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GENERAL PRODUCT SPECIFICATIONS

Vitraclad Vitreous Enamel Steel Cladding

(Document Reference CC/GPS/CLAD/01 Rev. 1 April 2010)

(E&OE - Document and content subject to change without prior notice)

(1) INTRODUCTION

Vitraclad panels are used in external cladding applications, on buildings where a low maintenance, durable, colour finish is required.

Internally, vitreous enamel is an ideal choice in high traffic areas where other less durable products may be prone to vandalism and wear as well in environments requiring ultra-hygienic and sterile conditions such as operating theatres, laboratories and production facilities (e.g. manufacturing of integrated circuits and pharmaceuticals).

In addition, panels can also be used as infill and spandrel panels in curtain and window wall systems.

Vitreous enamel is a versatile material with a number of unique properties, making it a wonderful medium that allows a designer to address most cladding conditions and requirements.

In general, our cladding system can be broken down into three basic components:

- The cladding panels.
- A metal framework / substructure (in steel), to provide flexibility and adjustment for the alignment of the panels during installation and to compensate for on site tolerances in the building work.
- The joint between individual panels, where a variety of details are available based on the design requirements and performance criteria of the cladding system.

Although simple flat sheet panels can be used in specific applications and under certain conditions, the basic construction of a vitreous enamel panel consists of a front plate of vitreous enamelled steel, a core and a balancing backer.



Member of the Institute
of Vitreous Enamellers (IVE)

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In addition to improving the flatness of the panels, core materials provide additional structural strength, thermal insulation, acoustic insulation and can also add to the fire resistant properties to the panels.

A range of core materials are available depending on the panel type and the design requirements of the cladding system, e.g. Calcium Silicate and Aluminium Honeycomb, the availability of the latter for Vitraclad panels currently under development.

Core materials are compression bonded (laminated) to the inside face of the panels, using appropriate adhesives and equipment.

The balancing backer laminated to the rear of the core is in general manufactured from 0.5 mm galvanised mild steel or alternatively, should the rear side of the panels be visible or accessible, a wide range of finishes can be supplied for the internal face of the panels depending on the specific design requirements.

In respect of architectural applications, three basic Vitraclad panel types are available:

- **Light Gauge Panels (C-Type or Composite Panel)** - Originally designed as infill panels, light gauge panels are also used in internal cladding and external fascia applications. Light gauge panels have a flush edge necessitating the introduction of extrusion edge covers and joints profiles. In addition, a ¼ round aluminium extrusion is also used to create 90° returns. The thickness of the enamelling quality steel is 0.7 mm. Vitraclad Light Gauge Panels are available in Standard (Non-Insulated) and Insulated options.
- **Heavy Gauge Panels (F-Type or Flanged Panel)** - Used to create more complex profiles that include curves, corners and flat profiles, heavy gauge panels are pre-fabricated to the required size and shape by cutting and notching steel sheets, bending the returns and flanges and finally welding, finishing off and testing the corners prior to enamelling. Flanged panels have an integral return flange around the full perimeter of the panel and, although the flange depth can vary as a function of the panel size, it is considered good enamelling practice to use a single flange return depth of 35-40 mm or, preferably, a double flange return combination of 35-40 mm + 20 mm. The thickness of the enamelling quality steel is 1.5 mm and a variety of fixing and joint details can be offered to the designer depending on the application and the aesthetic parameters. Vitraclad Heavy Gauge Panels are available in Standard (Non-Insulated) and Insulated options.
- **Heavy Gauge Sheets** - Used principally in lining of vehicular tunnels and curved soffits. Enamel steel sheets have a flush edge and firing holes are present to provide support points during the enamelling process - extrusion edge covers are therefore necessary at the joints and terminal ends. We can however also supply enamelled sheets with no firing holes, by using micro tags to provide support points during the firing process. The thickness of the enamelling quality steel varies between 1.5 mm, 2.0 mm and 2.5 mm depending on the application.

Vitraclad panels are manufactured with a maximum face width of 1200 mm on single return flange heavy gauge panels and heavy gauge sheets, or 1160 mm on double return flange heavy gauge panels and light gauge panels. The maximum length on all panels and sheets is 3000 mm, however the recommended maximum panel and sheet length is 2400 mm.

