

097.13 DPWH
08-31-2017



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

29 AUG 2017

DEPARTMENT ORDER)
No. **106**)
Series of 2017)
28.8.17

SUBJECT : DPWH Standard Specification on
Item 1051 – Railings

In order to provide specifications for railings which are specified in Department Order No. 05, Series of 2017 [*Revised Standardized Pay Items of Works for Civil Works Construction for Infrastructure Projects*], and also, in line with the mandate of the Department in providing effective Standard Specifications in the implementation of various infrastructure projects, the attached **DPWH Standard Specification for Item 1051 - Railings** is hereby prescribed, for the guidance and compliance of all concerned.

This specification shall form part of the on-going revision of the DPWH Standard Specifications for Public Works Structures - Buildings, Ports and Harbors, Flood Control and Drainage Structure and Water Supply Systems, Volume III, 1995 Edition.

This Order shall take effect immediately.


MARK A. VILLAR
Secretary

14.1.2 FET/RGT

Department of Public Works and Highways
Office of the Secretary



WIN7U01505

DPWH Standard Specification for ITEM 1051 – RAILINGS

1051.1 Description

This Item shall consist of furnishing, fabricating and installing the railings for buildings and other similar structures of the material or combination of materials in accordance with this Specification and in conformity with the Plans.

Railings shall be classified as concrete, wooden, masonry, stone, metal, stainless steel and glass, in accordance with the predominating material contained in each.

Railing shall not be considered a part of the structural system of the building unless it is stated in the design.

1051.2 Material Requirements

1051.2.1 Concrete

It shall conform to the applicable requirements prescribed in Section 900.2 Material Requirements of Item 900, Reinforced Concrete.

1051.2.2 Forms and Falseworks

It shall conform to the applicable requirements prescribed in Section 414.2 Material Requirements of Item 903, Formworks and Falseworks.

1051.2.3 Lumber, Plywood and Other Related Materials

It shall conform to the applicable requirements prescribed in Section 1003.2 Material Requirements of Item 1003, Carpentry and Joinery Works.

1051.2.4 Hardware

This shall conform to the applicable requirements prescribed in Section 1004.2 Material Requirements of Item 1004, Hardware.

1051.2.5 Masonry

These shall conform to the requirements of Section 1046.2 Material Requirements of Item 1046, Masonry Works.

1051.2.6 Mortar

Mortar shall consist of sand, cement and water conforming to the requirements of Item 405, Structural Concrete, mixed in the proportion of one (1) part cement to three (3) parts sand by volume, and sufficient water to obtain the required consistency.

1051.2.7 Reinforcing Steel

It shall conform to the requirements of Subsection 900.2.4, Metal Reinforcement of Item 900, Reinforced Concrete.

1051.2.8 Stone

The stone shall be clean, hard, and durable and shall be subjected for the Engineer's approval. Adobe stone shall not be used unless otherwise specified.

1051.2.9 Metal

Steel base metal to be welded shall be open-hearth or electric furnace steel conforming to AASHTO M 183 unless otherwise shown on the approved Plans.

1051.2.10 Stainless Steel (Non-Ferrous Metal)

It shall conform to the requirements of ASTM A 276 M, Standard Specification for Stainless Steel Bars and Shapes or as called for in the Plans.

1051.2.11 Glass and Glazing

It shall conform to the applicable requirements prescribed in Section 1012.2 Material Requirements of Item 1012, Glass and Glazing.

Glass shall be laminated, heat strengthened, and tempered unless otherwise indicated in the plans. If laminated glass were called for in the Plans it shall conform to ASTM Specification C 1048, Standard Specification for Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass and ASTM Specification C 1172, Standard Specification for Laminated Architectural Flat Glass. The minimum thickness of glass shall be six (6) mm unless otherwise indicated in the Plans.

If glass is intended for exterior railing in-fill panels, it shall comply to the following:

1. Test shall be in accordance with ASTM E 2353-06, Standard Test Methods for Performance of Glass in Permanent Glass Railing Systems, Guards & Balustrades. The said standard evaluates static strength, impact resistance, and post-break retention.

2. Railing systems shall be in accordance to ASTM E 2358-04, Standard Specification for the Performance of Glass in Permanent Glass Railing Systems, Guards, and Balustrades. These systems include glazing in-fill, as well as structural glass railing types. The four (4) levels of performance are shown below.

Performance Level	ASTM E 935 (Structural ^A) (Minimum)	ANSI Z97.1 (Safety Impact ^B) (Minimum)
1	Concentrated load: 890 N Uniform Load: 290 N/m Infill Horizontal Load: 220 N	Pass 230 J
2	Concentrated load: 890 N Uniform Load: 730 N/m Infill Horizontal Load: 220 N	Pass 542 J
3	Concentrated load: 1330 N Uniform Load: 730 N/m Infill Horizontal Load: 220 N	Pass 542 J
4	Concentrated load: 1620 N Uniform Load: 880 N/m Infill Horizontal Load: 220 N	Pass 542 J

^ATests performed as outlined in ASTM E 935, Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.

^BTests performed as described in ANSI Z97.1 2015, For safety glazing materials used in buildings - safety performance specifications and methods of test.

