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DEPARTMENT ORDER )

NO. **158** )  
Series of 2015 *10-16-N* )

REPUBLIC OF THE PHILIPPINES  
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS  
OFFICE OF THE SECRETARY  
MANILA

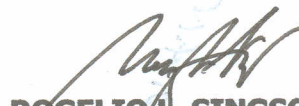
897.13 DPWH  
10-16-20 N

**SUBJECT: Amendments to DPWH Standard Specification for Item 605 – Road Sign**

In line with the mandate of the Department in providing effective standard specifications in the implementation of various infrastructure projects and in view of the need of setting amendments to standard specification for material requirements of Road Signs, the attached **Amendments to DPWH Standard Specification for Road Sign, Item 605** is hereby prescribed, for the guidance and compliance of all concerned.

The Specification shall form part of the revised 2012 edition of the DPWH Standard Specifications (Volume II – Highways, Bridges and Airports).

This Order supersedes Department Order No. 102, series of 2013 and shall take effect immediately.

  
**ROGELIO L. SINGSON**  
Secretary

Department of Public Works and Highways  
Office of the Secretary



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5.5.2 FET/JFS

## **DPWH STANDARD SPECIFICATION FOR ITEM 605 – ROAD SIGN**

### **605.1 Description**

This Item shall consist of furnishing and installing road signs in accordance with this Specification and at the locations shown on the Plans, or as required by the Engineer.

The road signs shall comply in all respects with the DPWH Highway Safety Design Standards Part 2: Road Signs and Pavement Marking Manual (May 2012) published by the DPWH. The categories of road signs are designated in the Manual, namely, danger warning signs, regulatory signs and informative signs, or guide signs. These are referred to in the Contract as warning signs and informatory signs.

Road signs shall be classified as standard or non-standard. Standard signs consist of all warning signs, regulatory signs and informatory signs with the exception of direction signs, place identification signs and the line. Non-standard signs consist of all informatory signs which are not classified as standard signs.

The size of warning and regulatory signs is the length of the side of triangular signs (measured from the points of intersection of the extension of the edges), the horizontal width of octagonal signs and the diameter of circular signs.

### **605.2 Material Requirements**

#### **605.2.1 Sign Panels**

Sign panels for warning, regulatory, and informatory signs shall be manufactured from aluminum sheeting at least 3 mm thick that conforms to the requirement of ASTM B 209 or 6061 – T6 aluminum.

#### **605.2.2 Tensile Properties of Material**

Limits – The sheet and plate shall conform to the applicable requirements for tensile properties of ASTM B 209M for heat-treatable alloys.

Number of Specimens – One sample shall be taken from each end of each parent coil, or parent plate, but no more than one sample per 1000 kg of sheet or 2000 kg of plate, or part thereof, in a lot shall be required.

Test Specimens – Geometry of test specimens and the location in the product from which they are taken shall be as specified in Test Methods B 557.

Test Methods – The tension test shall be made in accordance with Test Methods B 557.

#### **605.2.3 Bend Properties of Material**

Limits – Sheet and plate shall be capable of being bent cold through an angle of 180° around a pin having a diameter equal to N times the thickness of the sheet or plate without cracking, the value of N as prescribed in Table 1 based on ASTM B 209M for the different alloys, tempers, and thicknesses. The test need not be conducted unless specified on the purchase order.

**Test Specimens** – When bend tests are made, the specimens for sheet shall be the full thickness of the material, approximately 20 mm in width, and when practical, at least 150mm in length. Such specimens may be taken in any direction and their edges may be rounded to a radius of approximately 2mm. For sheet less than 20 mm in width, the specimens should be the full width of the material.

**Test Methods** – The bend tests shall be made in accordance with the Test Method in ASTM B 290M except as stated otherwise in 605.2.3, Test Specimens.

### 605.2.4 Retroreflective Sheeting

The retroreflective sheeting shall conform to the requirements of ASTM D 4956.

The retroreflective sheeting used on the signs shall consists of white or colored sheeting having a smooth outer surface which has the property of retroreflection over its entire surface. It shall be weather resistant and exhibit color fastness. It shall be new and unused or show no evidence of cracking, scaling and pitting, blistering, edge lifting or curling and shall have negligible shrinkage or expansion.

A certificate of having a sheeting tested for coefficient of retroreflection, day time color and luminance, shrinkage, flexibility, liner removal, adhesion, impact resistance, specular gloss and fungus resistance, 3 years outdoor weathering and its having passed these result shall be obtained from reputed International Laboratory by the manufacturer of retroreflective sheeting strictly as per ASTM D 4956.

