PERFORATIONS

Formglas
Formglas

Formglas Inc. is the world's leading manufacturer of Glass Fibre reinforced Gypsum cast products for interior use. With production facilities in Tokyo and Kuala Lumpur of 20,000 m² and over 300 engineering and production personnel, Formglas has the resources to handle any size project. A network of sales offices, which are supported by twelve service centers, cover the entire world, and our exclusive formlines are now available around the globe. Those agents will assist, with input from the factory, in finding cost-effective solutions to architect or contractors requirements.

Perforations

Formglas has over the past 7 years incorporated computerized modeling and tooling into a production system that affords the possibility of creating complex perforated shapes. A number of such projects have been completed, and this brochure illustrates some of the more interesting examples. In designing a perforated surface, the following are some criteria to bear in mind:

- Perforations can be any shape and can be incorporated into most any size.
- Minimum perforation size is 0.5 cm.
- Minimum distance between edges of perforations is 1.5 cm.
- Maximum panel size approximately 30 sq ft - 2.5 m².
- Maximum size of single flat perforated panel 3' X 5' - 1.6 X 1.6 m.
- Generally, a panel needs a non-perforated border of approximately 1.5 cm.
- A profiled reinforcement around the edge.
- All panels have a finished surface on one side with a rough back.

Formglas

Founded in 1961, Formglas Inc. is the principal manufacturer on the South American continent of preformed gypsum products for interior use. With production facilities in São Paulo and Rio de Janeiro, Formglas has the resources to handle any size project. A network of sales offices, which are supported by twelve service centers, cover the entire world, and our exclusive formlines are now available around the globe. Those agents will assist, with input from the factory, in finding cost-effective solutions to architect or contractors requirements. The perforated shapes produced are of great interest, and this brochure illustrates some of the more interesting examples. In designing a perforated surface, the following are some criteria to bear in mind:

- Perforations can be any shape and can be incorporated into most any size.
- Minimum perforation size is 0.5 cm.
- Minimum distance between edges of perforations is 1.5 cm.
- Maximum panel size approximately 30 sq ft - 2.5 m².
- Maximum size of single flat perforated panel 3' X 5' - 1.6 X 1.6 m.
- Generally, a panel needs a non-perforated border of approximately 1.5 cm.
- A profiled reinforcement around the edge.
- All panels have a finished surface on one side with a rough back.

Formglas

Founded in 1961, Formglas Inc. is the principal manufacturer on the South American continent of preformed gypsum products for interior use. With production facilities in São Paulo and Rio de Janeiro, Formglas has the resources to handle any size project. A network of sales offices, which are supported by twelve service centers, cover the entire world, and our exclusive formlines are now available around the globe. Those agents will assist, with input from the factory, in finding cost-effective solutions to architect or contractors requirements. The perforated shapes produced are of great interest, and this brochure illustrates some of the more interesting examples. In designing a perforated surface, the following are some criteria to bear in mind:

- Perforations can be any shape and can be incorporated into most any size.
- Minimum perforation size is 0.5 cm.
- Minimum distance between edges of perforations is 1.5 cm.
- Maximum panel size approximately 30 sq ft - 2.5 m².
- Maximum size of single flat perforated panel 3' X 5' - 1.6 X 1.6 m.
- Generally, a panel needs a non-perforated border of approximately 1.5 cm.
- A profiled reinforcement around the edge.
- All panels have a finished surface on one side with a rough back.

Formglas


Die vollständige Liste der Prüfungen sind auf der letzten Seite der ORG-Broschüre erfasst oder können auf der Web-Site www.formglas.com eingesehen werden.)

Lochung


In cooperation with various universities and research institutes, Formglas has been able to develop new and innovative solutions for the building materials industry. The company has invested heavily in research and development, and this has led to the creation of advanced materials that are now available for use in buildings.