Steel sheet sizes, furnace aperture and panel shape can also provide limitations to the final panel dimensions and it is always advisable to involve Vitrex as early as possible at the design stage of a project.

Vitraclad panels and sheets are manufactured in accordance with the European Standard EN 14431:2004 for “Vitreous and porcelain enamels – characteristics of the enamel coatings applied to steel panels intended for architecture”.

The standard was prepared by the European Committee for Standardization (CEN) and enjoys the status of National Standard in twenty-eight European countries including the United Kingdom, where it has replaced the original BS 3830 specification for “Vitreous enamelled steel building components”.

The new standard specifies the requirements for enamel-coated, cold rolled, heavy and light gauge steel panels intended for interior and exterior architectural use.

The standard also covers the functional and aesthetic characteristics and resistance to graffiti of these panels and related coatings as well as aspects such as the final thickness of the fired enamel, abrasion resistance, impact resistance, surface hardness, flatness, acid resistance, surface appearance, gloss and colour characteristics.

The nature of cladding systems in general is such that specific design solutions are required on each individual project.

Please note therefore, that whilst every attempt has been made to present broad outline specification parameters, it is advisable to consult with our staff at the early design stages, to determine your exact requirements and to draw up a detailed project specification document. In addition, we also recommend that reference is made within the specification documentation to the relevant drawings and that these be made available at quotation stage.

(2) GENERAL SPECIFICATIONS:

The following typical Vitraclad specifications are covered in this document:

INFILL APPLICATIONS:

- A.** Light Gauge Infill Panels (Non-insulated).
- B.** Light Gauge Infill Panels (Insulated).
- C.** Heavy Gauge Infill Panels (Insulated).

CLADDING APPLICATIONS:

- D.** Light Gauge Panel Cladding.
- E.** Heavy Gauge Panel Cladding.
- F.** Heavy Gauge Sheet Cladding / Lining.

SHEET APPLICATIONS:

- G.** Heavy Gauge Sheets.

Please note that the use of **italics** in the text indicates the need for an appropriate selection to be made by the Specifier:

INFILL APPLICATIONS:

(A) Standard Light Gauge Infill Panels (Non-insulated):

Proprietary **Vitraclad Light Gauge Vitreous Enamelled Steel Infill Panels (Non-insulated)**, overall thickness ± 14 mm, consisting of:

- i. **Front Plate** - Front plate of 0.7 mm enamelling quality steel, enamelled to a standard Vitraclad enamel colour to front face and with standard vitreous enamel base coat to rear.
- ii. **Core** - Core of 12 mm Calcium Silicate.
- iii. **Back Plate** - Back plate *0.5 mm Galvanised Mild Steel / 0.5 mm Pre-painted (Chromadek) Galvanised Mild Steel Sheet / 0.7 mm enamelling quality steel, enamelled to a standard Vitraclad enamel colour to front face and with standard vitreous enamel base coat to rear.* ⁽¹⁾
- iv. **Protection** - Vitreous enamel steel face of *front plate / front and back plates* ⁽²⁾ to be covered with removable protective plastic foil.
- v. **Edge Detail** - Square edge with no return flanges. Edge of the enamelled steel sheets to be laser cut prior to the enamelling process. No firing holes to be present and the sheets to be fired using laser cut micro tags.

Panels to be manufactured in accordance with the European Normative Standard EN14431:2004 and the Vitrex ISO 9001:2000 certified Quality Assurance system.

The vitreous enamelled steel surface is to be guaranteed to perform specifically to the functions for which it was intended, and to remain functionally unchanged for a period of twenty (20) years, under the terms of the general Vitraclad Guarantee.

