**PRODUCT DESCRIPTION**

Hy-Rib® Sacrificial Expanded Metal Formwork allows concrete slurry to flow through the key joint, ensuring aggregate interlock. Hy-Rib® is primarily used in construction joint applications but it also usable in wall, beam, column and soffit slab constructions, where the formed surface will not be seen.

**BENEFITS**

- Removes the need to scabble stop ends
- Reduces the risk of honeycombing and trapped air within the slab
- Can be effectively used horizontally or vertically
- Edge design allows for tight nesting of adjacent sheets.

**CONCRETING / VIBRATION COMPACTION**

- Where continuous vibration is used keep poker about 450mm from the Hy-Rib®
- In close proximity to Hy-Rib® stpend, vibrate in 5 second bursts until concrete is compacted
- Vibrate in this way until cement grout is observed coming through the open mesh
- Highly workable and ‘fluid’ mixes may require less total vibration effort than ‘stiff’ concrete mixes.

- Do not use continuous and excessive vibration too close to the Hy-Rib® face. This may result in excessive loss of concrete fines.
- Do not vibrate the stpend.
- External vibrators are not recommended for use with Hy-Rib®
- Do not vibrate the steel reinforcement.
### CONCRETE FINISH

The ideal Hy-Rib®/concrete face suitable for the subsequent pour is achieved by:

- ✔ Following the placement and compaction guidance in this document. Do nothing else!

### CLEANING

- ✔ If excess grout builds up on the walings and supports it is good practice to lightly brush these clean before the concrete hardens.

### CURING

- ✔ If curing is needed, use well sealed polythene sheeting pressed over the ends of any projecting reinforcement.

### PREPARING THE JOINT FOR THE NEXT POUR

- ✔ Remove the timber cover zone strips and prepare the exposed concrete band, being careful not to damage the edge corners.

- ✔ The Hy-Rib® surface itself needs little if any preparation before the next pour. Remove any fins and obvious debris.

- ✗ Never disturb the face of the fresh Hy-Rib®/concrete

- ✗ Never brush, scrape or jet-wash the fresh concrete/Hy-Rib® face

- ✗ Do not disturb the fresh concrete/Hy-Rib® face while removing any overspill and grout build up on the walings.

- ✗ Never brush, scrape or jet-wash the fresh concrete/Hy-Rib® face

- ✗ Do not use curing compounds on any joint or Hy-Rib® stopends to which a further pour will be connected (Many curing agents make excellent de-bonding agents!)

- ✗ Do not remove the Hy-Rib® sheet - It is permanent formwork!
DESIGN THEORY

PERFORMANCE OF EXPAMET HY-RIB®

Tests have been carried out to verify the performance of Hy-Rib® at construction joints.

Assessment of shear, flexure and concrete strength at the joint confirms that the use of Hy-Rib® can improve the load achieved at this location.

Examination of cores taken at concreted Hy-Rib® joints shows full compaction around the Hy-Rib® ribs and grout penetration at overlapping joints.


PROPERTIES OF EXPAMET HY-RIB®

<table>
<thead>
<tr>
<th>GRADE</th>
<th>2411</th>
<th>2611</th>
<th>2811</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section Modulus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z_{Joint}</td>
<td>mm^3/m</td>
<td>1710</td>
<td>1125</td>
<td>952</td>
</tr>
<tr>
<td>Z_{Span}</td>
<td>mm^3/m</td>
<td>2233</td>
<td>1488</td>
<td>1266</td>
</tr>
<tr>
<td>Moment of resistance (working) (kN-m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kN-m</td>
<td>0.330</td>
<td>0.217</td>
<td>0.184</td>
<td>At supports (rib away from load)</td>
</tr>
<tr>
<td>m</td>
<td>0.431</td>
<td>0.287</td>
<td>0.244</td>
<td>At midspan (rib towards load)</td>
</tr>
<tr>
<td>Bending stiffness (EI)</td>
<td>kN-m</td>
<td>3.94</td>
<td>2.53</td>
<td>2.00</td>
</tr>
<tr>
<td>Working maximum reaction</td>
<td>kN-m</td>
<td>19.94</td>
<td>14.90</td>
<td>10.88</td>
</tr>
<tr>
<td>Assumed max. working shear</td>
<td>kN-m</td>
<td>9.97</td>
<td>7.45</td>
<td>5.44</td>
</tr>
</tbody>
</table>

