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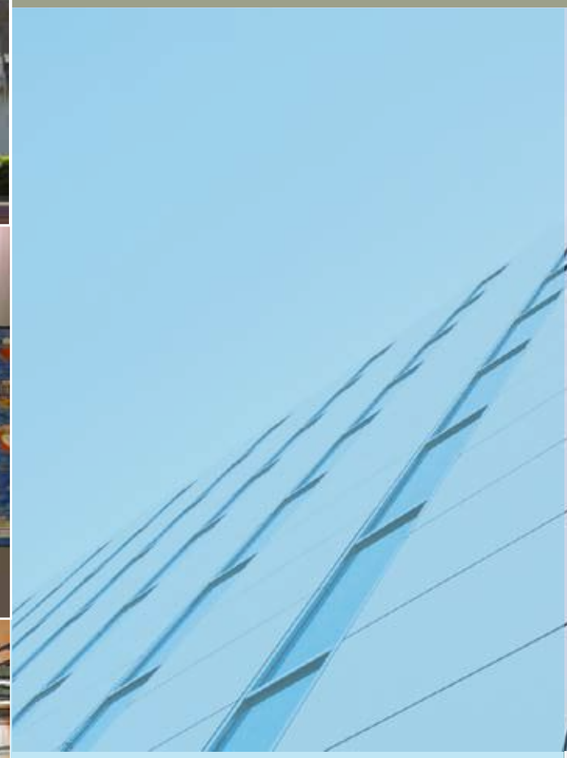
TECO

Expertise • Quality • Service



TECO ENAMEL PANEL

Quality Certified
ISO 9001:2008
Licence NO.: TA071-QC

British Standard Compliance

Chinese National Standard Compliance

Japanese Industrial Standards

A member of Porcelain Enamel Institute (USA)

TAIWAN ENAMELWARE CO., LTD.

TECO ENAMEL PANEL

Expertise • Quality • Service

Introduction

Expertise, Quality, and Service. These are three areas where TECO(Taiwan Enamelware Co., Ltd.) is unrivaled.

Established in 1989, TECO's main products include vitreous enamel panels and enamel bathtubs. We specialize in supplying the highest quality architectural vitreous enamel panels to almost any type of buildings or civil engineering projects around the world. TECO owns two modem computer-controlled fumaces for enamelware production. As per the quality control process of TECO, all the raw materials are carefully selected and inspected, and each finished product must pass the quality-assurance test before delivery to make sure that all TECO products meet the highest standards.

As an ISO 9001 registered company, TECO enamel panels possess both the good strength of steel and the splendor of vitreous enamel. With the characteristics of resistance to corrosion and. extreme weather conditions, TECO enamel panels are your best choice for not only interior but also exterior wall cladding materials.

I N D E X






Performance Characteristics

Durability
Vitreous enamel panels are extremely durable and need very little maintenance and cleaning. They will retain their original color and bright finish throughout the normal expected life of the building. Exposure to extreme weather conditions and coastal environments does not affect their performance or appearance.

Resistance to Abrasion
Vitreous enamel panels are extremely hardwearing, withstanding many abrasive materials, and will meet scratch resistance to Moh scale 6.

Fire Proof
Vitreous enamel panel is totally incombustible, will neither ignite nor burn and will, depending on the design and the nature of the backing materials, provide fire ratings of a min. of two hours. Higher fire ratings can be achievec

Anti-Graffiti
TECO enamel panels are ideal for use in public areas where unwanted graffiti and spray paints can be readily removed.

Resistance to Sunlight
Vitreous enamel panels are resistant to ultraviolet light and the individual color and finishes will not deteriorate under continuous exposure to sunlight.

Chemical Resistance
Vitreous enamel panels are resistant to all organic solvents and have excellent resistance to atmospheric pollution, corrosion and attack by the great majority of chemicals. They will not rust and are 100% water resistant.

Thermal Shock Resistance
Vitreous enamel panels can withstand rapid cooling by water spray from 400°C to normal room temperatures over a 30 second period.

Appearance
TECO enamel panels are sterile, germ free, odourless and easy to clean. Combined with their other characteristics and a smooth color fast surface, TECO enamel panels provide unmatched visual appearance.