Formglas


Perforations

Au cours des sept dernières années, Formglas a intégré dans son système de production de l'équipement informatique lui permettant de réaliser une modélisation de formes perforées en 3D. Vous trouverez dans cette brochure plusieurs des exemples les plus intéressantes illustrant cette technique. Cependant, il ne faut pas perdre de vue que ces figures sont le fruit de l'interaction entre le maître d'ouvrage, le manipulateur et le formateur.

- Les perforations sont de formes très variées et peuvent s'intégrer à l'incorporation de la fibre de verre.
- La taille minimale pour une perforation est de 1 cm de diamètre.
- La distance minimale à respecter entre les parois de chaque perforation est de 1 cm.
- La largeur maximale pour un panneau est d'environ 2,5 m².
- La largeur maximale d'un panneau perforé est simple et est de 1,5 cm par 1 m.
- Il faut prévoir un espace non perforé sur le pourtour extérieur du panneau de environ 40 mm, permettant de renforcer le contour.
- La finition n'est effectuée que sur une seule des deux faces.

有孔製品

当社では7年前よりコンピューターサポートによる形状の製造技術を導入し、過去3年曲面曲線までを製造可能な生産システムを確立いたしました。これにより数多くのニーズに対応し、実績を重ねてまいりました。その中でも特に参考としてご覧いただきたいた物件を、このパンフレットにてご紹介いたします。

有孔製品に関するデザイン上の留意点は以下の通りとなります。

- 問の位置の最小内径は5mm
- 問の幅は最小内径の2倍以上とする。
- 最大の製造サイズは約20m²です。
- 製品は精密製造の為に約0.5mmの無孔部分が必要です。
- 製品は仕上げがされた表面と仕上げされていない裏面からあります。
CONFERENCE ROOM CEILING

INVERTED PERFORATED DOME CEILING

ENLARGED PLAN WITH PERFORATIONS PATTERN

SECTION THROUGH CEILING

LUTHERAN CENTER
CONFERENCE ROOM BALTIMORE-MD.
DESIGN: GWATHMEY SIEGEL & ASSOC. - N.Y.
INSTALLATION: CENTERLINE CONST. CO. - BALTIMORE MD.
GENERAL VIEW OF TRADING FLOOR
FEATURES:
- Curved ceiling comprising of panels approximately 4’-8” (1.4m) square.
- Square panels are both ribbed and perforated.

THE NEW YORK STOCK EXCHANGE

DESIGN: SKIDMORE OWINGS & MERRILL - ARCHITECTS - NY
INSTALLATION: NATIONAL ACOUSTICS - NY
FEATURES:
- Ceiling comprised of concentric rings of curved panels.
- Front of panels rigidised to reflect sound.
- Rear of panels perforated to absorb sound and handle air.
- Perforation pattern is radial, emanating from center of circles.
- Openings for light fixtures cast in.
- Access panels provided in curved surface in 3 locations.
- Joints all taped - standard drywall / plasterboard taping.
REFLECTED CEILING PLAN

ACCESS PANEL

SECTION THROUGH CURVED CEILING

THIS FACE RIGIDISED
FEATURES:
- Perforated panels are removable and 4'5" (1.35m) square.
- Frame system replacing drywall was hung on wire.
- All lamp and sprinkler openings built into frame system.
- Prepainted panels were dropped in after completion of frame system.

PEPSICO CAFETERIA
PEPSICO PURCHASE - N.Y.

DESIGN: GWATHMEY SIEGEL & ASSOCIATES. N.Y.
INSTALLATION: CORD CONTRACTING - ROSLYN HTS. - N.Y.
DETAILS OF JOINTS BETWEEN PANELS

LECTURE HALL CEILING

FEATURES:
- Circular lecture hall ceiling comprised of three sizes of pyramid panels.
- Pyramids have two facets perforated, and two solid.
- While facets of pyramid are angular, perforations are at 90° to the horizontal.
- Light fixture openings were cast in for custom fixtures.
- Original design was in metal - Formglas G.R.G. was more economical.
- Slab above the hall serves as a helicopter landing pad.

