITEM 607(3) - INTERNALLY ILLUMINATED (SOLAR) PAVEMENT LEVELLED MARKERS/STUDS FLUSH TYPE

607(3).1 Description

This Item shall consist of furnishing and installing internally illuminated (solar) pavement levelled markers/studs on the surface of the pavement in accordance with this Specification and at the lines and locations shown on the Plans.

607(3).2 Material Requirements

607(3).2.1 Internally Illuminated (Solar) Pavement Levelled Markers/Studs

The internally illuminated (solar) pavement levelled markers/studs shall be either monodirectional or uni-directional, bi-directional or omni-directional.

The reinforced body case shall be made of aluminum die cast with adequate webbing to ensure a firm key to the road when installed. The protective upper cup or security ring shall be made of aluminum die cast with a minimum of five (5) stainless steel safety locks.

The internal circuit module shall be detachable from the reinforced body case for easy maintenance and shall be made of impact and abrasion resistant polycarbonate material which is tightly sealed with its body having an Ingress Protection (IP) 68 rating (dust and water resistant) based from IEC 60529, Degrees of protection provided by enclosures (IP Code).

The internally illuminated (solar) pavement levelled markers/studs shall conform to the applicable requirements of EN 55015, Limits and Methods of Measurement of Radio Disturbance Characteristics of Electrical Lighting and Similar Equipment, and EN 61547, Equipment for General Lighting Purposes - EMC Immunity Requirements. The certified true copy of the said test results shall be issued by the manufacturer to the Contractor reiterating the current date of certification and must be submitted to the Engineer before doing the installation work.

The solar cell and the rechargeable battery shall be of the latest technology and shall be able to last for at least 3 days of LED runtime with a 12 hour per day discharge criteria on one (1) full charge. The light-emitting diode (LED) shall have luminous intensity varying depending on the color (yellow, white, red, green, and blue). For yellow and white, the minimum luminous intensity values expressed in millicandela (mcd) is shown in Table 607(3).1. The LED shall have an output frequency of either steady or flashing.

Luminance intensity (med)	Color	
	Yellow White 350 400 200 200	
Vertical angle 0.2° / Horizontal angle 0°	350	400
Vertical angle 0.3° / Horizontal angle +5°	200	200
Vertical angle 0.3° / Horizontal angle -5°	200	200
Vertical angle 1.0° / Horizontal angle +10°	100	100
Vertical angle 1.0° / Horizontal angle -10°	100	100

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Table 607(3).1 Luminous Intensity Properties

All LEDs should be covered with polycarbonate covers on the sides. Mono-directional or Unidirectional Internally Illuminated (Solar) pavement levelled markers/studs shall either have three (3) LED or a minimum of one (1) LED on one (1) tapering side. Bi-directional internally illuminated (solar) pavement leveled markers/studs shall have a minimum of two (2) LEDs on one (1) tapering side. Omni-directional internally illuminated (solar) pavement leveled markers/studs shall have a minimum of three (3) LEDS on one tapering side and a minimum of two (2) on two (2) opposite tapering sides.

Properties	Requirements
Housing/Body	Aluminum Die Cast
Diameter (Main Body), Min.	123 mm dia.
Height, Min.	39 mm
Weight, Min.	590 grams
Solar Panel, Min.	Mono (Single) Crystalline 2.5V, 120mA
Rechargeable Battery	Anti-heat Lithium Iron Phosphate (LiFePO ₄) 3.2V, 1000-1500mAh
LED Chip, Min.	6mm
Gradient on LED Sides	30 degrees
Operating Temperature	-20°C to 65°C
Compression Test, Min.	30 Tons

Table 607(3).2 Specifications

607(3).2.2 Adhesive

Any approved two-part epoxy adhesive shall be used in the installation of the internally illuminated (solar) pavement levelled markers/studs.

607(3).3 Construction Requirements

The markers/studs shall be installed into the pavement in accordance with the manufacturer's instructions but shall also comply with the specified requirements.

Holes in the pavement shall be true to size of the marker/stud and shall be cleanly cut using appropriate coring equipment. Holes shall be clean and free from all dirt, dust, oil, grease, laitance, or any other materials, which would prevent bonding, prior to application of adhesive. No adhesive shall be applied when the weather is foggy or rainy.

Placing and positioning of the marker/stud shall be by means of rubber mallet until the top surface is flushed with the pavement and with the main directional LED light parallel to the centerline of the road. Excess adhesive displaced during the placing and positioning of the markers/studs shall be wiped clean and no adhesive shall be left exposed on the surface of the pavement.

Traffic shall be kept off the newly installed markers/studs for a period of at least 2 hours or until such time that the adhesive has sufficiently cured as determined by the Engineer.

607(3).3.1 Markings

Product marking (Manufacturer or applicable abbreviation and approval number) shall be clear and firm by way of not erasing easily and to be seen easily for road studs.

607(3).3.2 Warranty

The Contractor shall obtain from the manufacturer a one-year warranty for satisfactory field performance including stipulated luminous intensity of the LED and battery back-up capacity and submit the same to the Engineer.

607(3).4 Method of Measurement

The quantity of internally illuminated (solar) pavement levelled markers/studs to be paid for shall be the number of internally illuminated (solar) pavement levelled markers/studs of monodirectional or uni-directional type, bi-directional type and omni-directional type, whichever is called for in the Contract, installed complete and accepted.

607(3).5 Basis of Payment

The quantities measured as described in Section 607(3).4, Method of Measurement, shall be paid for at the Contract Unit Price of the Pay Items shown in the Bid Schedule, which payment shall constitute full compensation for furnishing and placing all materials, drilling of holes, preparation of surfaces, applying adhesive and for all labor, equipment, tools and incidentals necessary to complete the Item.

Payment shall be made under:

Pay Item Number	Description	Unit of Measurement
607 (3)a.1	Internally Illuminated (Solar) Pavement Levelled Marker/Stud Flush Type (Mono-directional or Uni- directional), 123mm dia.	Each
607 (3)a.2	Internally Illuminated (Solar) Pavement Levelled Marker/Stud Flush Type (Mono-directional or Uni- directional), 143 mm dia.	Each
607 (3)b	Internally Illuminated (Solar) Pavement Levelled Marker/Stud Flush Type (Bi-directional)	Each
607 (3)c	Internally Illuminated (Solar) Pavement Levelled Marker/Std Flush Type (Omni-directional)	Each

References:

1. International Electrotechnical Commission (TEC)

- IEC 60529, Degrees of protection provided by enclosures (IP Code)
- 2. European Standard (EN)
 - EN 55015, Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
 - EN 61547, Equipment for genera/ lighting purposes EMC immunity requirements
- 3. DPWH Standard Specification for Highways, Bridges, and Airports
- 4. CTC Builder & Supplies Incorporated; Road Devices & Equipment Corporation (Exclusive Distributor in the Philippines) / Green & Innovation (GU) Tech Co. Ltd (Korean Counterpart/Manufacturer/Principal)
- 5. Crownmix Corporation (Exclusive Distributor in the Philippines) / Miracle Ind. Co. Ltd (Korean Counterpart/Manufacturer/Principal)
- 6. Technoshine Trading International