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PRODUCT DESCRIPTION

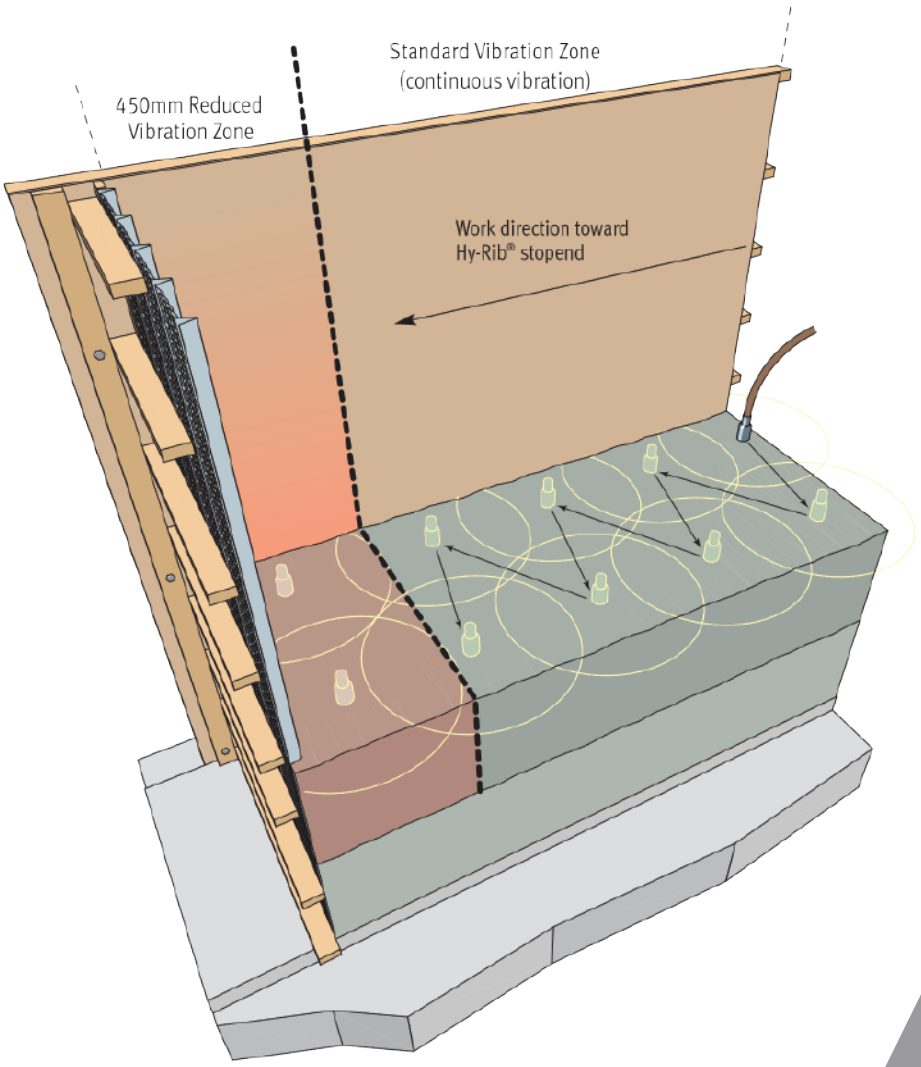
Hy-Rib® Sacrificial Expanded Metal Formwork allows concrete slurry to flow through the key joint, ensuring aggregate interlock. Hy-Rib® is primarily used in construction joint applications but it also usable in wall, beam, column and soffit slab constructions, where the formed surface will not be seen.

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

VIBRATION COMPACTION



- ✓ Where continuous vibration is used keep poker about 450mm from the Hy-Rib®
- ✓ In close proximity to Hy-Rib® stopend, vibrate in 5 second bursts until concrete is compacted
- ✓ Vibrate in this way until cement grout is observed coming through the open mesh
- ✓ Highly workability 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 stopend.
- ✗ External vibrators are not recommended for use with Hy-Rib®
- ✗ Do not vibrate the steel reinforcement

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CONCRETING / FINISH / CLEANING / CURING / NEXT POUR

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!

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

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

CLEANING

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

✗ 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

CURING

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

✗ 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!)

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.

✗ Do not remove the Hy-Rib® sheet - it is permanent formwork!

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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.

Test details are available at www.hy-rib.com.

PROPERTIES OF EXPAMET HY-RIB®

GRADE		2411	2611	2811	COMMENT
Section Modulus					
Z_{joint}	mm^3/m	1710	1125	952	Rib in tension
Z_{span}	mm^3/m	2233	1488	1266	Face in tension
Moment of resistance	kNm/m	0.330	0.217	0.184	At supports (rib away from load)
(working) (fZ)	kNm/m	0.431	0.287	0.244	At midspan (rib towards load)
Bending stiffness (EI)	kNm^2/m	3.94	2.53	2.00	See notes
Working maximum reaction	kNm/m	19.94	14.90	10.88	See notes
Assumed max. working shear	kNm/m	9.97	7.45	5.44	See notes

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.

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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.