Custom-made
TECO enamel panels can be made in various shapes, sizes and configurations according to your specific design requirements.

Graphics & Signage
Logos, names and selected graphics can be fired onto TECO enamel panels — these will have the same characteristics mentioned above and will maintain their appearance throughout their life.

The Most Durable Wall-Cladding Material

Performance Comparison

A comparison of vitreous enamel with major characteristics of other surface finishing materials indicates why vitreous enamel is the material of choice for most cladding applications：

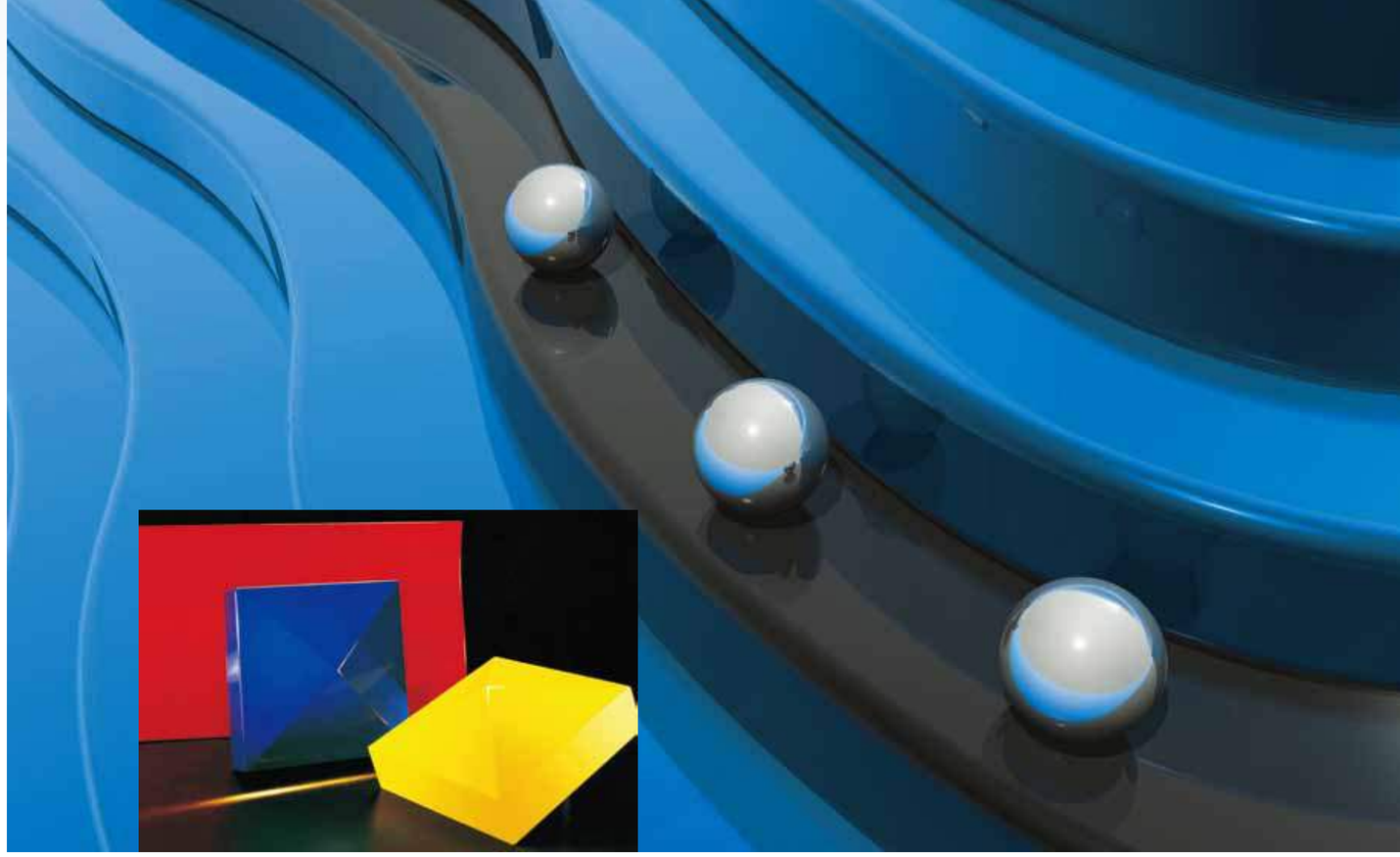
Color Fast (Durability)	Vitreous Enamel Panels	Aluminum	Tiling	Painted Steel
	30 years+	Color fades after 10 years	20 years+	Color fades after 3 years
Chemical Resistant	Yes	No	Tiles Yes, Grout No	No
Abrasion Resistant	Yes	No	Yes	No
Fire Proof	Yes	No	Tiles Yes, Adhesive No	No
Graffiti Resistant	Yes	No	Tiles Yes, Grout No	No
Ultraviolet Light Resistant	Yes	Color fade after 10 years	Yes, but grout will deteriorate	Color fade after 3 years

