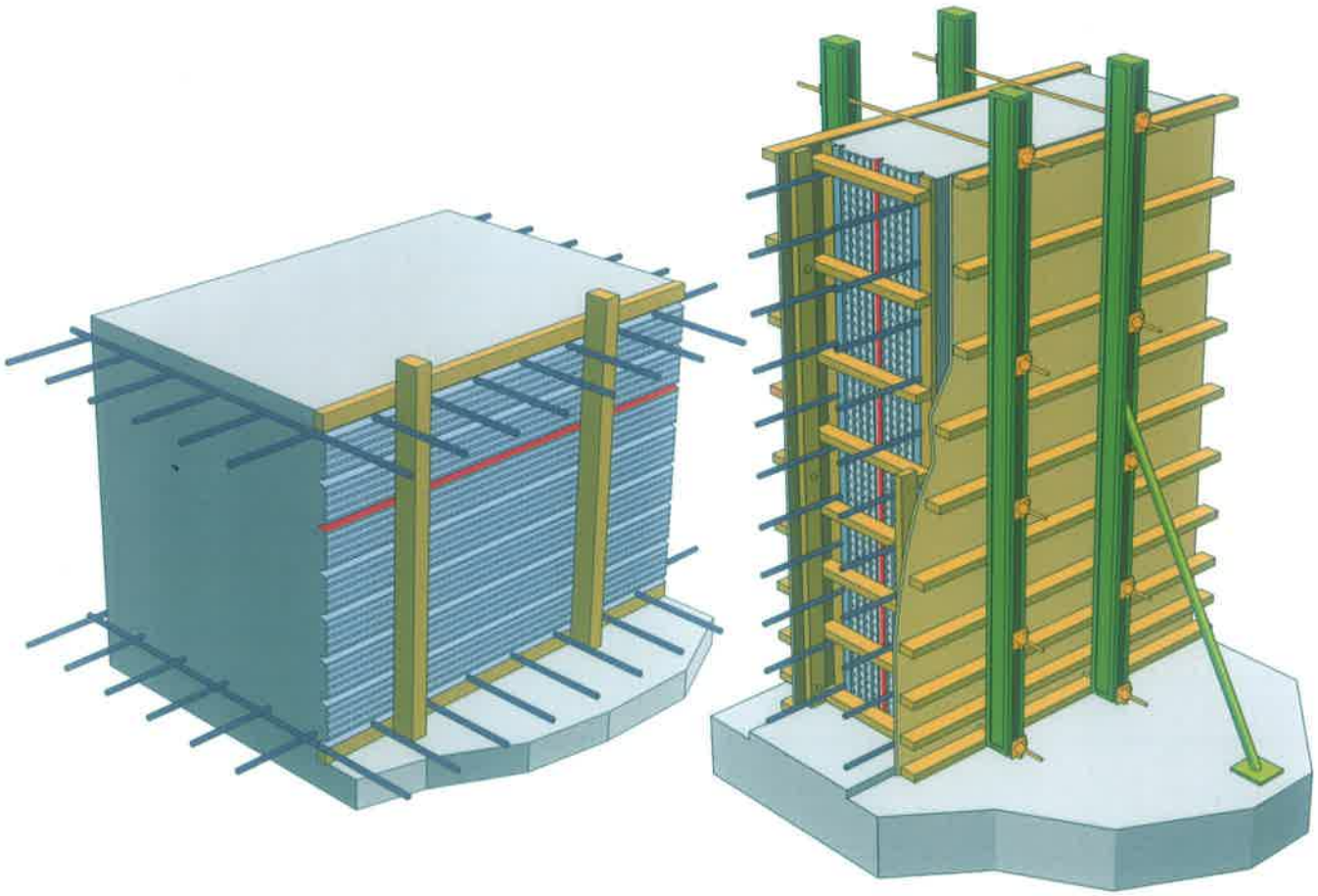
Xpa

BUILDING PRODUCTS

Permanent Formwork for Construction Joints



User's Guide

Xpa Form Rib USER'S GUIDE
INTRODUCTION

INTRODUCTION

Xpa Form 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 **Xpa Form Rib** tangs, allow the development of dense concrete nodules and indents on the face of the **Xpa Form Rib**, forming an enhanced mechanical key for the second phase pour. In the case of visible elements, the resulting

Xpa Form Rib surface is suitable to receive a rendered or tiled finish.

