

1. General Description

1-1 Overview

HISHITANK™ G Panel Type is a GRP panel sectional tank for which the design, purchase of raw materials, manufacturing, and shipment are all handled by MITSUBISHI CHEMICAL INFRATEC. Quality control of HISHITANK™ G Panel Type is in accordance with ISO 9001. HISHITANK™ G Panel Type meets the “Public Building Construction Standard Specifications (Machinery Edition)” Supervised by the Government Buildings Department, Minister’s Secretariat of MLIT.

1-2 Panel Specifications

1-2-1 Forming Method

Panels used for HISHITANK™ G Panel Type are formed by pressing SMC (sheet molding compound), a combination of unsaturated polyester resin (JIS K 6919) and alkali-free roving glass (JIS R 3412), which is heated to approximately 140°C into shapes in a mold. FRP panels are ivory in color. There are two types of panels; single panels and composite panels. A heat insulating material is attached to FRP panels at the manufacturer’s plant to form composite panels.

1-2-2 Panel Size and Thickness

HISHITANK™ G Panel Type is a water tank comprising a combination of panels of 0.5 m × 0.5 m, 0.5 m × 1.0 m, 0.5 m × 1.5 m, 0.5 m × 2.0 m, 1.0 m × 1.0 m, 1.0 m × 1.5 m, and 1.0 m × 2.0 m in size. The thickness of an FRP panel is 3 mm to 15 mm.

1-2-3 Manhole

A manhole panel is a 1.0 m × 1.0 m FRP panel having an opening of φ 600 mm in its center. For sanitary reasons, Manhole opening raise 100mm from roof panel surface to prevent water and other contaminants from getting inside, and the tank is sealed by a gasket between the lid and the opening. The manhole lid, which is attached with hinges, is detachable.

1-2-4 Reinforcement Specifications

The reinforcement specifications of HISHITANK™ G Panel Type are as follows:

3 mH or smaller: An External reinforcement structure having a Box-frame structure with sidewall reinforcement, steel footing, and ceiling reinforcement without stainless sag rods in the tank

3.5 mH to 4.0 mH: An internal reinforcement system in which the intersections of the panels of opposing sidewalls are pulled together with stainless sag rods

1-3 Steel (or Metal) Parts

The external reinforcement member is formed by hot dip galvanizing (JIS H 8641 HDZ40) an SS400 (JIS G 3101) or SM490 (JIS G 3106). There are two types of Panel fastening bolts: hot dip galvanized bolts and stainless bolts. While a hot dip galvanized bolt is made by hot dip galvanizing (JIS H 8641 HDZ35) a steel hexagon bolt, a stainless bolt is a hexagon bolt made of SUS304 (A2) or SUS316 (A4).

1-4 Gaskets

The gaskets used for HISHITANK™ G Panel Type meet the leaching standards of the Water Supply Act (EPDM) or that comply with BS6920 (silicon or PVC).

1-5 Heat Insulating Material

HISHITANK™ G Panel Type having a composite-panel structure is formed by applying additional coats of polystyrene foam to a well-insulated GRP panel and covering it with a beautiful synthetic-resin exterior panel for excellent weatherability. The heat insulating material is attached to the GRP panels at the manufacturer’s plant before shipment. The thickness of the heat insulating material is 6 mm to 40 mm (average 25 mm).

1-6 Foundation and Base

1-6-1 Outline of the Foundation Design

The foundation shall be continuous foundation and have adequate strength. The foundation surface shall be level.

The recommended foundation shape is as follows:

Foundation height	500mm
Foundation width	300mm
Foundation length	Tank width and length + 200 mm
Inner dimension of foundation	1700 mm or less

1-6-2 Outline of the Base Design

HISHITANK™ G Panel Type tanks are reinforced by tank reinforcement members and an Steel (or Metal) frame base underneath. The base is required to be formed in a parallel cross formation designed by the manufacturer.

1-7 Design Conditions

The design conditions of HISHITANK™ G Panel Type are as follows:

Hydrostatic pressure	Water level (m) × 0.01 Mpa {0.1 kgf/cm ² }
Design water level	Tank height (nominal height) × 0.9
Snow accumulation	0.6 × 10 ⁻³ Mpa {60 kgf/m ² }
Wind pressure	1160 N/m ²
Roof load	Short term central load per panel: 80 kg
Inlet water temperature	Ordinary temperature
Water quality	pH: 5.8 to 8.6
Illumination factor	0.1% or less
Weatherability	Since the roof is exposed to ultraviolet light when installed outdoors, better weatherability is provided by inserting non-woven fabric into the roof panel.

1-8 Physical Properties

The physical properties of the FRP panels of HISHITANK™ G Panel Type tanks are as follows:

Item	Test value	Testing standard
Tensile strength	113MPa	JIS K 6911
Tensile elastic modulus	13.9GPa	JIS K 7161
Bending strength	180Mpa	JIS K 6911
Bending elastic modulus	14.5GPa	JIS K 6911
Barcol hardness	52	JIS K 7060
Glass fiber content	37.7%	JIS K 7052
Specific gravity	1.87	JIS K 6911
Water absorption rate	0.078%	JIS K 7209
Compressive strength	340MPa	JIS K 6911
Interlaminar shearing stress	20.2MPa	JIS K 7057
Transverse shear strength	85.0MPa	JIS K 7058
Poisson ratio	0.41	JIS K 7161

* The data are actual values of the samples and are not a guarantee level.

1-9 Construction

HISHITANK™ G Panel Type tanks must be assembled by a builder that has received proper guidance from the manufacturer.

1-10 Certifications

HISHITANK™ G Panel Types have one or more of the following certifications.

“Public Building Construction Standard Specifications (Machinery Edition)” Supervised by the Ministry of Land, Infrastructure, Transport and Tourism.

Singapore Standard 245

Singapore Standard 375

WRAS (Water Regulations Advisory Scheme) Material Approval

WRAS (Water Regulations Advisory Scheme) Product Approval

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