TOYO UNIVERSITY
TOYO UNIVERSITY - TOKYO

DESIGN: DAI-ICHI KOUBOU.
GENERAL CONTRACTOR: KAJIMA & TODA - JAPAN.
REFLECTED CEILING PLAN

DETAIL OF FACETS OF PYRAMIDS WITH PERFORATION PATTERNS
FEATURES:

- Ceiling is skewed grid.
- Light fixtures are independently suspended in pre-cast openings in panels.
- Some panels are removable for access.
- Panels are approx. 4'x4' (1200mm x 1200mm)
FEATURES:

- Ceiling is curved in plan and section.
- Ceiling is a combination of perforated and plain curved panels.
- Ceiling panels incorporate lighting and mechanical.

AUDITORIUM

MERCK OFFICE COMPLEX

UPPER GWYNEDD TOWNSHIP - PA

DESIGN: BALLINGER - ARCHITECTS - PA.
INSTALLATION: DUGGAN & MARCON.
CONTRACTOR: TURNER CONSTRUCTION.
FEATURES:
- Panels are 5'-0" (1525mm) square.
- Panels are face fastened to light metal framing.
- Fastening is in ¾" (19mm) perimeter solid edge.
4" (100mm) wide MetalCast® 'Channels' these 'Cold Cast' Metal/G.R.G. Gypsum units are 1/3 the weight of steel.

A QuarryCast® 'Concrete' Screen at 1/3 the weight of concrete.

FOR DIFFERENT FORMGLAS MATERIAL TYPES SEE OUR 'INTERIOR ELEMENTS' BROCHURE.
IDEAS
IDEAS
STORE INTERIOR WITH PERFORATED PANEL CEILING

• SIMPLE ARRANGEMENT OF FLOATING PANELS
  INTERSPERCED WITH RECESSED LIGHTING.

COUNTRY ROAD STORE
NEW YORK
N.Y.

DESIGN: LALIRE MARCH ARCHITECTS - N.Y.C

REFLECTED CEILING PLAN

DETAIL PLAN

DETAIL AT JOINTS
1. SHOP DRAWINGS CONVERTED TO 3D MODELS.
2. PATTERNS CUT ON CNC MACHINES.
3. PANELS ARE FABRICATED.
4. PANELS INSTALLED ON SITE.

THE PROCESS
SHALLOW RIBS (SEE P. 7)  CAN SUIT ANY SHAPE  SHALLOW GROOVES

1/4" (6mm min.)

DEEP RIBS / CURVED SURFACE  RADIUS EDGES  CURVED SURFACE

1/2" 1/4" 1/2" 1/4" 1/2" 1/2"

1/16" 5

PERFORATION PATTERNS

• CUSTOM DESIGN ON ANY SHAPE.
• IN ANY FORMGLAS MATERIAL.
• CAN BE BACKED WITH ‘NON WOVEN’ FABRIC.
• MIN. PERFORATION DIAMETER - 1/4" (6mm)
• MIN. SPACE BETWEEN PERFORATIONS - 1/2" (12mm)
• MIN. PANEL THICKNESS - 3/16" (5mm)
• FLAT PANELS UP TO 5’ X 5’ (1.5m x 1.5m)
• ALL FORMGLAS PRODUCTS HAVE A ‘0’ FLAME, VERY LOW SMOKE RATINGS AND ARE APPROVED FOR UNRESTRICTED USE ACROSS THE GLOBE.