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PRODUCT RANGE

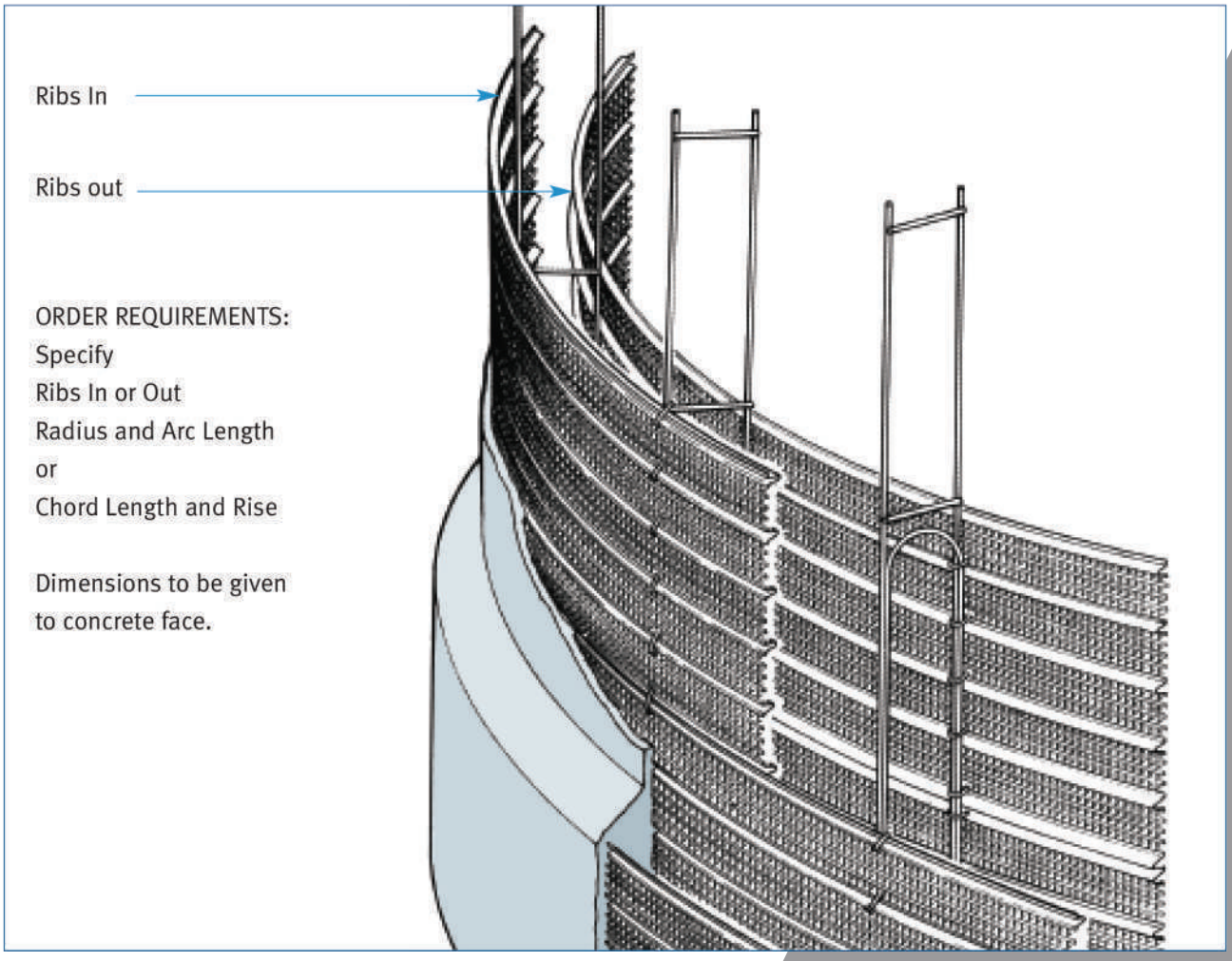
HY-RIB® IS AVAILABLE IN 2000, 3000, 4000 AND 5000mm LENGTHS

ORDER CODING:

Standard Sheet
Quote Grade and Length
e.g. 26113000
or 28113000S304

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

CURVED HY-RIB®



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DESIGN THEORY

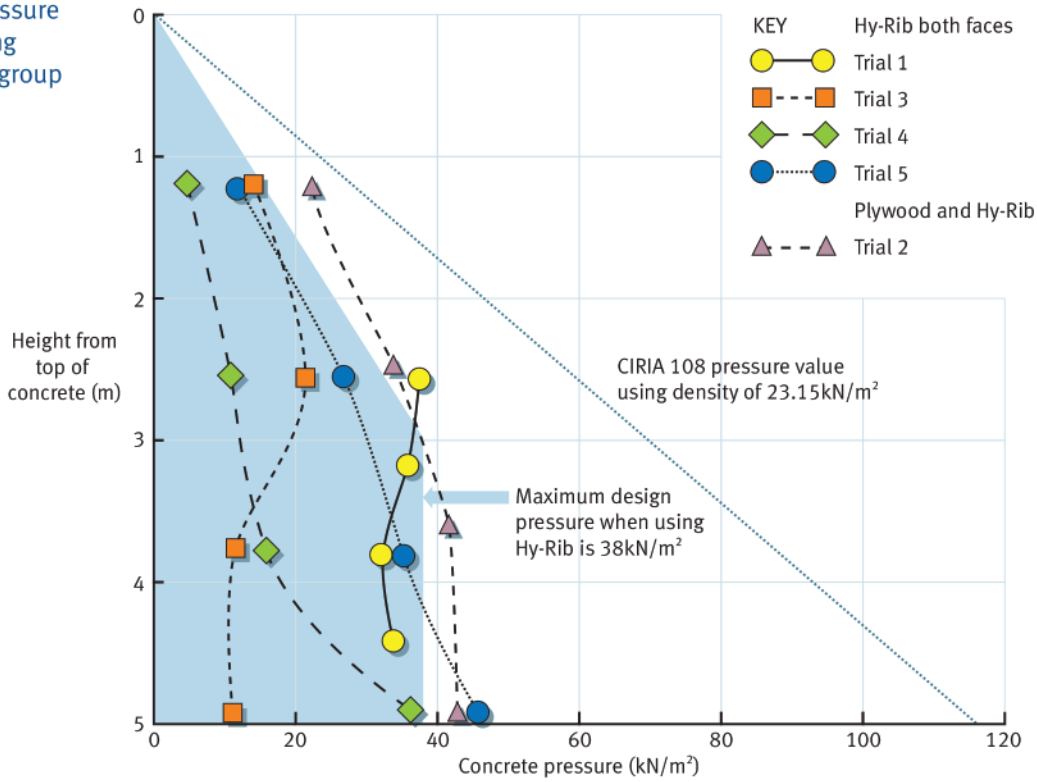
REDUCTION IN THE PRESSURE OF CONCRETE ON HY-RIB®

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



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.