Abrasion Resistant

Anti-Graffiti

Impact Resistant

Fire Proof



Color Range

The color range of TECO enamel panels is virtually unlimited. TECO has a good selection of enamel panels in a variety of colors. In addition to the colors shown in the catalogue, TECO enamel panels can be custom-made to the shades and tones specified by the color sheet provided by customers.

Color Matching Process (lead time ~15 days)

Color sheet or color code received → Color matching → Color sample fabrication → Color approved by customer

Flat Finish

Embossed Texture


Simulated Granite Vein

TECO VE panel can be flat finish or with embossed texture design, and the finish can come with different gloss levels. In addition to monochromatic products, TECO also supply enamel panels with simulated granite or marble vein as well as color enamel panels.


Vitreous enamel panels in dome shape and curved shape with simulated granite color adjacent to real granite wall cladding.

T01 T02 T03 T04 T05 T06

T07 T08 T09 T10 T11 T12

T13 T14 T15 T16 T17 T18

T19 T20 T21 T22 T23 T24

Technical Information

Materials

Steel

- 1.6mm or 2.0mm cold rolled decarbonized steel (Comply with JIS G3133, CNS 8975, BS 1449 CR4, ASTM A424)
- 0.7mm steel (for light gauge enamel panel)

Properties of steel:

Max Yield	Kgf/mm²	24
Max Tensile	Kgf/mm²	34
Min Elongation	%	40

Chemical contents of steel:

C	Mn	P	S
below 0.005%	below 0.4%	below 0.02%	below 0.03%

Vitreous Enamel Coating

The most significant ingredient of vitreous enamel coating is “frit". Vitreous enamel coating consists of one ground coat and one top coat.

Its main ingredients are: a mixture of silica, borax soda, inorganic pigment and various metal oxides.

Backing Materials

- Calcium Silicate Backing: 10mm or 12mm thick 100% asbestos free calcium silicate boards.
- Honeycomb Backing: Ø13mm or 19mm Aero web hexagon cell aluminum honeycomb backing.
- Gypsum Backing: 12mm thick gypsum board for curved panels.
- Fiberglass Backing: 25mm thick fiberglass for curved panels.

Coating Thickness

Ground Coat: 85~150μ (microns)
Top Coat: 90~250μ (microns)
Total Coating Thickness: 175~400μ (microns)

Color Inspection

Color variation of TECO enamel panels with an approved control sample: △E≤1. 5 using a Chroma Meter purchased from Japan.

Basic Information for

Design

1.Maximum Dimension: 1400mm×2800mm.
For best quality and cost effective the following are recommended:
- Optimum Dimension: 1100mm×1900mm.
- Optimum Area: Panel face area between 1.00 and 2.00m².

2.Welding process could often result in warping and de-enameling. Avoiding complicated panel design is recommended.
3.Bending and welding on finished enamel panels are not recommended.

Installation

1.The dimensions of fixing frame: (L30x30x3mm) (C50x25x10x2.3mm)
2.It is recommended to keep the spacing between expansion bolts at 600mm and to use the bolt with a pitch less than 600mm as a reference.
3.Total weight of 1.6mm thick enamel panel and 12mm thick calcium silicate backing is about 26kg/m².
4.The vitreous coating of an enamel panel could be damaged upon impact. Precaution should be exercised to prevent any damage to the enamel panel caused by improper installation processes.
5.Precautions should be taken to avoid staining the panels by welding spark or by mud during construction.