FOR DIFFERENT FORMGLAS MATERIAL TYPES SEE OUR ‘INTERIOR ELEMENTS’ BROCHURE.
<table>
<thead>
<tr>
<th>Country</th>
<th>Testing Agency</th>
<th>Test Method/Standard</th>
<th>Certificate</th>
<th>Type of Test</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>Ortech International</td>
<td>CAN-S114-M80</td>
<td>Flame 0 Smoke 6</td>
<td>Surface Burning Characteristics</td>
<td>MetalCast</td>
</tr>
<tr>
<td></td>
<td>Ortech International</td>
<td>ASTM E94-94</td>
<td>Flame 3 Smoke 6</td>
<td>Surface Burning Characteristics</td>
<td>QuarryCast E</td>
</tr>
<tr>
<td></td>
<td>Intertek Testing Service</td>
<td>CAN/ULC S-102-M88</td>
<td>96-T16-U4954-39</td>
<td>Hardness &amp; Abrasion</td>
<td>All Formglas Products</td>
</tr>
<tr>
<td></td>
<td>Ortech International</td>
<td>ASTM C501</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>CSTB</td>
<td>MO No RA99-076</td>
<td>Burning Characteristics</td>
<td>GRG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CSTB</td>
<td>MO No RA99-076</td>
<td>Burning Characteristics</td>
<td>QuarryCast</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CSTB</td>
<td>MO No RA99-076</td>
<td>Burning Characteristics</td>
<td>MetalCast</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MPA - NRW</td>
<td>DIN 4102-1(Mai 1998)</td>
<td>A2 No 23000982-3</td>
<td>Burning Characteristics</td>
<td>MetalCast</td>
</tr>
<tr>
<td></td>
<td>MPA - NRW</td>
<td>DIN 4102-1(Mai 1998)</td>
<td>A1 No 23000982-1</td>
<td>Burning Characteristics</td>
<td>GRG</td>
</tr>
<tr>
<td></td>
<td>Germanischer Lloyd</td>
<td>15-569-00 HH</td>
<td>Non Combustible - Type Approval Certificate</td>
<td>QuarryCast</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Germanischer Lloyd</td>
<td>15-568-00 HH</td>
<td>Non Combustible - Type Approval Certificate</td>
<td>GRG</td>
<td></td>
</tr>
<tr>
<td>Hong Kong</td>
<td>Facadotech</td>
<td>Safety test of GRC Mouldings</td>
<td>Structural Adequacy Test (Cyclic)</td>
<td>Formglas EP</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>Ministry of Construction</td>
<td>1142</td>
<td>Certificate of Non-Combustibility</td>
<td>QuarryCast</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ministry of Construction</td>
<td>11589</td>
<td>Certificate of Non-Combustibility</td>
<td>GRG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ministry of Construction</td>
<td>11916</td>
<td>Certificate of Non-Combustibility</td>
<td>Formglas EP</td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>SINTEF NBL</td>
<td>IMO Resolution A.472(XII)</td>
<td>250010.10/95.280B</td>
<td>Non-Combustibility Test</td>
<td>QuarryCast</td>
</tr>
<tr>
<td></td>
<td>Det Norske Veritas</td>
<td>IMO Resolution A.472(XII)</td>
<td>250010.10/95.280B</td>
<td>Non-Combustibility Test</td>
<td>GRG</td>
</tr>
<tr>
<td></td>
<td>Det Norske Veritas</td>
<td>BS476 Part 4</td>
<td>F15392</td>
<td>Non Combustible - Type Approval Certificate</td>
<td>QuarryCast</td>
</tr>
<tr>
<td></td>
<td>Det Norske Veritas</td>
<td>BS476 Part 4</td>
<td>F15391</td>
<td>Non Combustible - Type Approval Certificate</td>