A retroreflective sheeting typically manufactured as an unmetallized cube corner microprismatic retroreflective element material. The retroreflective surface after cleaning with soap and water in dry condition shall meet or exceed the minimum coefficient of retroreflection as per Type VIII, IX and XI of ASTM D 4956 as indicated in Table 1.

**Table 1- Minimum Coefficient of Retroreflection ( $R_A$ )**

Sheeting Type	Minimum Coefficient of Retroreflection( $R_A$ ,cd/ft <sup>2</sup> (cdlx <sup>-1</sup> m <sup>-2</sup> )											
	Observation Angle	Entrance Angle	White	Yellow	Orange	Green	Red	Blue	Brown	Fluorescent Yellow-Green	Fluorescent Yellow	Fluorescent Orange
VIII	0.1 <sup>a,b</sup>	-4°	1000	750	375	100	150	45	30	800	600	300
	0.1 <sup>a,b</sup>	+30°	460	345	175	46	69	21	14	370	280	135
	0.2°	-4°	700	525	266	70	106	32	21	560	420	210
	0.2°	+30°	325	245	120	33	49	15	10	260	200	95
	0.5°	-4°	250	190	94	25	38	11	7.5	200	150	75
	0.5°	+30°	115	86	43	12	17	5.0	3.5	92	69	35
	1.0°	+30°	45	34	16	5.0	7.0	2.0	1.0	36	27	14
IX	0.1 <sup>a,b</sup>	-4°	660	500	250	66	130	30	30	530	400	200
	0.1 <sup>a,b</sup>	+30°	370	280	140	37	74	17	17	300	220	110
	0.2°	-4°	380	285	145	38	76	17	17	300	230	115
	0.2°	+30°	215	162	82	22	43	10	10	170	130	65
	0.5°	-4°	240	180	90	24	48	11	11	190	145	72
	0.5°	+30°	135	100	65	14	27	6.0	6.0	110	81	41
	1.0°	+30°	80	60	30	8.0	16	3.6	3.6	64	48	24
XI	0.1 <sup>a,b</sup>	-4°	830	620	290	83	125	37	25	660	500	250
	0.1 <sup>a,b</sup>	+30°	325	245	115	33	50	15	10	260	200	100
	0.2°	-4°	580	435	200	58	87	26	17	460	350	175
	0.2°	+30°	220	165	77	22	33	10	7.0	180	130	66
	0.5°	-4°	420	315	150	42	63	19	13	340	250	125
	0.5°	+30°	150	110	53	15	23	7.0	5.0	120	90	45
	1.0°	+30°	120	90	42	12	18	5.0	4.0	96	72	36

<sup>a</sup> Minimum Coefficient of Retroreflection( $R_A$ ) cd/ft<sup>2</sup>(cd lx<sup>-1</sup>m<sup>-2</sup>)

<sup>b</sup> Values for 0.1° observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order.

### **605.2.5 Posts and Frames**

Wide flange posts and frames shall be fabricated from structural steel conforming to ASTM A 283 Grade D. In lieu of wide flange steel posts, the Contractor may use tubular steel posts conforming to ASTM A 501. All posts shall be thoroughly cleaned, free from grease, scale and rust and shall be given two coats of international orange CMYK: 0, 72, 77, and 24.

### **605.2.6 Bracket Railing/Stiffener**

Bracket railing/ stiffener shall be made of aluminum-alloy 6063 – T5 or higher that conforms to the requirement of ASTM B 221, and other ASTM designation as applies.

### **605.2.7 Other Aluminum Materials**

All other aluminum parts (nuts, bolts, washer, bracket, etc.) specified in the plan shall be made of 2024-T4 aluminum or 6061-T6 aluminum or higher conforms to the requirement of ASTM B221, and other ASTM designation as applies.

### **605.2.8 Application Technique**

**605.2.8.1** Surfaces and edges to be welded shall be smooth, uniform, and free from fins, tears, cracks and other discontinuities that would adversely affect the quality or strength of the weld. Members to be joined may be cut to shape and size by machining, shearing, sawing, plasma arc cutting, planing, milling, routing, or grinding. For heat treatable aluminum alloys to be welded, 1/8 in. of material shall be removed from plasma arc edges by machining or other mechanical means. This welding procedure shall govern the welding of components to the requirements of AWS D1.2, Structural Aluminum.