Maintenance

1.For routine maintenance and cleaning, it is recommended to hose down the enamel panels with water. For heavily soiled or oil-stained panel, a diluted neutral detergent is recommended to be used.
2.It should not use the detergents containing strong acidic agents, such as the detergents for cleaning tiles and toilets, so as to prevent the enamel coating from corrosion by the detergents.
3.It is recommended to wash enamel panels every two years.

Quality Control

International Standards

British Standards and Test Results

	Test Items	Test Results
1	BS 1449 Part 1.3 Sheet Steel	Grade CR4 or better.
2	BS 1344 Part 1 Resistance to Thermal Shock	No damage was observed. Satisfactory
3	BS 1344 Part 2 Resistance to Citric Acid	Class AA requirement
4	BS 1344 Part 3 Resistance to Sulphuric Acid	Class A requirement
5	BS 1344 Part 4 Resistance to Abrasion	Loss of weight (mg/mins): 0.07
6	BS 1344 Part 6 Resistance to Alkali	No damage was observed. Satisfactory
7	BS 1344 Part 7 Resistance to Heat	No damage was observed. Satisfactory
8	BS 1344 Part 8 Resistance to Boiling Citric Acid	g/m² = 15.1
9	BS 1344 Part 17 Resistance to Hot Sodium Hydroxide Solution	V_{24} = 0.42
10	BS 476 Part 4 Non-Combustibility Test	Class One surface spread of flame

Chinese National Standards and Test Results

	Test Items	Test Results
1	CNS 12810 Plane Surface	0.06%
2	CNS 12810 Salt Water Resistance	No rusted
3	CNS 12810 Impact Resistance	No peeling and crack
4	CNS 12810 Acid Resistance	Grade AA
5	CNS 12810 Compressive Strength	9225
6	CNS 6532 Incombustibility Test 耐燃性	Grade One

Japanese Industrial Standards and Test Results

	Test Items	Test Results
1	JIS R4301 Thermal Shock Test	No visual change
2	JIS R4301 Adhesion	No Peeling
3	JIS R4301 Acid Resistance	Grade AA
4	JIS R4301 Alkali Resistance	No pencil marks exist after wiping test with wet cloth
5	JIS A6516 Plane Surface	0.1%

Manufacturing Process

01 Computer Aided Design

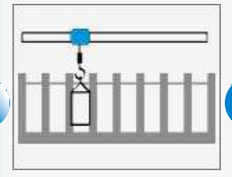
A CAD System is used to create working drawings to the client's specification.

02 Panel Cutting

Steel sheets are cut to shape and create the required fixing holes.

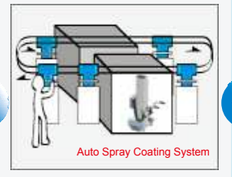
03 Bending

Panel returns and fixing flanges are formed by bending the steel sheet.



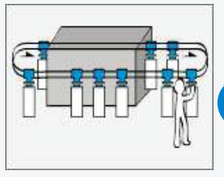
04 Pre-treatment

Every panel goes through a chemical process to remove contamination and provide an “etched” surface to receive the enamel.



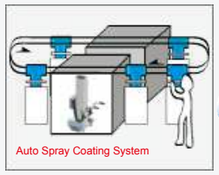
05 Ground Coat

The ground coat of vitreous enamel is applied to all surfaces.



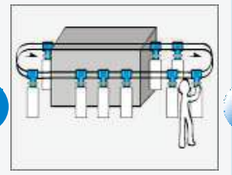
06 Furnace

Panels are pre-heated to 400°C before entering the furnace. The fusing of the vitreous enamel to the steel takes place at approximately 810°C.



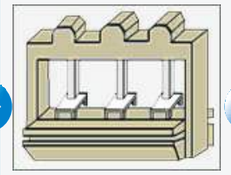
07 Top Coat

The top coat is the color coat and it consists of one or two coats depending on the color specified.



08 Furnace

Every color coat is individually fired at approximately 800°C.



