For Your Special Attention:

1. Enamel on a 3 product shall be 170µm
2. Always cut with enamel side facing up
3. Keep nozzle 2mm from enamel face
4. Consistent X distance from enamel face
5. Roller applied with enamel face down
6. Mitre cut corners for joint alignments
7. Proprietary 3mm width edge trims

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COMPOSITION OF SANDWICH PANEL

PolyVision enamel steel surface is mild steel used for the manufacture of vitreous enamel paneling of the continuous coil type. The base steel shall be of 0.56 mm of special cold rolled quality suitable for enameling process and shall be from continuous coil. The steel to be of ferrite structure with low carbon C + Mn + P + S + Si content (total 0.15 %) produced to EN 10209. The thickness of the finished enameled steel shall be 0.83 mm. The vitreous enameled finish together with the steel is to be smooth and non textured with the face coat on top of 170 μm in thickness and reverse side coatings of 70 μm all tested according to ISO2178. The enamel shall be applied in two coats. Ground coat: enamel to be roller coated and fused to base metal steel at approximately 820 Celsius. Colour coat similarly applied with vitreous enamel slip and fused at 800 Celsius to a semi gloss finish. The steel sheets shall be free from surface blemishes, scale, corrosion marks, or any other defects that may affect the serviceability or the appearances of the finished product. Ground coat and cover coat shall be smooth and non textured having the finish and coverage of the panel to the standard required in this specification. The VE facing panel shall be manufactured to meet the following standards: BS EN ISO 28722-2008
BS EN ISO 28706:2011
BS 476 Part 4/6&7
BS 4900:1976
EN 13501-1 + A1:2009

Elcometer 456 / Fisher Dualscope MP20.
The above precision ultrasonic gauges are designed to provide accurate measurements for thickness of materials. Enamel coating for a 3 product on 0.56mm steel shall be 170μm, ranging from 145μm to 220μm (max).

GROSS PANEL TOLERANCE

<table>
<thead>
<tr>
<th>Overall Panel</th>
<th>Tolerance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>H</td>
</tr>
<tr>
<td>Width</td>
<td>W</td>
</tr>
<tr>
<td>Diagonal</td>
<td>D</td>
</tr>
<tr>
<td>Thick</td>
<td>T</td>
</tr>
</tbody>
</table>

Elcometer 456 / Fisher Dualscope MP20. The above precision ultrasonic gauges are designed to provide accurate measurements for thickness of materials. Enamel coating for a 3 product on 0.56mm steel shall be 170μm, ranging from 145μm to 220μm (max).

Prior to shipping, all panels are checked as a part of quality control to ensure that they conform to manufacturer’s tolerance as per the diagrammatic illustrations.

<table>
<thead>
<tr>
<th>Enamel Facing</th>
<th>Tolerance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Galv Steel Backing</th>
<th>Tolerance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td></td>
</tr>
</tbody>
</table>
It is important to take into consideration measures to keep a consistent X distance (see Detail 1) from the enamel facing of the panel when setting up the jigs & the guide rails for the operation.

Proper precaution is to be taken to protect the enamel surface of the panels from being scratched or damaged during the cutting process.

The enamel surface must be facing up when routing. It is highly recommended that the job is assigned to skilled craftsman with adequate training.

Proper care and maintenance are necessary to ensure that the rotating disk cutter is replaced with new as per manufacturer’s recommendation in order to prevent poor cutting finish due to wear and tear over time.

Always clean the grooves after cutting, prior to the application of the edge protections.

**WATER JET CUTTING**

Water jet cutting is an important process involved in the construction of the light gauge VE panels. In order to achieve a reasonable quality cut finish that is free from undesirable saw-tooth edges, it is imperative that the equipment and the settings are configured as per the required specifications.

<table>
<thead>
<tr>
<th>SPECIFICATIONS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting Speed</td>
<td>1 to 1.3 m/min</td>
</tr>
<tr>
<td>Pressure</td>
<td>3000 to 3300 Bar</td>
</tr>
<tr>
<td>Nozzle Dia.</td>
<td>0.03 mm</td>
</tr>
<tr>
<td>Orifice</td>
<td>0.010 mm</td>
</tr>
<tr>
<td>Type of Sand</td>
<td>Olivine #120 Mesh</td>
</tr>
<tr>
<td>Flow of Sand</td>
<td>340 to 380 grams/min</td>
</tr>
</tbody>
</table>

Olivine sand is recommended due to it’s round shaped molecular structure that polishes cut edge while cutting.

Nozzle need to be replaced after every 150hrs of cutting and maintain a distance of not more than 2mm above surface finish during cutting to reduce water beam divergence and sputtering effects, which results in saw tooth cut edges.