(B) Light Gauge Infill Panels (Insulated):

Proprietary **Vitraclad Light Gauge Vitreous Enamelled Steel Infill Panels (Insulated)**, overall thickness ± 34 mm, consisting of:

- i. **Front Plate** - Front plate of 0.7 mm enamelling quality steel, enamelled to a standard Vitraclad enamel colour to front face and with standard vitreous enamel base coat to rear.
- ii. **Stiffening Boards** - Two (2) stiffening boards of 6 mm Calcium Silicate.
- iii. **Insulation Core** - Expanded Polystyrene (EPS), thickness 20 mm, density 24 kg/m^3 . ⁽²⁾
- iv. **Back Plate** - Back plate *0.5 mm Galvanised Mild Steel / 0.5 mm Pre-painted (Chromadek) Galvanised Mild Steel Sheet / 0.7 mm enamelling quality steel, enamelled to a standard Vitraclad enamel colour to front face and with standard vitreous enamel base coat to rear.* ⁽¹⁾
- v. **Protection** - Vitreous enamel steel face of *front plate / front and back plates* ⁽²⁾ to be covered with removable protective plastic foil.
- vi. **Edge Detail** - Square edge with no return flanges. Edge of the enamelled steel sheets to be laser cut prior to the enamelling process. No firing holes to be present and the sheets to be fired using laser cut micro tags.

Panels to be manufactured in accordance with the European Normative Standard EN14431:2004 and the Vitrex ISO 9001:2000 certified Quality Assurance system.

The vitreous enamelled steel surface is to be guaranteed to perform specifically to the functions for which it was intended, and to remain functionally unchanged for a period of twenty (20) years, under the terms of the general Vitraclad Guarantee.

(C) Heavy Gauge Infill Panels (Insulated):

Proprietary **Vitraclad Heavy Gauge Vitreous Enamelled Steel Infill Panels (Insulated)**, overall thickness ± 24 mm, consisting of:

- i. **Front Plate** - Front plate of 1.5 mm enamelling quality steel, enamelled to a standard Vitraclad enamel colour to front face and with standard vitreous enamel base coat to rear.
- ii. **Insulation Core** - Expanded Polystyrene (EPS), thickness 20 mm, density 24 kg/m^3 . ⁽²⁾
- iii. **Back Plate** - Back plate of 1.5 mm enamelling quality steel, enamelled to a standard Vitraclad enamel colour to front face and with standard vitreous enamel base coat to rear.
- iv. **Protection** - Vitreous enamel steel face of front and back plates to be covered with removable protective plastic foil.
- v. **Edge Detail** - Square edge with no return flanges. Edge of the enamelled steel sheets to be laser cut prior to the enamelling process. No firing holes to be present and the sheets to be fired using laser cut micro tags.

Panels to be manufactured in accordance with the European Normative Standard EN14431:2004 and the Vitrex ISO 9001:2000 certified Quality Assurance system.

The vitreous enamelled steel surface is to be guaranteed to perform specifically to the functions for which it was intended, and to remain functionally unchanged for a period of twenty (20) years, under the terms of the general Vitraclad Guarantee.

CLADDING APPLICATIONS:

(D) Light Gauge Panel Cladding:

Proprietary **Vitraclad Light Gauge Vitreous Enamelled Steel Cladding** system consisting of:

(D.1) Panels:

- i. **Front Plate** - Front plate of 0.7 mm enamelling quality steel, enamelled to a standard Vitraclad enamel colour to front face and with standard vitreous enamel base coat to rear.
- ii. **Core** - Core of 12 mm Calcium Silicate.
- iii. **Back Plate** - Back plate 0.5 mm Galvanised Mild Steel.
- iv. **Protection** - Vitreous enamel steel face of front plate to be covered with removable protective plastic foil.
- v. **Edge Detail** - Square edge with no return flanges. Edge of the enamelled steel sheet to be cut prior of the enamelling process with no firing holes

present through the use of micro tags. Panel edges to be fitted all round with a protective aluminium edge trim, polyester powder coated to a colour selected from the Vitrex Powder Coating Colours Schedule ⁽³⁾.

(D.2) Substructure:

- i. **Panel Fixing Detail** - Cladding panels to be secured to a suitable sub-structure by means of proprietary brackets.
- ii. **Substructure** - Appropriate mild steel sub-structure complete with brackets and adjustment elements, all in a **painting (red oxide) / hot dip galvanised** finish, to be secured to **brickwork / reinforced concrete / structural steel**.

(D.3) Joint Detail:

- i. **Panel Joint Detail** - Open joint (mm) *(The width of the joint between the panels is to be specified. Minimum size of joint 5 mm).*

Panels to be manufactured in accordance with the European Normative Standard EN14431:2004 and the Vitrex ISO 9001:2000 certified Quality Assurance system.