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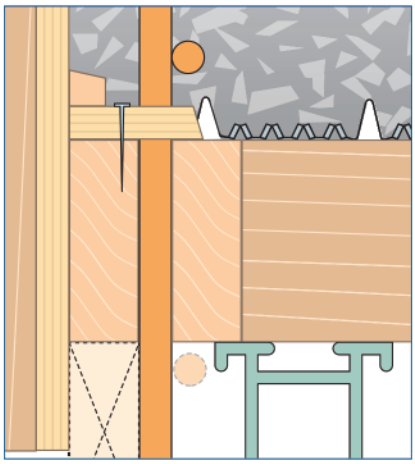
INSTALLATION ESSENTIALS

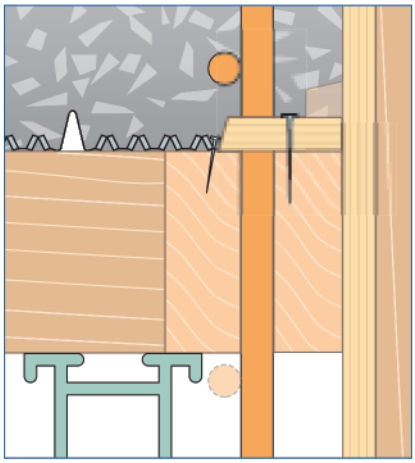
HY-RIB® SHEET EDGE DETAILS

Hy-Rib® butted to plywood comb

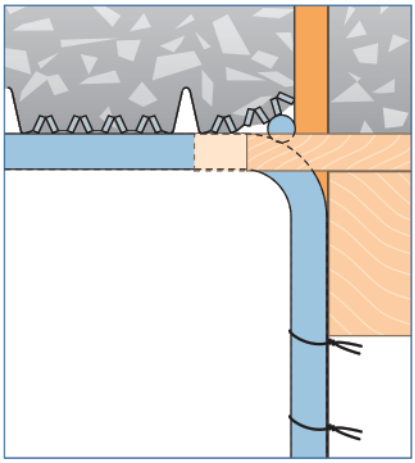


Taper edge of comb to ease strike

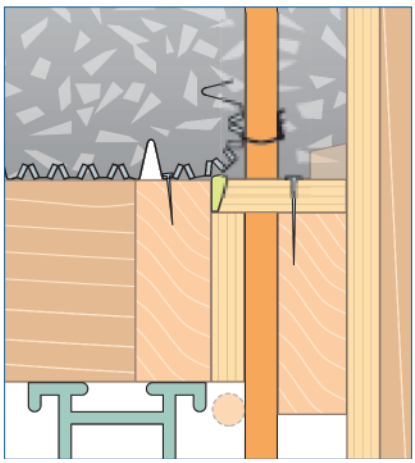
Large Hy-Rib® sheet cut to size



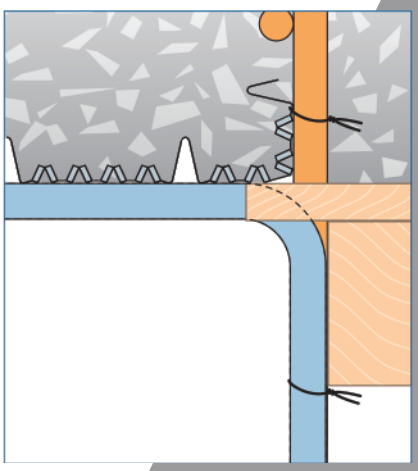
Ensure the cut edge is supported by timber or additional steel bar



Slightly oversized Hy-Rib® sheet



Fold and tie small return into pour



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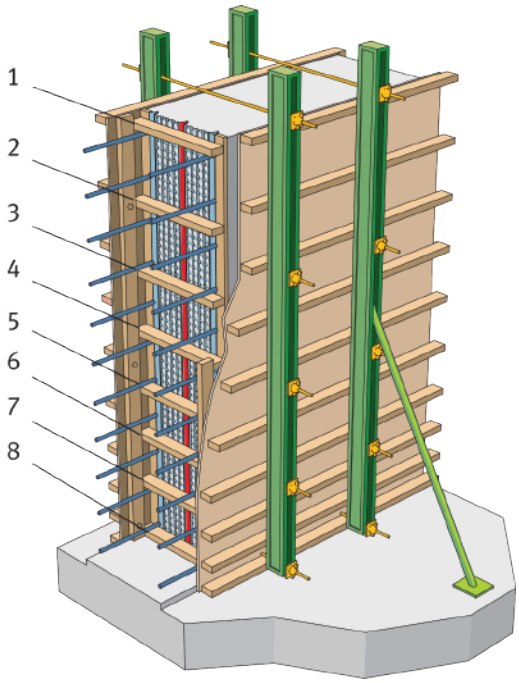
DESIGN THEORY

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

Position of the support measured from the top of the wall	Centre to centre spacing of the supports (mm) and the approximate height of wall (mm)					
	Grade 2411		Grade 2611		Grade 2811 Grade 2811 S 304 Grade 2811 S 316	
	support spacing	approximate wall height	support spacing	approximate wall height	support spacing	approximate wall height
1	650	see note 5	575	see note 5	550	see note 5
2	575	see note 5	525	see note 5	500	see note 5
3	525	see note 5	475	see note 5	450	see note 5
4	475	1750	425	1575	400	1500
5	425	2225	375	2000	375	1900
6	375	2650	325	2375	325	2275
7	375	3025	300	2700	275	2600
8		3400		3000		2875
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.

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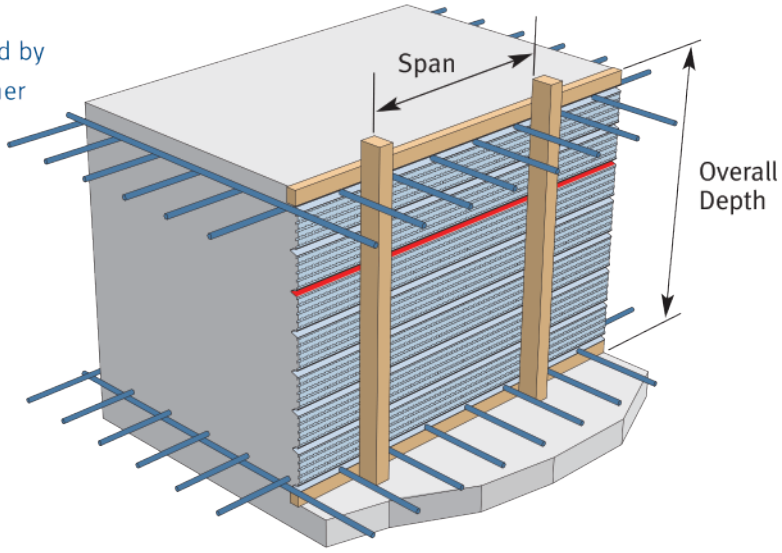
DESIGN THEORY

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

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

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.