Notes:
1. The properties assume that the Hy-Rib® is used with the ribs pointing into the concrete to be placed first and spanning in the strong direction between supports with the ribs parallel with the span.
2. The Hy-Rib® is considered a single use sacrificial material with a minimum factor of safety of 1.4 on ultimate failure. The failure stress being the minimum ultimate tensile strength of the Hy-Rib® sheet material.
3. The bending stiffness values should only be used for estimating deflections. They allow for the complex geometric changes in properties and shape as Hy-Rib® deflects.
HEALTH AND SAFETY INFORMATION

HY-RIB® HEALTH AND SAFETY DATA SHEET

1. IDENTIFICATION
Hy-Rib® expanded metal sheet
Expamet Building Products Limited
Greatham Street
Longhill Industrial Estate (North)
Hartlepool TS25 1PR
Tel: +44 (0)1429 866688
Fax: +44 (0)1429 866633

2. COMPOSITION
Galvanised steel
DX51D+Z275 (Fe PO 2 G Z275) to BS EN 10327
Stainless steel
X5CrNi8-10 (1.4301) to BS EN 10088-1
X2CrNiMo17-12-2 (1.4404) to BS EN 10088-1

3. HAZARDS IDENTIFICATION
Possible cuts from steel edges.
Toxic and irritant fumes from high temperatures.
Dust and noise from cutting with abrasive wheels.

4. FIRST AID MEASURES
Skin and eye contact: treat cuts from steel edges as required.
Ingestion: not applicable.
Inhalation: remove from source of fumes and dust.

5. FIRE FIGHTING MEASURES
Non-flammable material.

6. ACCIDENTAL RELEASE MEASURES
Not applicable.

7. HANDLING AND STORAGE
Bands and straps must not be used for lifting.
Use suitable PPE when handling the Hy-Rib sections.
Assess manual handling risks before lifting.
Bundles of Hy-Rib should be stacked on firm level ground in dry conditions.

8. EXPOSURE CONTROLS
Wear personal protection such as gloves, safety goggles and appropriate mask when handling and cutting sections.
Some products may have a film of soluble cutting fluid after manufacture; therefore carry out personal hygiene, including proper washing of hands, after contact.

9. PHYSICAL AND CHEMICAL PROPERTIES
Hy-Rib® is supplied in various lengths, widths and gauges. Metallic grey appearance.

10. STABILITY AND REACTIVITY
Hy-Rib® is stable under normal conditions but if subjected to high temperatures, fumes are produced.

11. TOXICOLOGICAL INFORMATION
Abrasive cutting of Hy-Rib may produce dust of the same composition as the coating and base metal.
High temperatures can produce fumes.

12. ECOLOGICAL INFORMATION
No known hazard.

13. DISPOSAL CONSIDERATIONS
Recycle or dispose of in accordance with Waste Management Licensing Regulations.

14. TRANSPORT INFORMATION
Not classified as hazardous for transport.

15. REGULATORY INFORMATION
Hy-Rib is an article therefore not subject to CHIP3.

16. OTHER INFORMATION
All products must be installed in accordance with Expamet Building Products’ published instructions.
The Hy-Rib® Health and Safety Data Sheet is not a product specification guide.