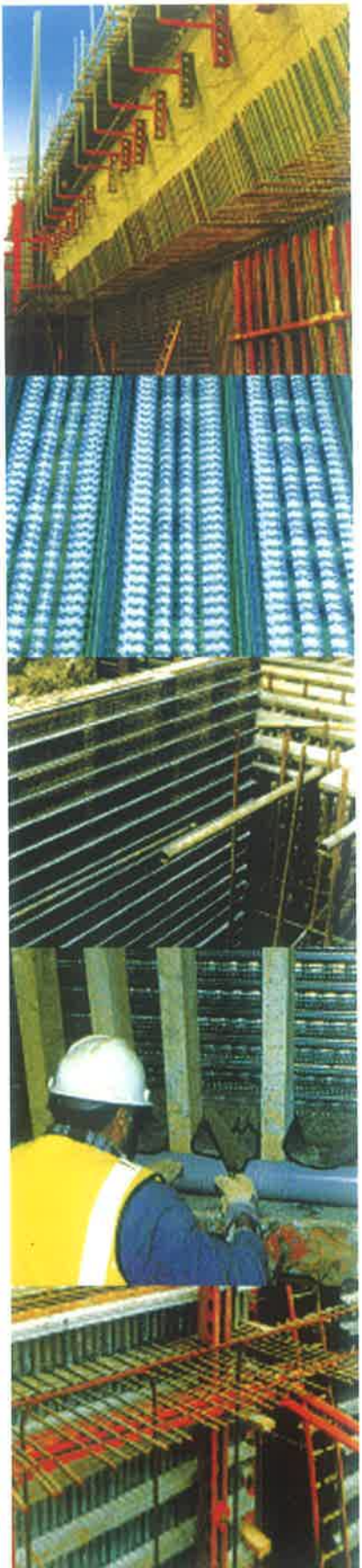
Xpa Form Rib is primarily used in construction joint applications but it is also used to form wall, beam and column surfaces and slabs soffits, where the formed surface will not be seen.

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

Xpa Form Rib has an enviable portfolio of technical data. Independent bodies have undertaken full scale testing programs to determine and verify Xpa Form 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.

REASONS TO USE Xpa Form Rib

- Reduced risk of Hand and Arm vibration injury (white finger): product featured in HSE document - Vibration Solutions Ref HS (G) 170
- When **Xpa Form 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.
- **Xpa Form Rib** joint surfaces require minimal preparation prior to the next pour, with the exception of the rebar cover zones. It minimizes the labour, mess and disposal requirements associated with scabbling, chemical retarders and jet washing.
- A correctly formed **Xpa Form Rib** joint outperforms traditionally prepared joints in shear and bond.
- **Xpa Form Rib** reduces the risk of trapped air and voids within the concrete.
- The range of narrower sheet widths improves site productivity and minimizes wastage.
- **Xpa Form Rib** is a proven construction product with comprehensive technical data, manufactured by a company.



Xpa Form Rib INSTALLATION GUIDE

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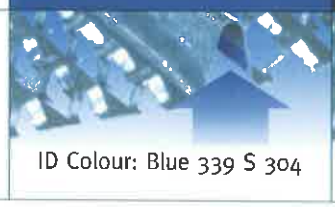
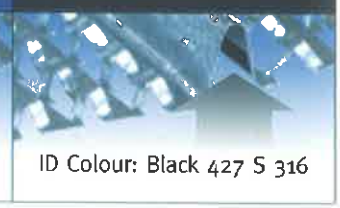
Xpa Form Rib USER'S GUIDE

Xpa Form Rib PRODUCT RANGE

ZINC COATED Xpa Form Rib

Grade	339	427	634
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** 339	 ID Colour: **Green** 427	 ID Colour: **Yellow** 634

STAINLESS STEEL Xpa Form Rib

Grade	339 S 304	427 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 339 S 304	 ID Colour: Black 427 S 316