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INTRODUCTION

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® tangs, 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.

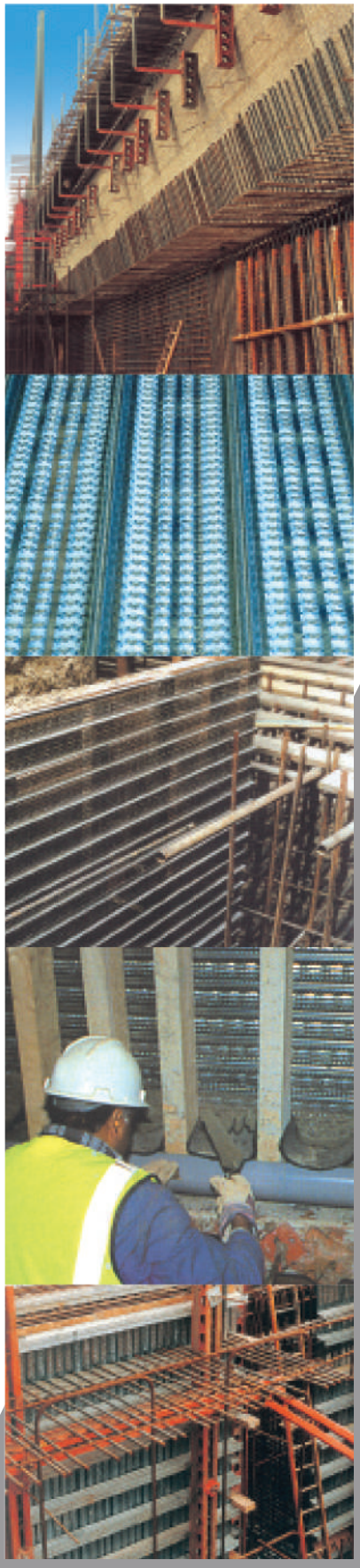
Hy-Rib® is primarily used in construction joint applications but it is also used to form wall, beam and column surfaces and slabs soffits, where the formed surface will not be seen.

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



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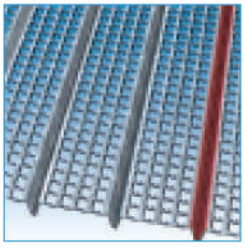

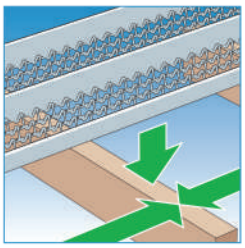

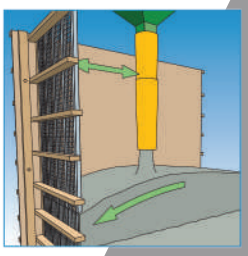

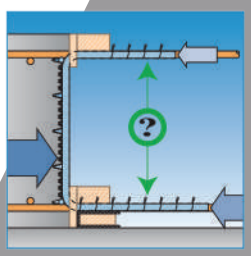

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PRODUCT RANGE

ZINC COATED HY-RIB®

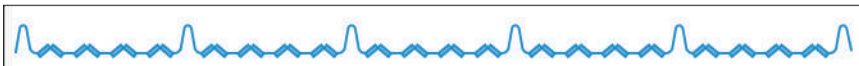
Grade	2811	2611	2411
Type: (BS EN 10327)	DX51D + Z275	DX51D + Z275	DX51D + Z275
Thickness (Steel Gauge)	0.4mm	0.5mm	0.75mm
Weight	3.39kg/m²	4.23kg/m²	6.34kg/m²
Sheet Identification	 ID Colour: **Red 2811**	 ID Colour: **Green 2611**	 ID Colour: **Yellow 2411**

STAINLESS STEEL HY-RIB®

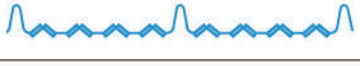
Grade	2811 S 304	2811 S 316
Type: (BS EN 10088-1)	1.4301	1.4404
Thickness (Steel Gauge)	0.4mm	0.4mm
Weight	3.4kg/m²	3.4kg/m²
Sheet Identification	 ID Colour: **Blue 2811 S 304**	 ID Colour: **Black 2811 S 316**

SHEET WIDTHS

HY-RIB® STANDARD SHEET SIZE - ALL GRADES

	6 Rib	Width: 445mm Lengths: 2m, 3m, 4m, 5m

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

	5 Rib	Width: 356mm Lengths: 2m, 3m, 4m, 5m
	4 Rib	Width: 267mm Lengths: 2m, 3m, 4m, 5m
	3 Rib	Width: 178mm Lengths: 2m, 3m, 4m, 5m
	2 Rib	Width: 89mm Lengths: 2m, 3m, 4m, 5m

