Summary of specification data - ALPOLIC®/fr TCM
Titanium Composite Material

1. General

ALPOLIC®/fr TCM is a titanium composite material with a non-combustible mineral-filled core, used as an exterior cladding and roof covering on new buildings and retrofit applications. The material is manufactured by Mitsubishi Plastics, Inc., and furnished by approved dealers or distributors.

Note: Specification data may be changed in part without affection of material quality.

2. Product composition

ALPOLIC/fr TCM is composed of a non-combustible mineral-filled core sandwiched between 0.3mm thick titanium sheet on the topside and 0.3mm thick stainless steel sheet on the backside:

Composition

Topside skin material;	0.3mm thick pure titanium for industrial use, JIS Class 1 or equivalent
Core material;	Non-combustible mineral filled core
Backside skin material;	0.3mm thick stainless steel, NSSC 220M, a highly rust-resistant ferric stainless steel

The core has the same contents as the established fire-retardant core of ALPOLIC/fr. The titanium surface is protected with a self-adhesive peel-off protective film consisting of two polyethylene layers of white and black. According to weathering tests under normal outdoor conditions, the protective film will withstand six months' exposure without losing its original peel-off characteristic or causing stains or other damages.

3. Surface finish

Dull finish

4. Product dimension and tolerance

(1) Panel thickness: 4 mm

(2) Panel size: Width = 1000 mm [Note]

Length = less than 5000 mm

Note: 1219mm wide product is available upon request. Contact local distributors or our office.

(3) Product tolerance

Width:	±2.0 mm
Length:	±4.0 mm
Thickness:	±0.2 mm
Bow:	Maximum 0.5% (5mm/m) of the length or width

Square-ness (diagonal difference): Maximum 5.0 mm

5. Principal properties

(1) Panel weight: 9.3 kg/m^2

(2) Thermal expansion: 10.4×10^{-6}/°C

(3) Deflection temperature (ASTM D648): 112°C

(4) Sound transmission loss (ASTM E413): 25 STC (Sound Transmission Class)

(5) Mechanical properties of TCM

a. Tensile strength (ASTM E8): 69 MPa or N/mm^2
b. 0.2% proof stress (ASTM E8): 60 MPa or N/mm^2
c. Elongation (ASTM E8): 11.1 %
d. Flexural elasticity, E (ASTM C393): 49.0 GPa or kN/mm^2
e. Flexural rigidity, E×I, (ASTM C393): 265 $kNmm^2/mm$

(6) Mechanical properties of skin metals:

	Titanium, topside	Stainless steel, backside
a. 0.2% proof stress (ASTM E8):	162 MPa or N/mm^2	295 MPa or N/mm^2
b. Flexural elasticity (ASTM E8):	106 GPa or kN/mm^2	201 GPa or kN/mm^2

6. Fire performance

In Japan, TCM is approved as a non-combustible material for exterior and interior uses, based on the fire test results of the heat release test (ISO 5660-1) and the gas toxicity test. The tests done in accordance with the UK and USA standards are only general tests for building materials, but TCM is virtually approved as an eligible material for external claddings and roof coverings in most countries on the basis of the extensive fire test results on ALPOLIC/fr. TCM 4mm has passed the following fire tests.

Country	Test standard	Result & Classification
U.K.	BS476 Part 6 BS476 Part 7	Class 0 Class 1
U.S.A.	Tunnel test (ASTM E-84)	Class A/Class 1
Japan	Heat release test (ISO 5660-1) & gas toxicity test	Non-combustible material. Certificate No. NM-0229

7. General notes

(1) Processing method

The machinability of titanium and stainless steel is low. Therefore, we need special machines and tools for cutting and grooving TCM panels. Use a square shear or a CNC router for cutting, and use a CNC router or a V-cut machine (planer) for grooving. Refer to the fabrication manual for details.

(2) Prevention of galvanic corrosion

Titanium and stainless steel belong to the noble metal in corrosion potential. If dissimilar metals are used for assembling TCM panels, the corrosion of the less noble metal may be accelerated with galvanic corrosion under moist circumstances. Use stainless steel rivet and stainless steel bolt/nut for joining. Use stainless steel angle and flange for accessory, if possible. When aluminum extrusions are used for accessory, insulate the aluminum surface electrically with anodizing or coating.

(3) Color variation among production lots

It is possible that the color of TCM slightly varies among production lots and the inconsistent color is visible after installation. This is caused by the slight color difference between titanium coils. In order to prevent this problem, we recommend placing the total requirement in one order or allotting the panels with adequate grouping arrangement.

For further information, please contact:

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