Any arrangement of reinforcing steel shown in this brochure is indicative only.
Actual reinforcement installations must comply with current Health and Safety requirements.
**PRODUCT RANGE**

**HY-RIB® IS AVAILABLE IN 2000, 3000, 4000 AND 5000mm LENGTHS**

**ORDER CODING:**

**Standard Sheet**
Quote Grade and Length
e.g. 26113000
or 281130005304

**Galvanised Narrow Width Sheet**
Quote Grade, Length and Rib Numbers
e.g. 26113000 - 3rib

**CURVED HY-RIB®**

ORDER REQUIREMENTS:
Specify
Ribs In or Out
Radius and Arc Length
or
Chord Length and Rise
Dimensions to be given to concrete face.
**DESIGN THEORY**

**REDUCTION IN THE PRESSURE OF CONCRETE ON HY-RIB®**

The recommended reduction in design concrete pressure when using Hy-Rib®, compared to the calculated Construction Industry Research and Information Association (CIRIA) Report 108 values for casting against impermeable formwork are shown at below. These show that the maximum concrete pressure obtained when using Hy-Rib® is almost halved for pours up to 3m in height, with an upper limit of 38 kN/m² for walls from 3m up to 5m in height. 

The research work, carried out by the British Cement Association confirmed the significant reduction in the pressure of concrete placed in vertical sections against Hy-Rib® when compared to the predicted pressure obtained using the full weight density head of concrete. 

The results from five full scale wall pours, each 5m high, are shown plotted below. They were also published in Concrete magazine. The trials were carried out using concrete with additions and admixtures to provide a very high workability mix to give extremely fast rates of rise. The CIRIA Report 108 "Concrete pressures on formwork" categorises these concretes as Group 4, and predicts that at such rates of rise the design maximum pressure should use the weight density head of concrete. The actual concrete density averaged 23.15 kN/m³ in the wall trials.

![Concrete pressure diagram using Hy-Rib® and group 1,2,3,4 or 5 concrete](image)

The general method of determining the design concrete pressure uses Table 2 from CIRIA Report 108 with a weight density of 25 kN/m³, and concrete classified into five groups. Although the full scale tests were carried out on a very fluid group 4 concrete, the BCA are of the opinion that it is reasonable to assume that the pressure reductions can also be applied when using Hy-Rib® with the stiffer group 1 and 2 concretes using CEM I, CEM I/R or + SR with or without any admixture. Hy-Rib® is also effective when used with Group 6 and 7 concrete, and has been used with concrete of slump 180mm.

In addition the BCA have recorded the same reduction of concrete pressure on a very thick section (8m wide) whilst pouring a 5m high double faced wall using Hy-Rib® to both faces.
**INSTALLATION ESSENTIALS**

**HY-RIB® SHEET EDGE DETAILS**

Hy-Rib® butted to plywood comb

Taper edge of comb to ease strike

Large Hy-Rib® sheet cut to size

Ensure the cut edge is supported by timber or additional steel bar

Slightly oversized Hy-Rib® sheet

Fold and tie small return into pour
**DESIGN THEORY**

**THIN WALL CONSTRUCTION JOINTS:**
**MAXIMUM SPACING ON TIMBER SUPPORTS**

⚠️ All temporary works must be designed by a competent Temporary Works Designer

**INDICATIVE SPACING OF SUPPORTS TO HY-RIB® AT A VERTICAL JOINT IN A WALL**

<table>
<thead>
<tr>
<th>Position of the support measured from the top of the wall</th>
<th>Grade 2411</th>
<th>Grade 2611</th>
<th>Grade 2811</th>
<th>Grade 2811 S 304</th>
<th>Grade 2811 S 316</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>support spacing</td>
<td>approximate wall height</td>
<td>support spacing</td>
<td>approximate wall height</td>
<td>support spacing</td>
</tr>
<tr>
<td>1</td>
<td>650</td>
<td>see note 5</td>
<td>575</td>
<td>see note 5</td>
<td>550</td>
</tr>
<tr>
<td>2</td>
<td>575</td>
<td>see note 5</td>
<td>525</td>
<td>see note 5</td>
<td>500</td>
</tr>
<tr>
<td>3</td>
<td>525</td>
<td>1750</td>
<td>475</td>
<td>1575</td>
<td>450</td>
</tr>
<tr>
<td>4</td>
<td>475</td>
<td>2225</td>
<td>425</td>
<td>2000</td>
<td>400</td>
</tr>
<tr>
<td>5</td>
<td>425</td>
<td>2650</td>
<td>375</td>
<td>2375</td>
<td>375</td>
</tr>
<tr>
<td>6</td>
<td>375</td>
<td>3025</td>
<td>325</td>
<td>2700</td>
<td>325</td>
</tr>
<tr>
<td>7</td>
<td>375</td>
<td>3400</td>
<td>300</td>
<td>3000</td>
<td>275</td>
</tr>
</tbody>
</table>