The water jet work table has to be covered with polysty-

**ROUTING (GROOVE CUTTING)**

Routing is done to provide grooves on the sides of the panels for structural restrain purposes when the panels are fitted as a whole with frames made of extruded aluminum edge profiles. The importance is to achieve tight fitting between the edge profile and the panel with no tolerance for movements. Proper jigs and guide rails securely fixed on work table are to be considered during routing to prevent scratches. The recommended hand held routing tool is the Festool 1400 and the information with regards to technical specifications can be found in the following website: http://www.shopfestool.com

The Festool 1400 Hand-held Router & Guide Rail

Always cut with enamel side facing up
EDGE PROTECTION

Edge protections are to be applied before final assembly of the panels with extruded aluminium profiled frames. It’s important to apply edge protections without delay after water jet cutting is done. The recommended edge protection is Ameron & Amershield (2 component) coating system (see product data).

1. After water jet cutting, allow the panels to dry for at least 6 hours, assisted with hot air blowers.
2. Lay the tapes on the enamel side of the panel as per shown in detail 1 & 2.
3. Remove a width of the tape by cutting (1 mm to 2 mm) with a razor sharp cutter and a guide template (see picture 1).
4. Turn the panels (enamel side facing down) and stack up with spacers creating consistent gaps in between each of the panel (see picture 2).
5. With the enamel side facing down, apply the Ameron (2 component) coating to the edges of the panels with a roller (see picture 2).

Important Note:
Always place enamel side facing down when applying edge protection on panel’s edge. Stagger & stack the panels in such a way that the edges to be protected are not covered or over lapped by any of the the adjacent panel. Ensure coatings are fully cure before succeeding coats.
The light gauge VE sandwich panels shall be made from a continuous coil with an applied coating of vitreous enamel. The vitreous enamel sheet sandwiched panels are cut to size after the actual site measurements had been read. The panel’s core is a non-combustible 12 mm fibre cement reinforced calcium silicate board and has a galvanised steel backing sheet. The edges of the panel shall be treated with a two component epoxy coating and protected by aluminium extrusion edging and the panels shall be complete with cleats to fasten directly onto the steel sub frames.

### SECTION PROPERTIES OF ALLUMINIUM EDGE TRIM

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>133.25</td>
</tr>
<tr>
<td>Perimeter</td>
<td>162.55</td>
</tr>
<tr>
<td>Centroid</td>
<td>X: 0.00 Y: 0.00</td>
</tr>
<tr>
<td>Moments of inertia</td>
<td>X: 16206.10 Y: 3293.28</td>
</tr>
<tr>
<td>Product of inertia</td>
<td>XY: 3898.69</td>
</tr>
<tr>
<td>Radii of gyration</td>
<td>X: 11.03 Y: 4.97</td>
</tr>
<tr>
<td>Principal moments &amp;</td>
<td>I: 2207.48 along [0.27 0.96] J: 17291.90 along [-0.96 0.27]</td>
</tr>
</tbody>
</table>

### Tolerance for Panel Production

<table>
<thead>
<tr>
<th>Tolerance</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radius</td>
<td>(+/-) 1mm of Girth</td>
</tr>
<tr>
<td>Deviation (Width)</td>
<td>+ 1mm of 2.0m span</td>
</tr>
<tr>
<td>Deviation (Length)</td>
<td>+ 1mm of 2.0m span</td>
</tr>
</tbody>
</table>

### Precautionary Note:

Provide pilot holes on panel & clean with air blower before fastening the aluminum edge frames/trimming with the self drilling screws (see sketch above).

Install all panels with making allowance for all anticipated building and thermal movement. For panel flatness, the deflection limits shall be 0.15% in both directions. Install panelling such that any one panel may be easily removed and re-erected without requiring the prior removal of adjacent panels. All cladding panels shall be properly fixed in relation to each other and to adjacent components and shall be carefully plumbed. The finished area cladding shall be true plane. All panels shall be factory cut and strictly cutting on site are not allowed.
NORMAL CLEANING

1. Contamination like dust particles, dirt traces can be removed with warm water and a solution of synthetic detergent.
2. Do not use hard soap as it leaves a residue of dry film which will be hard to remove.
3. If hard soap had been used, additional cleaning with a solution of ammonia in water is required.
4. After cleaning, rinse with clean water thoroughly and wipe dry.

GRAFFITI – PERMANENT MARKERS

1. With alcohol and clean water or tissue. Soak if needed to dissolve the pigments.
2. Wipe off with clean cotton cloth or tissue. Repeat until all pigments are removed.
3. Should normal alcohol be inappropriate, use propanol or acetone. Polyvision ceramicsteel is resistant to all commercial solvents; the surface will not be attacked using them.
4. After cleaning, rinse with clean water and wipe dry.

METAL DEPOSIT TRACES

1. Attack by vandals using metal objects can cause traces of those metals onto the surface. These are not scratches but deposits of metals. Such persistent traces can be removed using commercial abrasive cream (kitchen use). Scrub intensively. The excellent scratch and wear resistant ceramicsteel will not be damaged. Do not use scouring pads or nylon sponge containing abrasive grains.
2. After cleaning, rinse with clean water thoroughly and wipe dry.

CALCAREOUS DEPOSIT

1. Calcareous deposit as a result of long lasting contact with hard water can be removed using acidic solutions or acidic commercial abrasive cream (eg Vitrolin). Polyvision Ceramicsteel has an excellent resistance to acids and commercial acidic detergents.
2. When strong industrial acidic solutions are used contact is only allowed for a while.
3. After cleaning, rinse with clean water and wipe dry.