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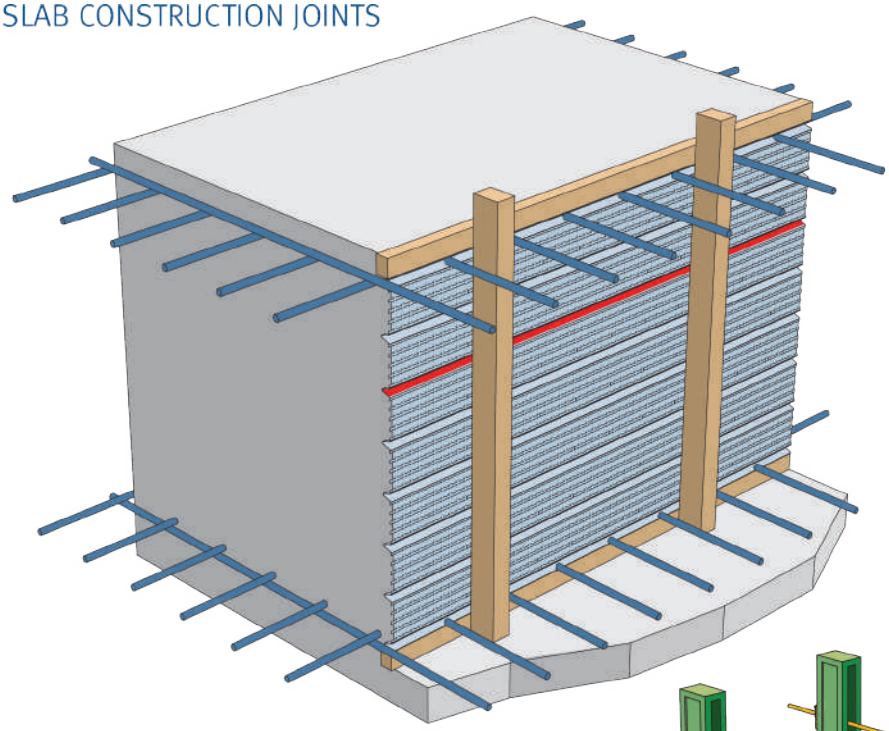
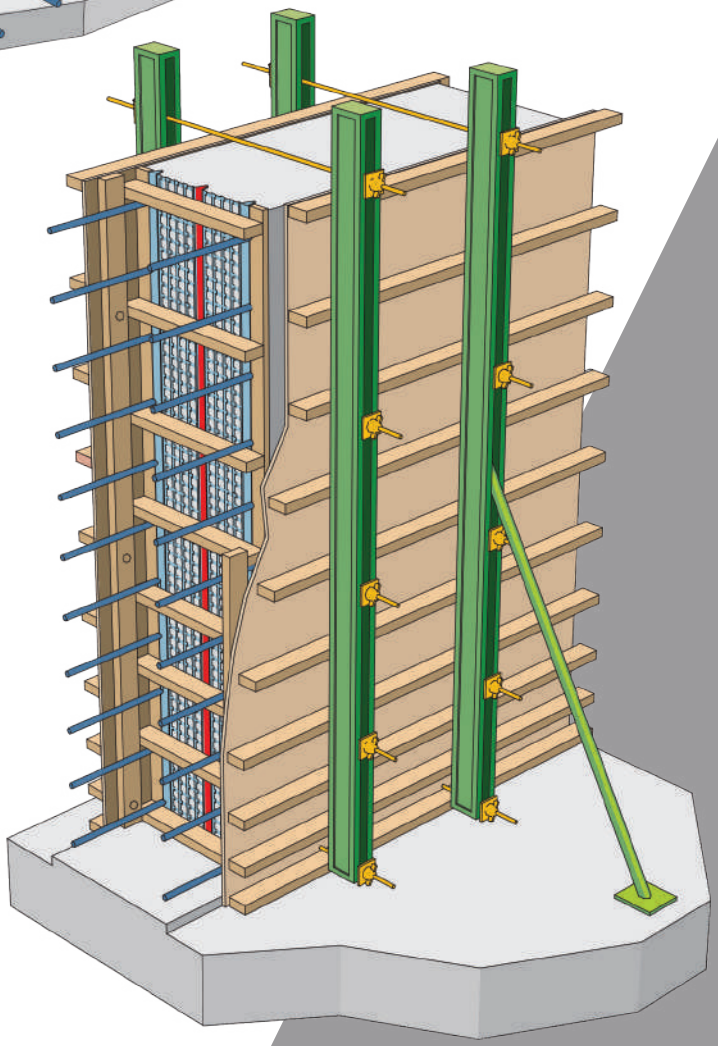
INSTALLATION ESSENTIALS

SLAB CONSTRUCTION JOINTS



WALL CONSTRUCTION JOINTS



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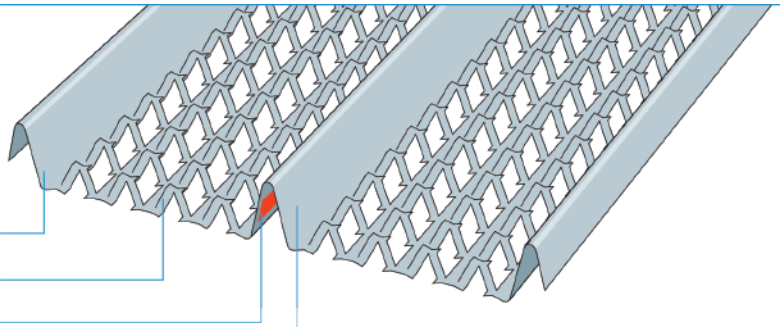
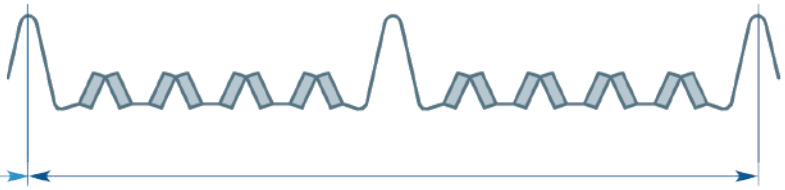
INSTALLATION ESSENTIALS