The vitreous enamelled steel surface is to be guaranteed to perform specifically to the functions for which it was intended, and to remain functionally unchanged for a period of twenty (20) years, under the terms of the general Vitraclad Guarantee.

(E) Heavy Gauge Panel Cladding:

Proprietary **Vitraclad Heavy Gauge Vitreous Enamelled Steel Cladding** system consisting of:

(E.1.1) Panels (Flat):

- i. **Fabricated Plate** - Front plate of 1.5 mm enamelling quality steel, vitreous enamelled to a standard Vitraclad colour to the front face and with standard vitreous enamel base coat to rear.
- ii. **Flange Returns** - Panels to have double return flanges (40 mm + 20 mm) all around. Outside radius of the return bend on the return flanges to be $R_{OUTSIDE} = 3.6$ mm (finished or enamelled dimension).
- iii. **Core** - Core of 12 mm Calcium Silicate.
- iv. **Back Plate** - Back plate of 0.5 mm galvanised mild steel.
- v. **Protection** - Vitreous enamelled steel face of front plate to be covered with removable protective plastic foil.
- vi. **Edge Detail** - Panel edges taped all round with a pressure sensitive polyethylene cloth tape. Perimeter of core against return flanges sealed with silicone sealant.
- vii. **(OPTIONAL) Insulation** - Expanded Polystyrene (EPS), thickness 20 mm, density 24 kg/m³. ⁽²⁾

(E.1.2) Panels (Curved):

- i. **Fabricated Plate** - Front plate of 1.5 mm enamelling quality steel, roll formed to a radius of R _____ mm (*The radius of curvature of the panels is to be specified. The minimum roll forming radius is $R_{MIN} = 550$ mm*) and vitreous enamelled to a standard Vitraclad colour to the front face, with standard vitreous enamel base coat to rear.
- ii. **Flange Returns** - Curved Panels to have single return flange (40 mm) all around. Outside radius of the return bend on the return flanges to be $R_{OUTSIDE} = 3.6$ mm (finished or enamelled dimension).
- iii. **Anti-drumming** - Rear of the curved panels to be finished with suitable anti-drumming compound.
- iv. **Protection** - Vitreous enamelled steel face of front plate to be covered with removable protective plastic foil.
- v. **Edge Detail** - Panel edges taped all round with a pressure sensitive polyethylene cloth tape.

(E.2) Substructure:

- i. **Panel Fixing Detail** - Cladding panels to be secured to a suitable sub-structure by means of proprietary brackets.
- ii. **Substructure** - Appropriate mild steel sub-structure complete with brackets and adjustment elements, all in a *painting (red oxide) / hot dip galvanised* finish, to be secured to *brickwork / reinforced concrete / structural steel*.

(E.3) Joint:

- i. **Panel Joint Detail** - *Open joint (___ mm) (The width of the joint between the panels is to be specified. Minimum size of joint 5 mm) / Closed joint (15 mm) (Silicone ⁽⁴⁾ and polycord).*

Panels to be manufactured in accordance with the European Normative Standard EN14431:2004 and the Vitrex ISO 9001:2000 certified Quality Assurance system.

The vitreous enamelled steel surface is to be guaranteed to perform specifically to the functions for which it was intended, and to remain functionally unchanged for a period of twenty (20) years, under the terms of the general Vitraclad Guarantee.

(F) Heavy Gauge Sheet Cladding / Lining:

Proprietary **Vitraclad Heavy Gauge Sheet Vitreous Enamelled Steel Cladding / Lining** system consisting of:

(F.1) Sheets:

- i. **Sheet** - 1.5 mm enamelling quality steel, vitreous enamelled to a standard Vitraclad colour to the front face and with standard vitreous enamel base coat to rear.
- ii. **Protection** - Vitreous enamelled steel face of sheet to be covered with removable protective plastic foil.
- iii. **Edge Detail** - Square edge with no return flanges. Edge of the enamelled steel sheet to be laser cut prior of the enamelling process. Sheet edges taped all round with a pressure sensitive polyethylene cloth tape.