GLUE & GREASE

1. Glue and grease can be removed using strong solvents like acetone, methylethyketon, and other solvents. Use on a clean cloth or tissue and soak if needed.
2. Repeat with clean solvent and clean cloth or tissue. Remove cleaning stripes or traces or solvent residues with alcohol or propanol.
3. After cleaning rinse with water thoroughly and wipe dry.

PAINT & LACQUEOR (GRAFFITI)

1. These type of contaminants can be mechanically removed to the maximum using cutter blade or razor blade.
2. Do not scrape but cut pushing the blade under a small angle almost flat on the surface.
3. Continue cleaning with solvent as paragraph 5.
4. Remove cleaning stripes or traces or solvent residues with alcohol or propanol & rinse with clean water thoroughly and wipe dry.

RUST

1. Rust can be removed as you do with calcareous deposits.
2. Use an acidic solution and a nylon scouring pad (not containing abrasive grain).
3. Alternatively, industrial derusters can be used (eg. Vosimex)
4. Rinse with clean water thoroughly and wipe dry.
MAINTENANCE & REPAIR

For defects and damages (such as mechanical damage like chips and starlike defects) smaller than the size of a coin not more than 10mm in diameter, apply the recommended steps for repair works. For panels with defects or damage any larger than that size it is recommended to be replaced.

1. Cleaning Method
   a. Mark all the major defects (such as mechanical damage and star like lamination defects) with a permanent marker.
   b. Clean the superficial rust on the panel by rubbing intensively with a moist hard nylon pad with "Biodescaler" from "Vossen Laboratories" on it, according to the specifications from the suppliers.
   c. Remove loose pieces of enamel with Stanley knife.
   d. Clean the superficial rust on the panel again by rubbing intensively with a moist hard nylon pad with Biodescaler on it. Remove the residual of Biodescaler by spraying a window cleaner and using a dry cloth to wipe dry.

2. Repair Method
   a. Degrease surface using Beta Clean 3900 (Gurrit Essex) and wipe the spot with a dry clean cloth.
   b. Wipe the damaged spots with Beta Wipe on a clean cloth. Allow to dry for about 3 minutes.
   c. Apply Beta Prime with a clean cloth on the damaged spots. Allow to dry for about 10 minutes.
   d. Apply 1 coat of 2 components PSX 700 (Ameron) as to obtain a minimum layer thickness of 125µm (1 part cure and 4 parts paint).
   e. Curing of the PSX 700 varies with the environment temperature and moisture. Standard temp. 20 ° C with moisture between 50% and 70 % it takes 4 h. to be dust dry and 24 hours before handling.
   f. Apply 1 finishing coat of paint of the matched color delivered by PolyVision on top of the previous applied layers by using a paint brush.
   g. To buff the applied paint you have to wait until the paint is hardened completely. This can take up to 48 hours depending on the environment temperature and moisture.

Note: All preparation have to be done in agreement with the technical prescriptions for each product.

COLOUR CONSISTENCIES

The 964 handheld spectrophotometer, designed to address a wide range of industry specific color needs, is ideal for ensuring consistent color quality in the plant, laboratory, or field. In the event of dispute, the deviation allowed shall be:

Delta \( \Delta E \) not exceeding 1.5
Spectrophotometer: Handheld X-Rite Model 964 or equivalent.
Configuration: 0/45° (0° illumination, 45° measurement angle)
Illuminant: D65/10° (D65 daylight; 10° observer)
Color difference expression: \( \Delta E^* \) with l/c ratio of 1.3/1.0

X-rite Portable 0/45 Spectrophotometer 964

GLOSS LEVEL

Reference to ISO 28762 Gloss ISO 2013 ASTM 0523 60°/ 20°

Gloss level is monitored online using a handheld gloss meter. It contains 1, 2 or 3 light sources such that the incident light is at 20°, 60° or 85° from the normal. Light receptors at the opposite angles -20°, -60° and -85° measure the amount of light that has been reflected by the sample, which is a measure of the specula gloss of the surface. The angle which is chosen for measurement is determined by the surface itself, as to obtain significant readings.

Reference to norm/specification or document: ISO 2013 ASTM 0523 60°/ 20°

In practice, the gloss level of a surface determines the way it reflects light coming from projectors, ambient light or natural light and lighting fixtures. Since these reflections might be experienced as disturbing PolyVision offers a range of gloss levels that can be suited to the meeting room or class room’s configuration.

PolyVision measures gloss levels at 20° and 60 to get significant readings dependant on the surface. So, when a tender specifies 70% that is not a correct, nor a complete statement. It should read: \( \pm xx \) GU (ISO 2813 – xx°). For example the gloss levels of warm white colour RAL 9003 G and RAL 9003 M are to read as follow:

9003 G: 65 +/- 10 GU (ISO 2813 – 20°)
9003 M: 60 +/- 10 GU (ISO 2813 – 60°)