HY-RIB® DEFINITIONS

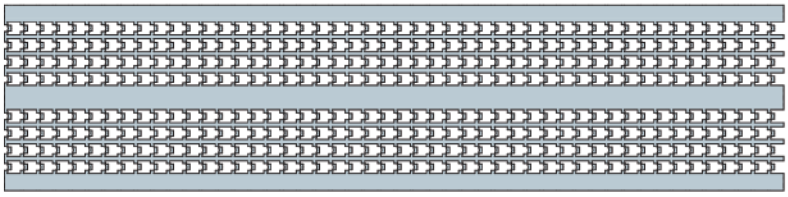


Edge Rib
Tangs
Colour Coding Strip inside the rib
Inner Rib

MEASURING POINTS



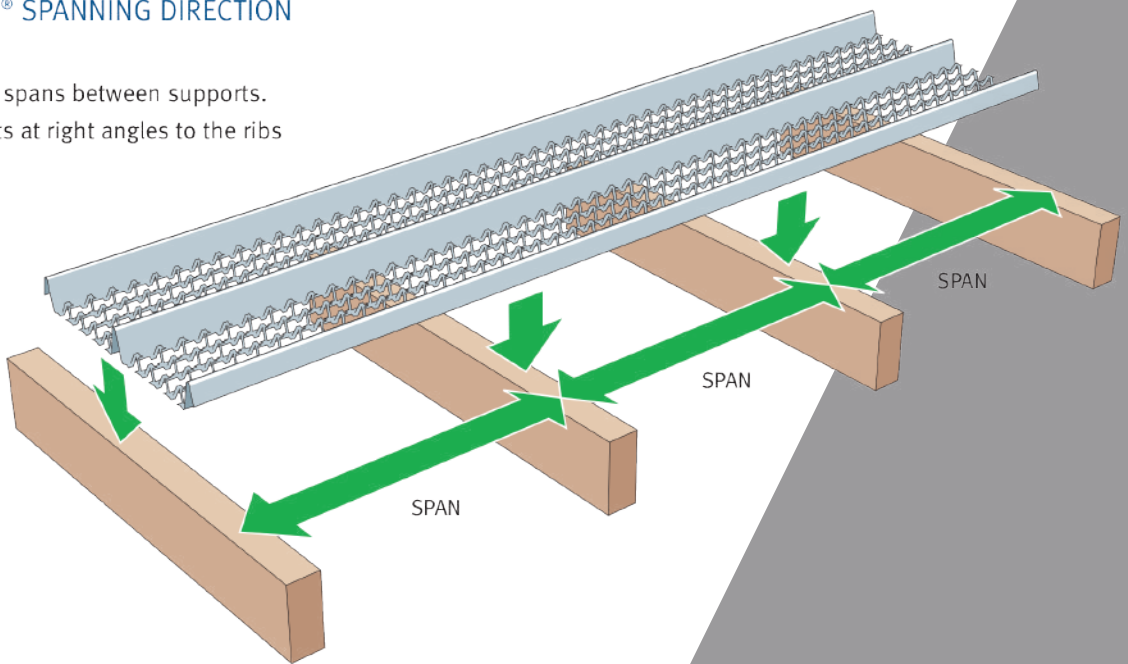
Sheet width based on
edge rib to edge rib centres



Sheet length

HY-RIB® SPANNING DIRECTION

Hy-Rib® spans between supports.
Supports at right angles to the ribs



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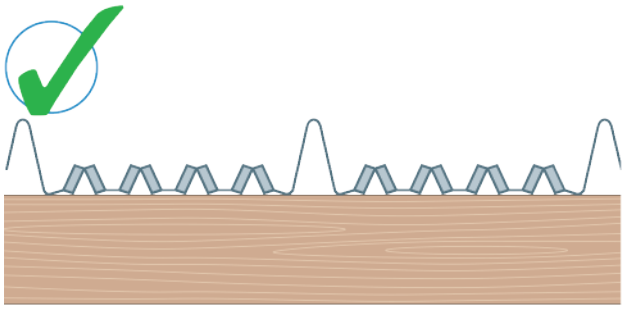
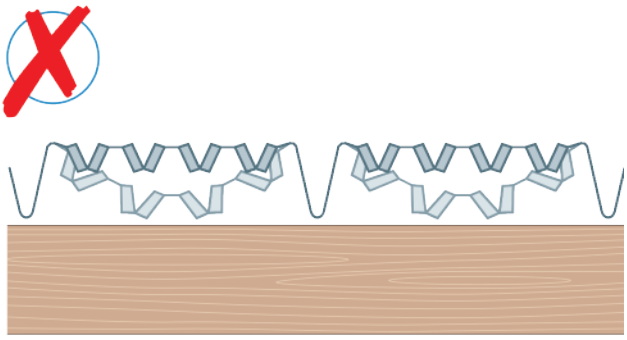
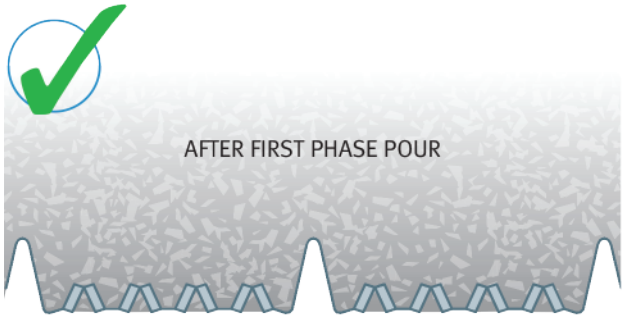
INSTALLATION ESSENTIALS

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

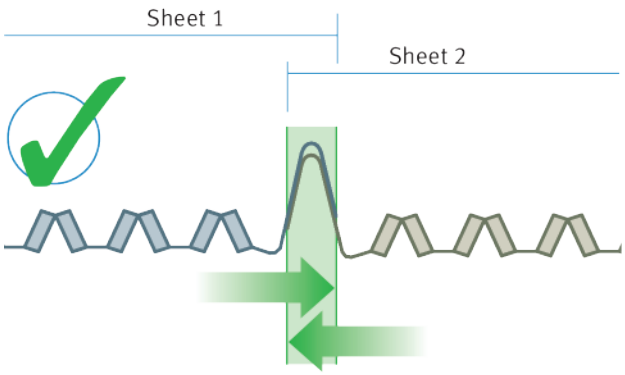


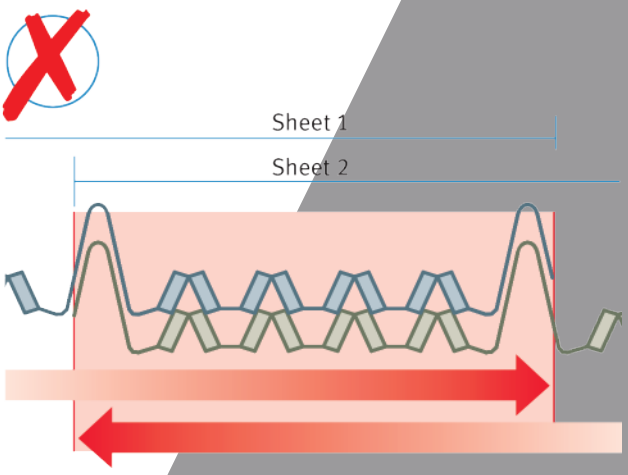




SIDE LAPPING OF HY-RIB® SHEETS

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





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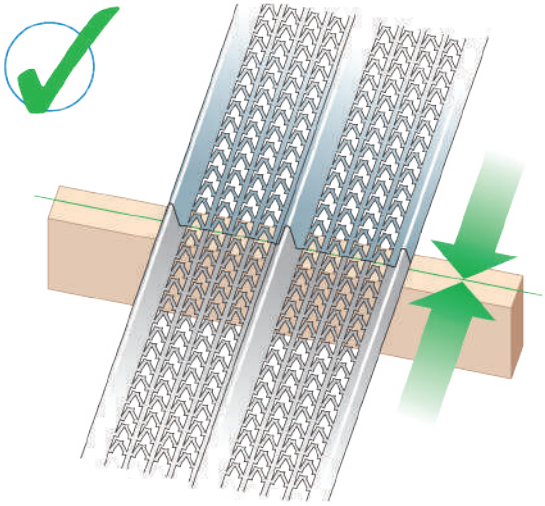
INSTALLATION ESSENTIALS