**605.2.8.2** Bond strength is dependent upon the amount of adhesive-to-surface contact developed. Firm application pressure and moderate heat, will assist the adhesive in developing intimate contact with the bonding surface. To obtain optimum adhesion performance, the bonding surfaces must be clean, dry, free of grease oil and well unified.

### **605.2.9 Mounting**

The bracket railing shall be mounted to the signboard using requirements of AWS D1.2 as shown on the plan.

### **605.2.10 Concrete Foundation Blocks**

The concrete for the foundation blocks shall Class A, Structural Concrete and shall be of the size shown on the Plans.

## **605.3 Construction Requirements**

### **605.3.1 Excavation and Backfilling**

Holes shall be excavated to the required depth to the bottom of the concrete foundation as shown on the Plans.

Backfilling shall be carried out by using material approved by the Engineer and shall be compacted in layers not exceeding 150 mm in depth. Surplus excavated material shall be disposed of by the Contractor as directed by the Engineer.

### **605.3.2 Erection of Posts**

The posts shall be erected vertically in position inside the formwork of the foundation block prior to the placing of the concrete and shall be adequately supported by bracing to prevent movement of the post during the placing and setting of concrete. The posts shall be located at the positions shown on the Plans.

### **605.3.3 Sign Panel Fabrication/Installation**

#### **605.3.3.1 Fabrication of Sign**

The sign panel shall be effectively prepared to receive the retroreflective sheeting. This sign panel shall be de-greased either by acid or hot alkaline etching and all scale/dust are removed to obtain a smooth plain surface before the application of retroreflective sheeting. If the surface is rough, approved surface primer may be used. After cleaning, it should not be handled, except by suitable device or clean canvas gloves, between all cleaning and preparation operation and application of reflective sheeting/primer. There shall be no opportunity for sign panel to come in contact with grease, oil or other contaminants prior to the application of retroreflective sheeting. The material shall cover the sign surface evenly and shall be free from twists, cracks and folds. Cut outs to produce legends, letters and borders shall be bonded with the sheeting in the manner specified by the retroreflective sheeting manufacturer.

The messages (legends, letters, numerals, etc.) and borders shall be cut outs from the same type of reflective sheeting. Screen printing shall be processed and finished with materials and in a manner specified by retroreflective sheeting manufacturer. For the informatory and other sign boards, the messages (legends,/letters/numerals, etc.) and borders shall be strictly cutouts from the same reflective sheeting only except those in black which shall be of non-reflective opaque film.

#### **605.3.3.2 Installation**

Sign panels shall be installed in accordance with the details shown on the Plans. Any chipping or bending of the sign panels shall be considered as sufficient cause to require replacement of the panels at the Contractor's expense.

All newly erected traffic road signs shall be covered until ordered removed by the Engineer.

### **605.4 Method of Measurement**

The quantities of standard reflective warning and regulatory road signs shall be the number of such signs of the size specified, including the necessary posts and supports erected and accepted.

The quantities for standard reflective informatory signs and non-standard reflective informatory signs shall be the number of such, including the necessary posts and supports, erected and accepted.

### **605.5 Basis of Payment**

The quantities as determined in Section 605.4, Method of Measurement, shall be paid for at the contract unit price for the Pay Items shown in the Bid Schedule which price and payment shall be full compensation for furnishing and installing road signs, for excavation, backfilling and construction of foundation blocks, and all labor, equipment, tools and incidentals necessary to complete the Item.

Payment will be made under:

Pay Item No.	Description	Unit of measurement
605 (1)	Warning Signs	Each
605 (2)	Regulatory Signs	Each
605 (3)	Informatory Signs	Each

### **References:**

1. DPWH Standard Specifications for Highways, Bridges and Airports, Volume II, 2012 Edition
2. American Society for Testing Materials (ASTM)
  - ASTM B 209M – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
  - ASTM B 557 – Standard Test Methods for Tension Testing Wrought and Cast Aluminum and Magnesium Alloy Products
  - ASTM D 4956 – Standard Specification for Retroreflective Sheeting for Traffic Control
  - ASTM A 283M – Low and Intermediate Tensile Strength Carbon Steel Plates
  - ASTM A 501M – Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
  - ASTM B 221M – Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire Profiles and Tubes
3. DPWH Highway Safety Design Standards Part 2: Road Signs and Pavement Markings Manual (May 2012)