(F.2) Substructure:

- i. **Sheet Fixing Detail** - Sheets to be secured to a suitable sub-structure by means of proprietary brackets.
- ii. **Substructure** - Appropriate *mild steel sub-structure complete with brackets and adjustment elements, all in a hot dip galvanised finish / stainless steel sub-structure complete with brackets and adjustment elements* to be secured to *brickwork / reinforced concrete*.

(F.3) Joint:

- i. **Panel Joint Detail** - All sheet edges and joints between sheets to be covered by *bespoke aluminium extrusions in a polyester powder coated finish to a colour selected from the Vitrex Powder Coating Colours Schedule ⁽³⁾ / stainless steel extrusions*.

Sheets to be manufactured in accordance with the European Normative Standard EN14431:2004 and the Vitrex ISO 9001:2000 certified Quality Assurance system.

The vitreous enamelled steel surface is to be guaranteed to perform specifically to the functions for which it was intended, and to remain functionally unchanged for a period of twenty (20) years, under the terms of the general Vitraclad Guarantee.

SHEET APPLICATIONS:

(G) Heavy Gauge Sheets:

Proprietary **Vitraclad Heavy Gauge Vitreous Enamelled Steel Sheets** consisting of:

- i. **Sheet** - 1.5 mm enamelling quality steel, vitreous enamelled to a standard Vitraclad colour to the front face and with standard vitreous enamel base coat to rear.
- ii. **Protection** - Vitreous enamelled steel face of sheet to be covered with removable protective plastic foil.
- iii. **Edge Detail** - Square edge with no return flanges. Edge of the enamelled steel sheet to be laser cut prior of the enamelling process. Sheet edges taped all round with a pressure sensitive polyethylene cloth tape.

Sheets to be manufactured in accordance with the European Normative Standard EN14431:2004 and the Vitrex ISO 9001:2000 certified Quality Assurance system.

The vitreous enamelled steel surface is to be guaranteed to perform specifically to the functions for which it was intended, and to remain functionally unchanged for a period of twenty (20) years, under the terms of the general Vitraclad Guarantee.

(A) Specification Notes:

Refer to the numbered references in the specification text.

- (1) The finish of the back plate can vary depending on the design requirements of the panels and system, e.g. are the panels visible from the rear, is the rear of the panel accessible to the public, etc ...
- (2) The thickness and density of the Expanded Polystyrene (EPS) Insulation can be changed to suit the overall panel thickness and / or the U-value requirements. The table hereunder provides typical U-values for the Vitraclad panels described in the general specifications detailed above:

| | | |
|--|-------|----------------------|
| Light Gauge Panel - no insulation | 12.28 | W / m ² K |
| Light Gauge Panel with 20 mm EPS (24 kg/m ³) | 1.45 | W / m ² K |
| Heavy Gauge Panel - no insulation | 12.14 | W / m ² K |
| Heavy Gauge Panel with 20 mm EPS (24 kg/m ³) | 1.45 | W / m ² K |
| Cavity Brick Wall Plastered both Sides | 1.79 | W / m ² K |

- (3) Please refer to the Vitrex Document Ref. CC/PPC/01 "Vitrex Powder Coating Colours for Aluminium Extrusions" for details of the available colours.
- (4) Silicone to be in one of the commercially available colours.

(B) Technical Notes:

- a. Consideration should be given to possible requirements for ventilation behind the cladding system as well as the application of a seal to the external face of the brickwork or concrete.
- b. Vitraclad systems with closed joints can be considered as being watertight but should not be taken to be fully waterproof.
- c. In general, the front face of the cladding panels will be fixed $\pm 80 - 120$ mm away from the outside face of the structure on which the cladding substructure is secured.
- d. Allowance can be made in the cladding panels for cut outs in respect of services. Please note however that this would need to be clearly specified in the tender documentation.
- e. Permanent graphics can be incorporated in the design of the panels. Please note however that this would need to be clearly specified in the tender documentation and all relevant artwork (positives) required for the preparation of the screening (graphics) must be made available by the Client, where applicable in accordance with their Identity Programme, and in an appropriate format (Corel Draw or Macromedia).
- f. The design of the Vitraclad cladding system will be in accordance with our standard Vitraclad details. Please note however that should certification of the design of the cladding system by a registered Engineer be required, this would need to be clearly specified in the tender documentation.
- g. The indicative overall thickness of the Infill Panels described in the General Specifications above are as follows:

| | |
|---|-------|
| Light Gauge Infill Panel - no insulation | 14 mm |
| Light Gauge Infill Panel - with 20 mm EPS (24 kg/m ³) | 34 mm |
| Heavy Gauge Infill Panel - with 20 mm EPS (24 kg/m ³) | 24 mm |

