

## Summary of Technical Data Sheet – ALPOLIC™/fr

### 1. General

ALPOLIC™/fr is an aluminum composite material (ACM) with a fire-retardant core, suitable for exterior or interior claddings and roof covering in new buildings and retrofit applications. The ALPOLIC/fr material is manufactured by Mitsubishi Chemical Infratec Co., Ltd. and is furnished by approved distributors and authorised dealers.

**Note:** Technical data may be changed in part without affecting the material quality.

### 2. Product composition

ALPOLIC/fr is composed of a fire-retardant core sandwiched between two skins of 0.5mm thick aluminum alloy:

Composition	Skin material:	0.5mm thick aluminum alloy (3005-H14 or 3105-H14)
	Core material:	mineral-filled fire-retardant core

ALPOLIC/fr consists of approximately 70% of mineral ingredients within the core material. The core contains a trace of carbon black additives that improves its durability.

The surface is finished with a high-performance Lumiflon™-based fluoropolymer coating as standard. ALPOLIC/fr is available in finishes of: Solid Colors, Metallic Colors, Sparkling Colors, Prismatic Colors, Patterns, Matte Colors and Premium Aluminum series. In these finishes, Lumiflon-based fluoropolymer paints are applied in manufacturer's continuous coil coating lines.

The back side of ALPOLIC/fr, which will face the structural wall or steel when it is installed as a cladding panel, has a polyester-based wash coating or a service coating to protect it from possible corrosion problems.

The surface is protected with a co-extruded (white/black) removable, self-adhesive protection film. 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. Product dimension and tolerance

(1) Panel thickness: 3 mm, 4 mm and 6 mm

(2) Panel size: Width = 965, 1270 and 1575 mm, Length = less than 7200 mm

**Note:** Custom width can be accepted between 914 mm and 1620 mm subject to minimum quantity. Please contact local distributors or our office. Premium Aluminum series Gold and Copper are available maximum 1270 mm width. Consult panel width in case of Premium Aluminum hairline finishes.

(3) Product tolerance

Width:  $\pm 2.0$  mm

Length:  $\pm 1.0$  mm/ m

Thickness:  $\pm 0.2$  mm in 3 and 4 mm thick,  $\pm 0.3$  mm in 6 mm thick

Bow: Maximum 0.5% (5mm/m) of the length or width

Square-ness (diagonal difference): Maximum 5.0 mm

Surface defect: The surface shall not have any irregularities such as roughness, buckling and other imperfections in accordance with our visual inspection rules. ALPOLIC/fr is supplied with a cut edge and without aluminum sheet displacement or core protrusion.

**4. Principal properties**

ALPOLIC/fr has the following properties in common.

(1) Panel weight:

	Unit	3mm	4mm	6mm
Panel weight	kg/m <sup>2</sup>	6.0	7.6	10.9

(2) Thermal expansion:

	Unit	3mm	4mm	6mm
Thermal expansion (ASTM D696)	1/°C	$22 \times 10^{-6}$	$23 \times 10^{-6}$	$22 \times 10^{-6}$

(3) Mechanical properties of ALPOLIC/fr:

	Unit	3mm	4mm	6mm
Tensile strength (ASTM E8)	MPa or N/mm <sup>2</sup>	61	49	29
0.2% proof stress (ASTM E8)	MPa or N/mm <sup>2</sup>	53	44	26
Elongation (ASTM E8)	%	4	5	2
Flexural elasticity, E (Calculation)	GPa or kN/mm <sup>2</sup>	49.0	39.8	29.1

(4) Mechanical properties of aluminum alloy:

0.2% proof stress (ASTM E8): 150 MPa or N/mm<sup>2</sup>

Flexural elasticity (ASTM E8): 70 GPa or kN/mm<sup>2</sup>

(5) Deflection temperature: 120°C in 3mm, 116°C in 4mm and 109°C in 6mm

(6) Sound transmission loss (ASTM E413):