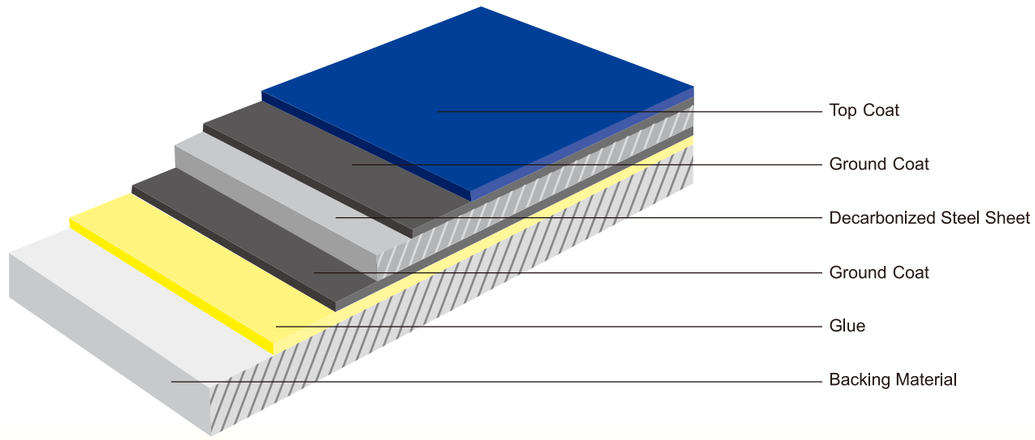
09 Backing & Bonding

The panel surfaces are protected following completion of the top coats. The requested panel backing is then applied. These are bound to the panels by various materials depending on the required backing.

10 Packaging & Shipment

After final inspection and packaging, panels are packed and shipped.