- h. The indicative unit weight of the panels as detailed in the General Specifications above, with a Calcium Silicate core, would be as follows:

| | | |
|--|------|---------------------|
| Light Gauge Infill Panel with no insulation and 0.5 mm GMS Backer | 26 | Kg / m ² |
| Ditto but with 0.7 mm Enamelled Steel Backer | 32 | Kg / m ² |
| Light Gauge Infill Panel with 20 mm EPS (24 kg/m ³) insulation and 0.5 mm GMS Backer | 26.5 | Kg / m ² |
| Ditto but with 0.7 mm Enamelled Steel Backer | 32.5 | Kg / m ² |
| Heavy Gauge Infill Panel with 20 mm EPS (24 kg/m ³) insulation and 1.5 mm Enamelled Steel Backer | 32.5 | Kg / m ² |
| Light Gauge Cladding Panel | 26 | Kg / m ² |
| Heavy Gauge Cladding Panel | 32 | Kg / m ² |
| Heavy Gauge Cladding Panel with 20 mm EPS (24 kg/m ³) | 32 | Kg / m ² |
| Heavy Gauge Sheet | 16 | Kg / m ² |

We expect that once the aluminium honeycomb cores are introduced, the corresponding reductions in the panel weight could be as much as 10 Kg / m².

- i. The provision of setting out points and datum lines will remain the responsibility of the Main Contractor.
- j. The provision, erection and dismantling of any scaffolding or hoisting equipment that may be required will remain the responsibility of the Main Contractor.
- k. The design, provision and installation of the following related building activities would be specifically excluded from our scope of works and would remain the responsibility of the Main Contractor:
- i. Structural Steel and Reinforced Concrete work.
 - ii. Brickwork, plastering, painting and tiling.
 - iii. Mechanical (e.g. air grilles, sprinklers, etc...) and electrical services (e.g. luminaires).
 - iv. Ceilings.
 - v. Bulkheads.
 - vi. Roofing, flashings, gutters and downpipes.
 - vii. Waterproofing.

- I. The cladding elements need to be identified and specified in the BOQ documentation. In general:
- i. **Cladding:** The cladding areas need to be identified and combined in respect of flat and curved applications. Furthermore the areas should then be separated in terms of radius (curved applications), panel module (width) and overall panel length.
Unit of measure = m².
Reference must be made to the relevant drawings and these must be available at time of tender.
 - ii. **Cills, Soffits and Side Returns:**
The requirement for cills, soffits and side returns needs to be specified in terms of the depth of return.
Unit of measure = m.
 - iii. **Internal and External Corners:**
The requirement for internal or external corners needs to be specified.
Unit of measure = No.
 - iv. **Cappings:** The requirement for cappings of varying shape and girth needs to be identified and specified.
Unit of measure = m.
 - v. **Cut-outs:** The provision of cut-outs needs to be specified in terms of shape and size.
Unit of measure = No.
 - vi. **Graphics:** The provision of graphics needs to be specified.
Unit of measure = Item.
Reference must be made to the relevant drawings and full details of the graphics required must be available at time of tender.
- m. In addition to the standard Vitraclad colours, where specific colours need to be matched in enamel, this is done in accordance with good enamelling practice, after ensuring that the colours are proven stable under production conditions and as close as technically possible to the required colour. In addition, specific enamel thickness requirements need to be met (ideally the overall enamel thickness should be ± 300 µm) and allowance must be made for two (2) cover coats, over and above the general ground coat (black). Colours are matched progressively on a trial and error basis. Please refer to the Vitrex Document Ref. CC/CM/01 “Colour Matching in Enamel” for further details.
- n. Our staff and Agents remain available to address any queries, provide project specific recommendations as well as to assist with sizing and take-offs from the relevant drawings. We would then also be in a position to draw up an itemised schedule and prepare a corresponding estimate for the proposed scope of work.