Load in the supports: approximately 14.3 kN/m, approximately 11.4 kN/m, approximately 10.5 kN/m

**Notes:**

1. The Hy-Rib® is used in vertical sheets with the ribs pointing into the concrete.
2. The value of the support spacing is measured centre to centre of the vertical supports and is NOT the clear distance.
3. The supports to the Hy-Rib® are horizontal and are a minimum of 50mm wide.
4. The approximate load per metre of the supporting members is given as a guide only.
5. It is assumed that the Hy-Rib® is continuous over at least three spans (i.e. over four horizontal supports).
   If this is not the case, refer to a designer for the increase in load on the supports.
DESIGN THEORY

SLAB CONSTRUCTION JOINTS: MAXIMUM SPACING ON TIMBER SUPPORTS

⚠️ All temporary works must be designed by a competent Temporary Works Designer

INDICATIVE CLEAR DISTANCE BETWEEN SUPPORTS AT SLAB JOINTS

<table>
<thead>
<tr>
<th>Overall depth of slab joint</th>
<th>Theoretical* Table 2 CIRIA 108</th>
<th>Assumed for Hy-Rib</th>
<th>Grade 2411</th>
<th>Grade 2611</th>
<th>Grade 2811</th>
<th>Grade 2811 S 304</th>
<th>Grade 2811 S 316</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>kN/m²</td>
<td>kN/m²</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
</tr>
<tr>
<td>250</td>
<td>6.25</td>
<td>3.20</td>
<td>1250</td>
<td>1025</td>
<td>950</td>
<td>675</td>
<td>550</td>
</tr>
<tr>
<td>500</td>
<td>12.50</td>
<td>6.30</td>
<td>900</td>
<td>725</td>
<td>675</td>
<td>550</td>
<td>550</td>
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<tr>
<td>750</td>
<td>18.75</td>
<td>9.50</td>
<td>725</td>
<td>600</td>
<td>550</td>
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<td>550</td>
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<tr>
<td>1000</td>
<td>25.00</td>
<td>12.70</td>
<td>625</td>
<td>500</td>
<td>475</td>
<td>425</td>
<td>400</td>
</tr>
<tr>
<td>1250</td>
<td>31.25</td>
<td>15.80</td>
<td>575</td>
<td>450</td>
<td>425</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>1500</td>
<td>37.50</td>
<td>19.00</td>
<td>525</td>
<td>425</td>
<td>400</td>
<td>375</td>
<td>350</td>
</tr>
<tr>
<td>2000</td>
<td>50.00</td>
<td>25.30</td>
<td>450</td>
<td>375</td>
<td>350</td>
<td>300</td>
<td>275</td>
</tr>
<tr>
<td>2500</td>
<td>62.50</td>
<td>31.70</td>
<td>400</td>
<td>325</td>
<td>300</td>
<td>275</td>
<td></td>
</tr>
<tr>
<td>3000</td>
<td>75.00</td>
<td>38.00</td>
<td>375</td>
<td>300</td>
<td>275</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:

1. The Hy-Rib® is used in horizontal sheets with the ribs pointing into the concrete to be placed, and spanned in the strong direction between vertical supports.

2. The theoretical maximum pressure is that calculated using Table 2 in CIRIA report 108 with a concrete density of 25kN/m³, for EITHER a wall, base or column; AND applies to concrete groups 1 to 5 inclusive.