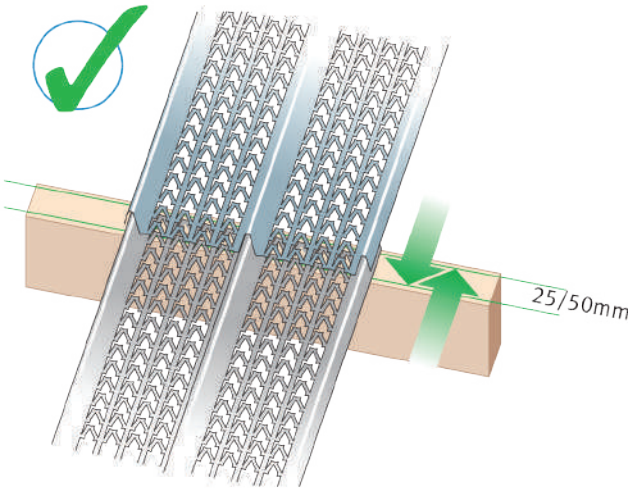
END LAPPING OF HY-RIB® SHEETS

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

✓ **Butt ends together:** zero overlap

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

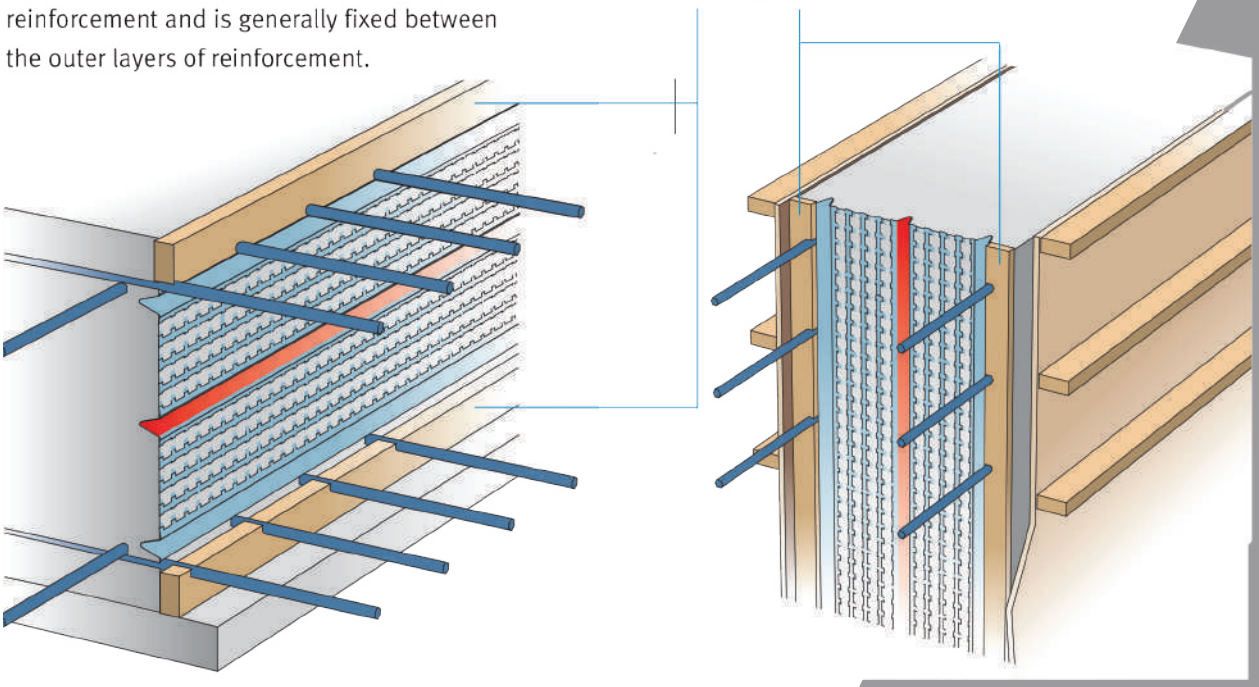




COVER TO HY-RIB® ON CONSTRUCTION JOINTS

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



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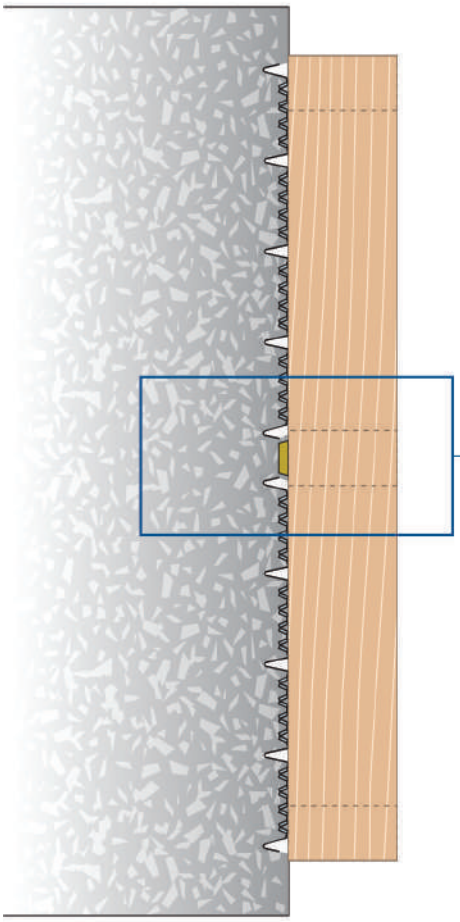
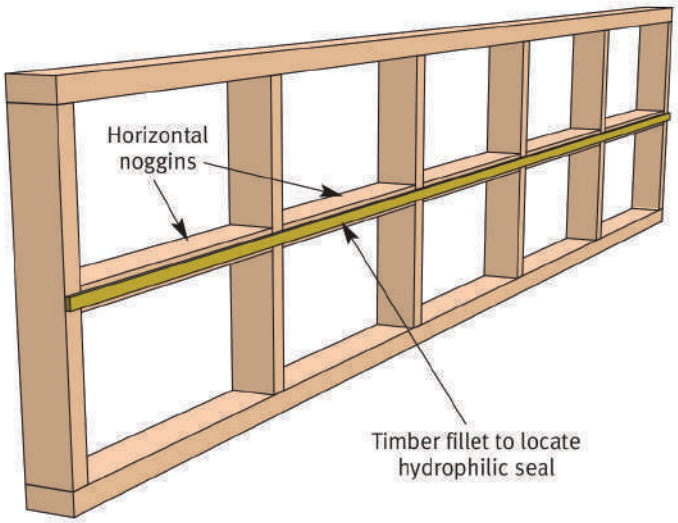
INSTALLATION ESSENTIALS