Thickness	4mm	6mm
STC (Standard Transmission Class)	27	29

## 5. Summary of fire tests

Extensive fire tests have been performed in accordance with standards in various countries. ALPOLIC/fr has passed or classified the following fire tests around the world:

**Table 5-1 Fire test for a building material**

Country	Test standard	ALPOLIC/fr specimen	Results & classification
EU	EN 13823, EN ISO 11925-2, EN 13501-1	4mm, 6mm	Class B-s1, d0
United Kingdom	BS476 Part 7	4mm, 6mm	Class 1
	BS476 Part 6	4mm, 6mm	Class 0
USA	NFPA 259-93 British Thermal Unit	4mm	Passed
	ASTM D1781-76 Climbing Drum Peel Test	4mm, 6mm	Passed
	ASTM E84, Steiner Tunnel Test	4mm, 6mm	Class A / Class 1
	ASTM E108, Modified	4mm	Passed
	UBC 26-9 & NFPA 285, ISMA Test (Intermediate Scale Multi-story Apparatus)	4mm, 6mm	Passed (Subject to a fixing system)
Canada	CAN/ULC-S 134-92, Full-scale Exterior Wall Fire Test	4mm	Passed
China	GB8625, GB8626 & GB8627	4mm	Class B1
Japan	Heat Release Test for Non-combustible Material (ISO 5660-1) & Toxicity Gas Test	3, 4, 6mm	Passed. Certificate No. NM-1933

**Table 5-2 Fire tests for other categories**

Category	Country	Test Standard	ALPOLIC/fr specimen	Results & classification
Fire resistant rating wall	USA	ASTM E119, 1-hr Fire Rating and 2-hr Fire Rating	4mm & 6mm	Passed
Roof material	USA	ASTM E108, Fire Test for Roof Covering	4mm	Passed Class A
Interior material	USA	UBC 26-3, Interior Room Corner Test	4mm	Passed
		Combustion Toxicity Test, New York State Uniform Fire Prevention and Building Code	4mm	Passed

## 6. Paint finish

### (1) Coating system

The surface is finished with Lumiflon-based fluoropolymer coating as standard; the back side is a wash coating or a service coating. ALPOLIC/fr is available in finishes of: Solid Colors, Metallic Colors, Sparkling Colors, Prismatic Colors, Patterns (Stone, Timber, Metal, and Abstract), Matte Colors and Premium Aluminum series (hairline and mill finishes). In these finishes, Lumiflon-based fluoropolymer paints are applied in the manufacturer's coil coating lines.

The coating system of each finish is:

A. "Solid Colors" are three-coat three-bake system

The thickness is 30 microns (1.18 mils) minimum and consists of a conversion coating, an inhibitive primer, a Lumiflon-based fluoropolymer coating and a clear coating.

B. "Metallic Colors", "Sparkling Colors" and "Prismatic Colors" are a three-coat three-bake system.

The thickness is 28 microns (1.1 mils) minimum and consists of a conversion coating, an inhibitive primer, a Lumiflon-based metallic coating and a clear coating.

C. "Patterns" is coated with a unique image transfer process.

The thickness is 39 microns (1.54 mils) minimum and consists of a conversion coating, an inhibitive primer, a Lumiflon-based fluoropolymer coating and a clear coating including the image transfer layer. Matte finish is also available.

D. "Matte Colors" are three-coat three-bake system

The thickness is 28 microns (1.1 mils) minimum and consists of a conversion coating, an inhibitive primer, a Lumiflon-based fluoropolymer coating and a clear coating.

E. "Premium Aluminum series" are two-coat two-bake system.

The thickness is 36 microns (1.42 mils) minimum and consists of a conversion coating, a clear or tinted primer and a Lumiflon-based fluoropolymer clear coating.

**Note 1:** Lumiflon-based fluoropolymer coating has basically a coating warranty for 10 years. However, except Matte Colors and Matte Patterns, 20 year-coating warranty is available subject to several conditions. Please contact local distributors or our office.

**Note 2:** ALPOLIC/fr is finished with Lumiflon-based fluoropolymer paint as standard, but polyester and other coatings are also available as an option.