1051.2.12 Aluminum

It shall conform to the requirements of AASHTO M 193, Standard Specification for Cast Aluminum Alloy Railings Posts, ASTM B 221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes or ASTM B 308 - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles or as called for in the Plans.

1051.2.13 Painting, Varnishing and Other related works

These shall conform to the applicable requirements prescribed in Section 1032.2, Material Requirements of Item 1032, Painting, Varnishing and Other Related Works.

1051.3 Construction Requirements

1051.3.1 General

Railings shall be constructed in accordance with the Plans and shall not reflect any unevenness in the structure/ building. All railing posts shall be set plumb unless otherwise indicated in the Plans.

1051.3.2 Concrete Railing

Concrete railing shall be constructed in accordance with the requirements of Subsection 900.3 Construction Requirements of Item 900, Reinforced Concrete.

1051.3.2.1 Railing Cast-In-Place

Forms shall be secured to be smooth and tight fitting which can be rigidly held in line and grade and removed without damage to the casted concrete structure.

Forms shall either be of single width boards or shall be lined with suitable material to have a smooth surface which shall meet the approval of the Engineer or as shown in the Plans.

All moldings, panel work and bevel strips shall be constructed according to the detailed Plans with mitered joints. All corners in the finished work shall be true, sharp and clean cut, and shall be free from cracks, spalls, honeycombs and other defects.

1051.3.2.2 Precast Railings

Moist tamped mortar precast members shall be removed from the molds as soon as it is practicable and shall be kept damp for a period of at least ten (10) days. Any member that shows cracking of soft corners of surfaces shall be rejected.

1051.3.3 Wooden Railing

The construction requirements shall be in conformance, whenever applicable, with Section 1003.3.1 Quality of Materials of Item 1003, Carpentry and Joinery Works.

1051.3.4 Masonry Railing

The construction requirements shall be in conformance, whenever applicable, with Section 1003.3.1 Quality of Materials of Item 1003, Carpentry and Joinery Works.

1051.3.5 Stone Railing

The maximum projection of stones beyond the pitch lines shall not be more than 50 mm.

1051.3.6 Metal Railing

The metal railing shall be fabricated in accordance with the dimensions shown on the approved Plans. In case of welded railings, all exposed joints shall be finished by grinding or filing after welding to give a neat appearance. Welding may be substituted for rivets or bolts with the approval of the Engineer.

1051.3.7 Stainless Steel Railing

The metal railing shall be fabricated in accordance with the dimensions shown on the Plans. During installation, stainless steel railing shall be free from rust and surface blemish. It shall be rust free until ten (10) years after completion.

1051.3.8 Glass Railing

The construction requirements shall be in conformance, whenever applicable, with Section 1012.3 Construction Requirements of Item 1012, Glass and Glazing

1051.4 Method of Measurement

The quantity to be paid for shall be the number of linear meters of specified railing materials and sizes or by Lump Sum for actually completed and accepted measured from center to center of end posts as shown on the Plans or as directed by the Engineer.

1051.5 Basis of Payment

The accepted quality, measured as prescribed in Section 1051.4, shall be paid for at the contract unit price for Railing, which price and payment shall be full compensation for furnishing and placing all materials including all labor, equipment, tools and incidentals necessary to complete this Item.

Payment shall be made under:

Pay Item Number	Description	Unit of Measurement
1051 (1) <u>a</u>	Railing	Meter
1051 (1) <u>b</u>	Railing	Lump Sum
1051 (2) <u>a</u>	Concrete Railing, Standard	Meter
1051 (2) <u>b</u>	Concrete Railing, Baluster	Meter
1051 (2) <u>c</u>	Concrete Railing, Parapet	Meter
1051 (3)	Wooden Railing	Meter
1051 (4)	Stone and Brick Railing	Meter
1051 (5)	Metal Railing	Meter
1051 (6)	Stainless Steel Railing	Meter
1051 (7)	Glass Railing	Meter

REFERENCES:

1. ASTM A 276 M - Standard Specification for Stainless Steel Bars and Shapes
2. ASTM Specification C 1048 - Standard Specification for Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass
3. ASTM Specification C 1172 - Standard Specification for Laminated Architectural Flat Glass
4. ASTM E 2353 16 - Standard Test Methods for Performance of Glazing in Permanent Railing Systems, Guards, and Balustrades
5. ASTM E 2358-04, Standard Specification for the Performance of Glass in Permanent Glass Railing Systems, Guards, and Balustrades
6. ASTM E 935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings
7. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
8. ASTM B 308 - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles
9. AASHTO M 193 – Standard Specification for Cast Aluminum Alloy Railings Posts
10. ANSI Z97.1-2015 - For safety glazing materials used in buildings - safety performance specifications and methods of test
11. DPWH Standard Specification for Highways, Bridges and Airports Volume II, 2012 Edition
12. DPWH Standard Specification for Public Works Structures Volume III, (Buildings, Ports and Harbors, Flood Control and Drainage Structures and Water Supply Systems)
13. Website www.glasswebsite.com. (30-March-2017 14:00 MT) - Glass Association of North America (GANA)
14. Website www.lta.gov.sg (16-April-2017 11:00 MT) Singapore - Materials and Workmanship Specification For Architectural Works