Composition of VE Coating Layers



Taoyuan International Airport,Taiwan

Banciao High Speed Rail Station, Taiwan

Nunawading Station, Melbourne Australia

Project References

■ METRO

Xindian City Hall Station, Taiwan

Taipei Main Station, Taiwan

Longshan Temple Station, Taiwan

Lok Ma Chau Station, Hong Kong

Nangang Software Park Station, Taiwan

Kaohsiung International Airport Station, Taiwan

Harbour Front Station, Singapore

Middle Road Station, Hong Kong

Taipei City Hall Station, Taiwan

Delta Electronics, Taiwan

Banciao Residence,Taiwan

Tian-Mu Residence, Taiwan

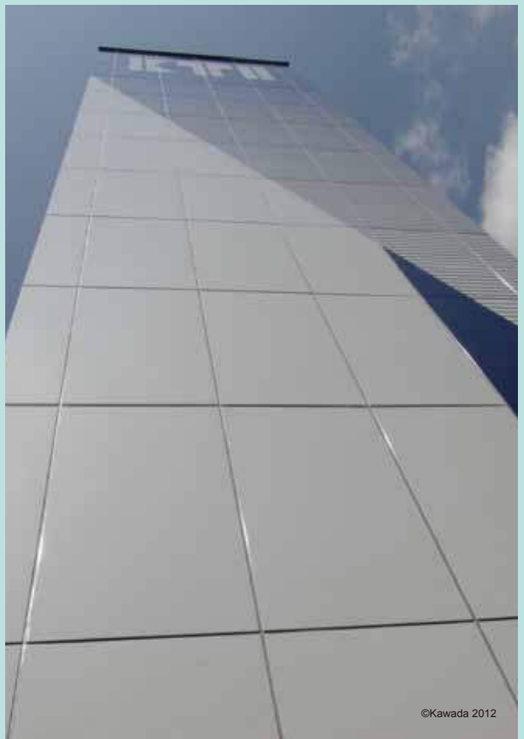
Chang-Gung Memorial Hospital, Taiwan

E-TEN Information Systems Co., Ltd., Taiwan

Uni-President Enterprises Corp., Taiwan

Exchange Square, Taiwan

Siliconware Precision Industries Co., Ltd., Taiwan



Kawada Technologies Inc., Japan

■ ARCHITECTURAL

Hiwin Technologies Corp., Taiwan

TECO ENAMEL PANEL

■ ACOUSTIC BARRIER


Shatin Tunnel, Hong Kong


Taipei Metro, Taiwan

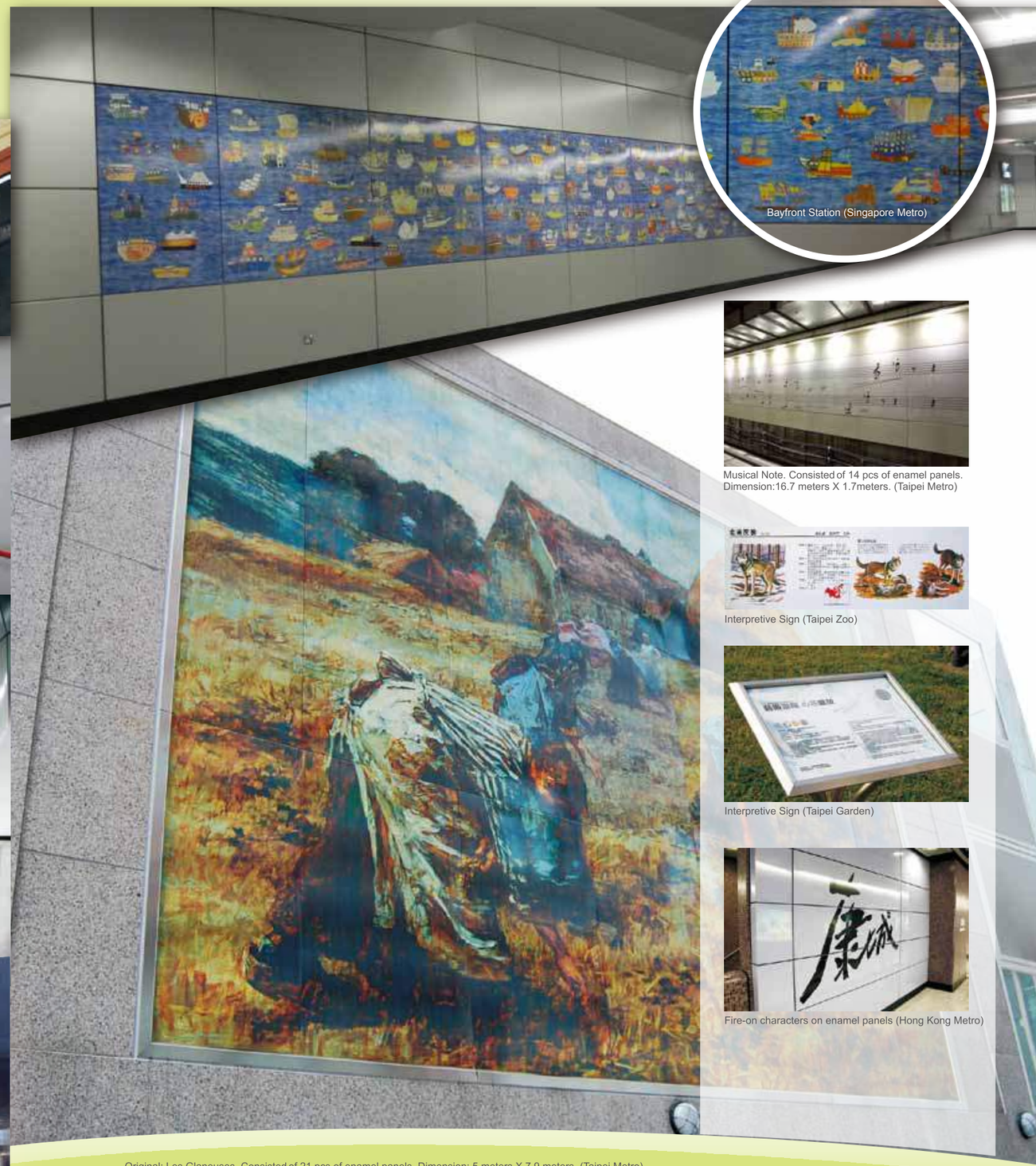
■ TUNNEL


Wakefield Tunnel, England


Eagle's Nest Tunnel, Hong Kong

Central Underpass, Hong Kong

■ GRAPHIC PANEL & SIGNAGE



Bayfront Station (Singapore Metro)

Musical Note. Consisted of 14 pcs of enamel panels. Dimension:16.7 meters X 1.7meters. (Taipei Metro)

Interpretive Sign (Taipei Zoo)

Interpretive Sign (Taipei Garden)

Fire-on characters on enamel panels (Hong Kong Metro)

Original: Les Glaneuses. Consisted of 21 pcs of enamel panels. Dimension: 5 meters X 7.9 meters. (Taipei Metro)