<td>GRG</td>
</tr>
<tr>
<td>Singapore</td>
<td>Singapore Fire Service</td>
<td>BS476 Part 4</td>
<td>Ref G61417/B/HT</td>
<td>Non-Combustibility Test</td>
<td>QuarryCast</td>
</tr>
<tr>
<td></td>
<td>PSB - Singapore</td>
<td>BS476 Part 4</td>
<td>Ref G 132941/B/SCA</td>
<td>Non-Combustibility Test</td>
<td>Formglas EP</td>
</tr>
<tr>
<td></td>
<td>SISIR</td>
<td>BS476 Part 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switzerland</td>
<td>Sicherheitsinsitut</td>
<td>Certificate 20000.6241</td>
<td>Non-Combustibility Test</td>
<td>QuarryCast</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Stanfield</td>
<td>BS 5432 &amp; BS EN 1170</td>
<td>Report 7/22/99</td>
<td>4 Point Bend Testing</td>
<td>Formglas EP</td>
</tr>
<tr>
<td></td>
<td>Department of Transport</td>
<td>SUR22 (Rev 7/92)</td>
<td></td>
<td>Certificate of Acceptability</td>
<td>QuarryCast</td>
</tr>
<tr>
<td></td>
<td>Marine Directorate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>Lloyds Register</td>
<td>IMO Resolution A.472(XII)</td>
<td>MEDIT050301</td>
<td>EC Examination (Type Approval)</td>
<td>QuarryCast</td>
</tr>
<tr>
<td></td>
<td>Lloyds Register</td>
<td>IMO Resolution A.472(XII)</td>
<td>MEDIT050301</td>
<td>EC Examination (Type Approval)</td>
<td>GRG</td>
</tr>
<tr>
<td></td>
<td>United States Testing Company</td>
<td>PRO/MT/…/LC/SCREEN</td>
<td>04431</td>
<td>Combustion Product inhalation Toxicity Screening</td>
<td>GRG</td>
</tr>
<tr>
<td></td>
<td>Dept. of Buildings-N.Y. City</td>
<td>MEA 211-83-M</td>
<td></td>
<td>Approval of material for use in construction</td>
<td>QuarryCast</td>
</tr>
<tr>
<td></td>
<td>United States Coast Guard</td>
<td>46 CFR Ch1.</td>
<td>Subpart 164.009-3c</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>United States Testing Company</td>
<td>ASTM E84-81a</td>
<td>85394</td>
<td>Surface Burning Characteristics of Building Materials</td>
<td>GRG/Gformglas EP</td>
</tr>
<tr>
<td></td>
<td>Underwriters Laboratories</td>
<td>IMO A.799</td>
<td>R20583/00N04138</td>
<td>Noncombustibility</td>
<td>GRG/Gformglas EP/GRG/Gformglas EP</td>
</tr>
<tr>
<td></td>
<td>Underwriters Laboratories</td>
<td>IMO A.799</td>
<td>R20583/00N04138</td>
<td>Noncombustibility</td>
<td>GRG/Gformglas EP/GRG/Gformglas EP</td>
</tr>
<tr>
<td></td>
<td>Underwriters Laboratories</td>
<td>IMO A.653 (16) Section 10</td>
<td>R20583/00N04138</td>
<td>Noncombustibility</td>
<td>QuarryCast/Gformglas EP/GRG/Gformglas EP</td>
</tr>
</tbody>
</table>
FORMGLAS LITERATURE

FORMGLAS LITERATURE

DESIGN ①  QuarryCast®  MetalCast®

Interior Elements  PERFORATIONS

Formglas Inc.
20 Toro Road, Toronto, ON CANADA M3J 2A7
Tel: (416) 635-8030  Fax: (416) 635-6588
Web Site: http://www.formglas.com
Email: enquiries@formglas.com

Formglas (SEA) Sdn Bhd.
Number 23, Jln Perindustrian 5, Jln Haji Manan,
Bt 51/2, Off Jln Meru, 41050 Klang, Selangor
Tel: (603) 3009-5998  Fax: (603) 3009-5989

Formglas Japan Inc.
1-10-4 Shinjuku Shinjuku-Ku, Tokyo 160, JAPAN
Tel: (03) 3225-8397  Fax: (03) 3225-9153

CC1478 - 011415