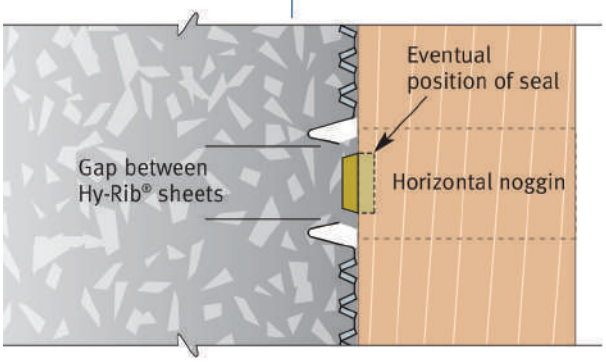
FITTING A HYDROPHILIC SEAL TO A CONSTRUCTION JOINT SUPPORTED BY TIMBER



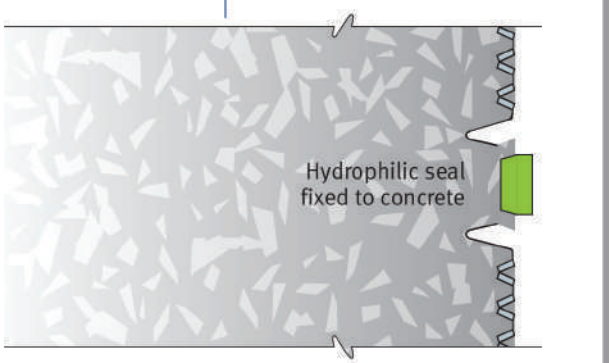
Fit noggins between vertical Hy-Rib® support timbers at the position where the hydrophilic seal will need to be located.

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





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.

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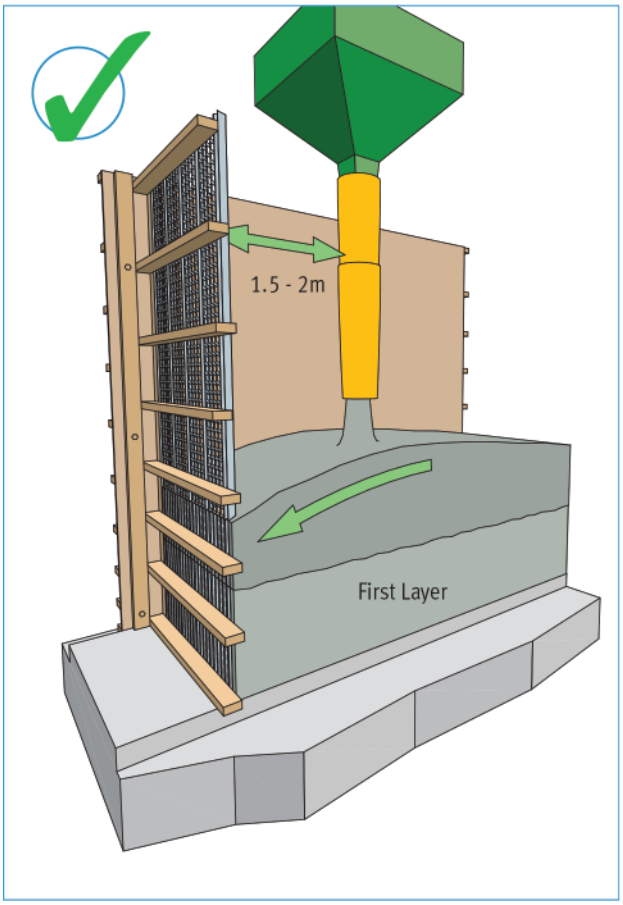
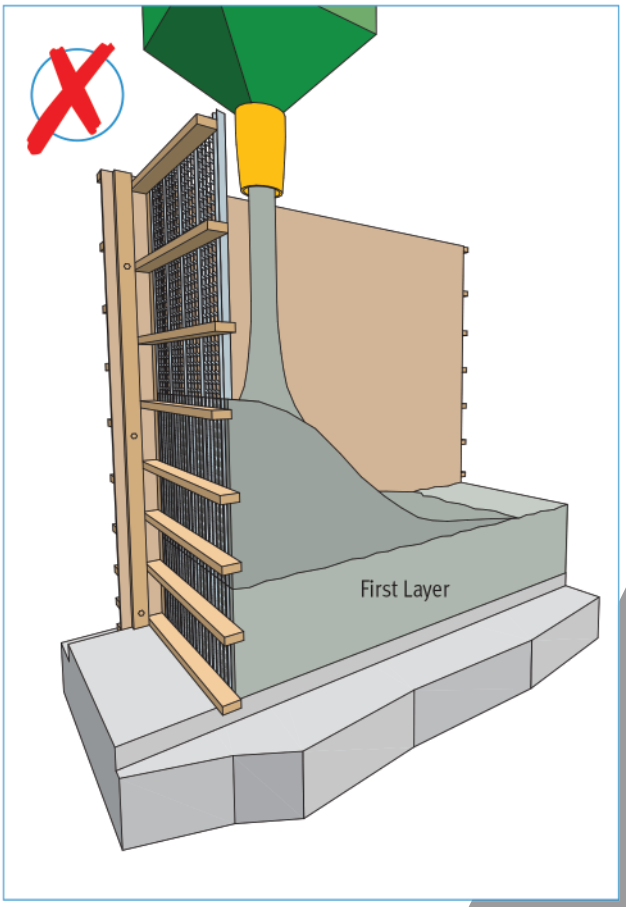
CONCRETING / PLACEMENT

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