### (2) Color and gloss

Standard colors are provided in the Color Chart. Custom colors are available for all finishes upon request subject to respective minimum quantities. The standard gloss is 30% for Solid and Metallic Colors, 30-80% for Sparkling Colors, 80% for Prismatic Colors, 15-80% for Patterns (Stone, Timber, Metal, and Abstract) and 5% for Matte Colors. Premium Aluminum series are available High Gloss and Low Gloss. Custom gloss is available between 15 and 80%, except Premium Aluminum series, upon request subject to minimum quantities. Please contact local distributors or our office for custom color requests.

### (3) Coating performance

The Lumiflon-based fluoropolymer coating meets the following criteria:

### **Solid Colors, Metallic Colors, Sparkling Colors, Prismatic Colors, Patterns and Matte Colors**

**Table 6-1 General properties**

Dry film property	Test method	Criteria
Gloss (60°)	ASTM D523	15 to 80% (Matte 5%)
Formability (T-bend)	NCCA II-19 ASTM D1737	2T, no cracking
Reverse impact-crosshatch	NCCA II-5	No pick off
Hardness-pencil	ASTM D3363	H
Adhesion	ASTM D3359, method B 37.8°C, 24 hrs. 100°C, 20 min.	No pick off
Dry		No pick off
Wet		No pick off
Boiling water		No pick off
Abrasive resistance	ASTM D968 (Falling sand)	40 liters/mil (except Matte data not available)
Chemical resistance:		
Muriatic acid, 10%HCl, 72hrs	ASTM D1308	No change
Sulphuric acid, 20%H <sub>2</sub> SO <sub>4</sub> , 18hrs	ASTM D1308	No change
Sodium hydroxide, 20%NaOH, 1hr	ASTM D1308	No change
Mortar, pat test, 24hrs	AAMA2605	No change
Detergent, 3% solution, 38°C, 72hrs	ASTM D2248	No change

**Table 6-2 Weatherability**

Dry film property	Test method	Criteria
Weather-o-meter test		
Colour retention:	ASTM D2244	Maximum 5 units after 4000 hrs.
Gloss retention:	ASTM D523	70% after 4000 hrs.
Chalk resistance:	ASTM D4214	Maximum 8 units after 4000 hrs.
Salt spray resistance:	ASTM B117	Blister-10, scribe-8, after 4000 hrs, 35°C salt fog
Humidity-thermal	ASTM D2246	No blister, no cracking After 15 cycles of 38°C 100%RH for 24hrs and -23°C for 20hrs
Humidity resistance:	ASTM D2247	No change After 4000 hrs, 100%RH, 35°C

## Premium Aluminum series

Table 6-3 General properties

Dry film property	Test method	Criteria
Impact	JIS K 5600-5-3	No pick off
Hardness-pencil	JIS K 5600-5-4	H
Adhesion		
Dry	JIS K 5600-5-6	No pick off
Wet, 50°C, 240 hrs.	ditto	No pick off
Boiling water, 100°C, 8 hrs.	ditto	No pick off
Chemical resistance:		
Sulphuric acid, 5% H <sub>2</sub> SO <sub>4</sub> , 24 hrs.	JIS H4001 (reference)	No change
Sodium hydroxide, 1% NaOH, 24 hrs.	ditto	No change

Table 6-4 Weatherability

Dry film property	Test method	Criteria
Weather-o-meter test	JIS B7753	
Colour retention:	JIS Z8730	Maximum 5 units after 4000 hrs.
Gloss retention:	JIS Z8741	50% after 4000 hrs.
Cyclic corrosion resistance	ASTM G85 A.5	Rating No. Area $\geq$ 8, Scribe $\geq$ 7
Humidity resistance	JIS K 5600-7-2	No change After 240 hrs., 95% RH, 60°C

The material properties or the test data in this leaflet are portrayed as general information only and a guide without warranty. Due to product changes, improvements and other factors, Mitsubishi Chemical Infratec Co., Ltd. reserves the right to change or withdraw information contained herein without prior notice.

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