3. The Hy-Rib® pressure diagram up to 3m in height of joint is assumed to be triangular. The permissible spans calculated from a uniformly applied concrete have been increased by a factor of 1.2 to allow for the triangular shape of the concrete pressure diagram. The maximum pressure only applies at the very bottom of the joint.
INTRODUCTION

Expamet Hy-Rib® is an expanded metal sheet product, specifically developed for use as permanent formwork to concrete. The profile of the open mesh, in combination with the Hy-Rib® tags, allow the development of dense concrete nodules and indents on the face of the Hy-Rib®, forming an enhanced mechanical key for the second phase pour. In the case of visible elements, the resulting Hy-Rib® surface is suitable to receive a rendered or tiled finish.

Hy-Rib® is primarily used in construction joint applications but it is also used to form wall, beam and column surfaces and slabs soffits, where the formed surface will not be seen.

For over 80 years Hy-Rib® has been successfully used as permanent formwork on innumerable building and infrastructure projects, throughout the world.

Hy-Rib® has an enviable portfolio of technical data. Independent bodies have undertaken full scale testing programmes to determine and verify Hy-Rib’s® effectiveness in forming construction joints. The result is a product with well defined engineering properties, established formwork pressure characteristics and measured improvements to the joint performance. Hy Rib® is certified for use as permanent formwork by the British Board of Agrément (BBA). Hy-Rib® is manufactured within a factory production control system conforming with BS EN ISO 9001/2000.

REASONS TO USE EXPAMET HY-RIB®

- Reduced risk of Hand and Arm vibration injury (white finger); product featured in HSE document - Vibration Solutions Ref HS (G) 170
- When Hy-Rib® is used as vertical formwork, the resulting formwork pressure is significantly less than that developed with traditional forming materials, reducing the overall support requirement.
- Expamet Hy-Rib® joint surfaces require minimal preparation prior to the next pour, with the exception of the rebar cover zones. It minimises the labour, mess and disposal requirements associated with scabbling, chemical retarders and jet washing.
- A correctly formed Hy-Rib® joint outperforms traditionally prepared joints in shear and bond.
- Hy-Rib reduces the risk of trapped air and voids within the concrete.
- The range of narrower sheet widths improves site productivity and minimises wastage.
- Hy-Rib is a proven construction product with comprehensive technical data, manufactured by an established UK company.
CONTENTS

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PRODUCT RANGE

SECTION 2
INSTALLATION ESSENTIALS

SECTION 3
CONCRETE

SECTION 4
DESIGN THEORY
PRODUCT RANGE

ZINC COATED HY-RIB

<table>
<thead>
<tr>
<th>Grade</th>
<th>2811</th>
<th>2611</th>
<th>2411</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type: (BS EN 10327)</td>
<td>DX51D + Z275</td>
<td>DX51D + Z275</td>
<td>DX51D + Z275</td>
</tr>
<tr>
<td>Thickness (Steel Gauge)</td>
<td>0.4mm</td>
<td>0.5mm</td>
<td>0.75mm</td>
</tr>
<tr>
<td>Weight</td>
<td>3.39kg/m²</td>
<td>4.23kg/m²</td>
<td>6.34kg/m²</td>
</tr>
</tbody>
</table>

Sheet Identification
- ID Colour: Red 2811
- ID Colour: Green 2611
- ID Colour: Yellow 2411

STAINLESS STEEL HY-RIB

<table>
<thead>
<tr>
<th>Grade</th>
<th>2811 S 304</th>
<th>2811 S 316</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type: (BS EN 10088-1)</td>
<td>1.4301</td>
<td>1.4404</td>
</tr>
<tr>
<td>Thickness (Steel Gauge)</td>
<td>0.4mm</td>
<td>0.4mm</td>
</tr>
<tr>
<td>Weight</td>
<td>3.4kg/m²</td>
<td>3.4kg/m²</td>
</tr>
</tbody>
</table>

Sheet Identification
- ID Colour: Blue 2811 S 304
- ID Colour: Black 2811 S 316

SHEET WIDTHS

HY-RIB® STANDARD SHEET SIZE - ALL GRADES

<table>
<thead>
<tr>
<th>Width: 445mm</th>
<th>Lengths: 2m, 3m, 4m, 5m</th>
</tr>
</thead>
</table>

6 Rib

HY-RIB® NARROW WIDTH SHEET SIZE - ZINC COATED GRADES

<table>
<thead>
<tr>
<th>Width: 356mm</th>
<th>Lengths: 2m, 3m, 4m, 5m</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Rib</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Width: 267mm</th>
<th>Lengths: 2m, 3m, 4m, 5m</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Rib</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Width: 178mm</th>
<th>Lengths: 2m, 3m, 4m, 5m</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Rib</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Width: 89mm</th>
<th>Lengths: 2m, 3m, 4m, 5m</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Rib</td>
<td></td>
</tr>
</tbody>
</table>
INSTALLATION ESSENTIALS

SLAB CONSTRUCTION JOINTS

WALL CONSTRUCTION JOINTS
**INSTRUCTION ESSENTIALS**

**HY-RIB® DEFINITIONS**
- Edge Rib
- Tangs
- Colour Coding Strip inside the rib
- Inner Rib

**MEASURING POINTS**
- Sheet width based on edge rib to edge rib centres

**HY-RIB® SPANNING DIRECTION**
Hy-Rib® spans between supports. Supports at right angles to the ribs

INSTALLATION ESSENTIALS

FIXING HY-RIB® TO BACKING SUPPORT

✓ Hy-Rib® sits flat on support
✓ Ribs point into first phase pour
✓ Tangs embed in first pour
✓ Colour coding facing outside

AFTER FIRST PHASE POUR

SIDE LAPPING OF HY-RIB® SHEETS

✓ Lap edge ribs only: approx 12mm overlap
✓ Wire tie lapped edge ribs at 300mm centres (150mm for soffits)
**INSTALLATION ESSENTIALS**

**END LAPPING OF HY-RIB® SHEETS**

Typical end lapping of Hy-Rib® sheets for wall stopends and construction joints.

- **Butt ends together:** zero overlap

- **Small overlap - 25 mm - 50 mm**
  - Tie sheets tightly together to minimise gap
  - Nail or tie Hy-Rib® to supports

**COVER TO HY-RIB® ON CONSTRUCTION JOINTS**

Hy-Rib® must have the same cover as the reinforcement and is generally fixed between the outer layers of reinforcement.

Temporary timber used to form cover zones.
**INSTALLATION ESSENTIALS**

**FITTING A HYDROPHILIC SEAL TO A CONSTRUCTION JOINT SUPPORTED BY TIMBER**

1. Leave a gap between adjacent Hy-Rib® sheets in line with the edge of the noggins to ensure a flat concrete surface where the seal is to be located.

2. After the first pour, remove the timber support and noggins and fix the seal to the flat concrete surface as per the manufacturer’s instructions.

Fit noggins between vertical Hy-Rib® support timbers at the position where the hydrophilic seal will need to be located.

Ensure that the timber noggins are at least as wide as the hydrophilic waterstop product.
CONCRETING / PLACEMENT

This section illustrates current best practice for placement and compaction of concrete in proximity to Hy-Rib® stopends. Further consultation should be taken if there is any uncertainty regarding site conditions - pour shape and size, concrete mix, type of compaction equipment and the Project Specification.

CONCRETE PLACEMENT ADJACENT TO STOP END: BEST PRACTICE DO’S AND DON’TS

Always follow standard good placement practice to avoid overloading any stopend.

✅ Use correct length of pipe trunking or tremie tube
✅ Place concrete at least 500mm from Hy-Rib® stopend
✅ Allow concrete to naturally flow up toward the Hy-Rib® stopend

❌ Don’t dump the concrete from excess height
❌ Don’t discharge concrete directly against the Hy-Rib® stopend
❌ Don’t allow concrete to pile up against the Hy-Rib® stopend