SHEET WIDTHS

Xpa Form Rib STANDARD SHEET SIZE - ALL GRADES

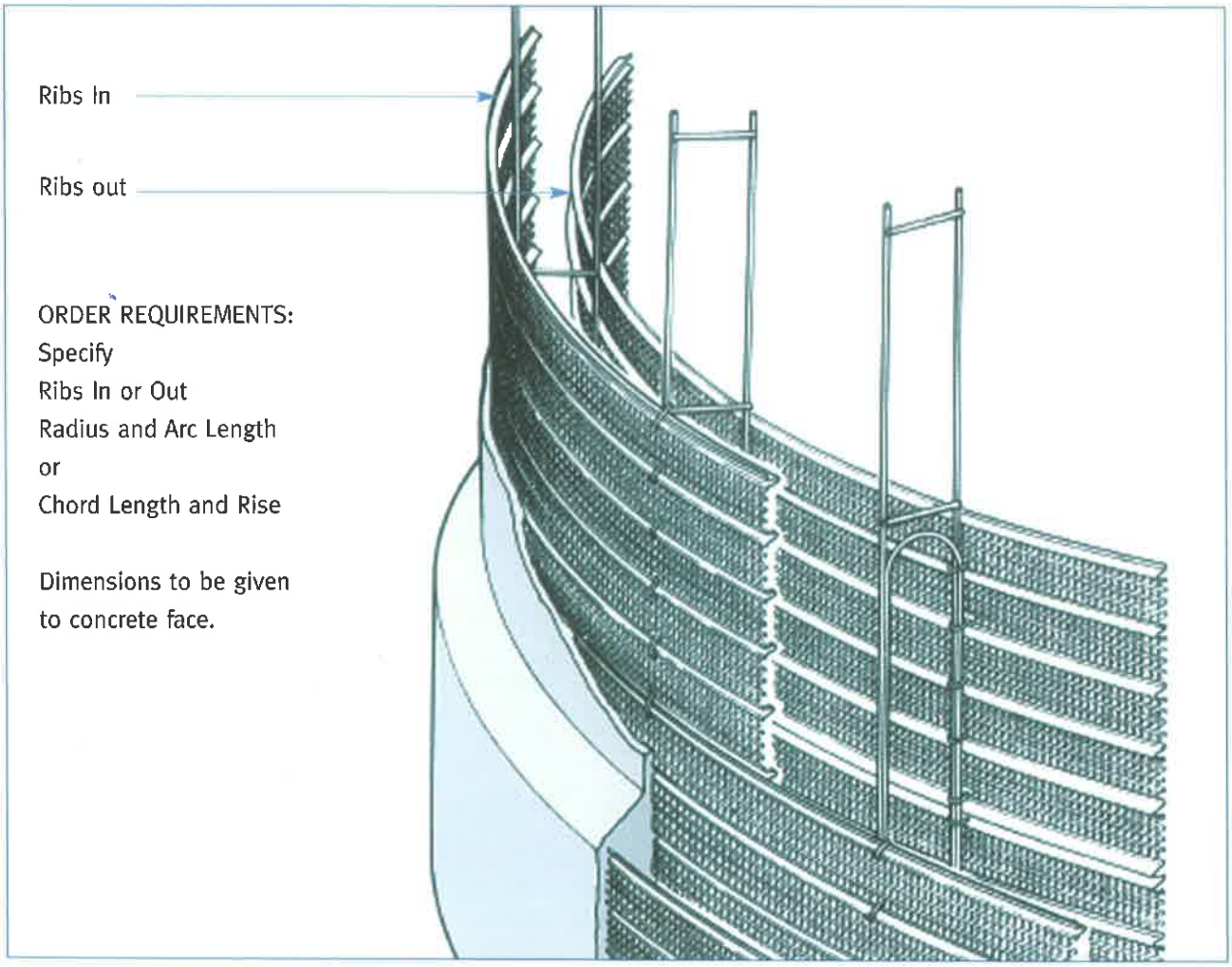
	6 Rib	Width: 445mm Lengths: 2m, 3m, 4m, 5m

Xpa Form Rib IS AVAILABLE IN 2000, 3000, 4000 AND 5000mm LENGTHS

ORDER CODING:

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

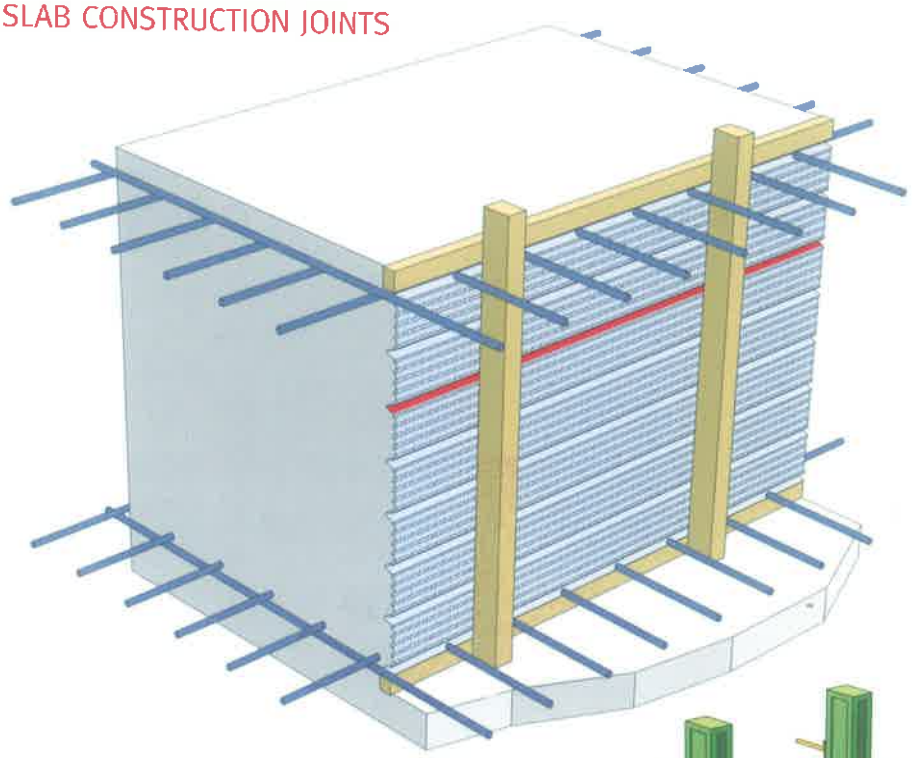
Xpa Curved Form Rib



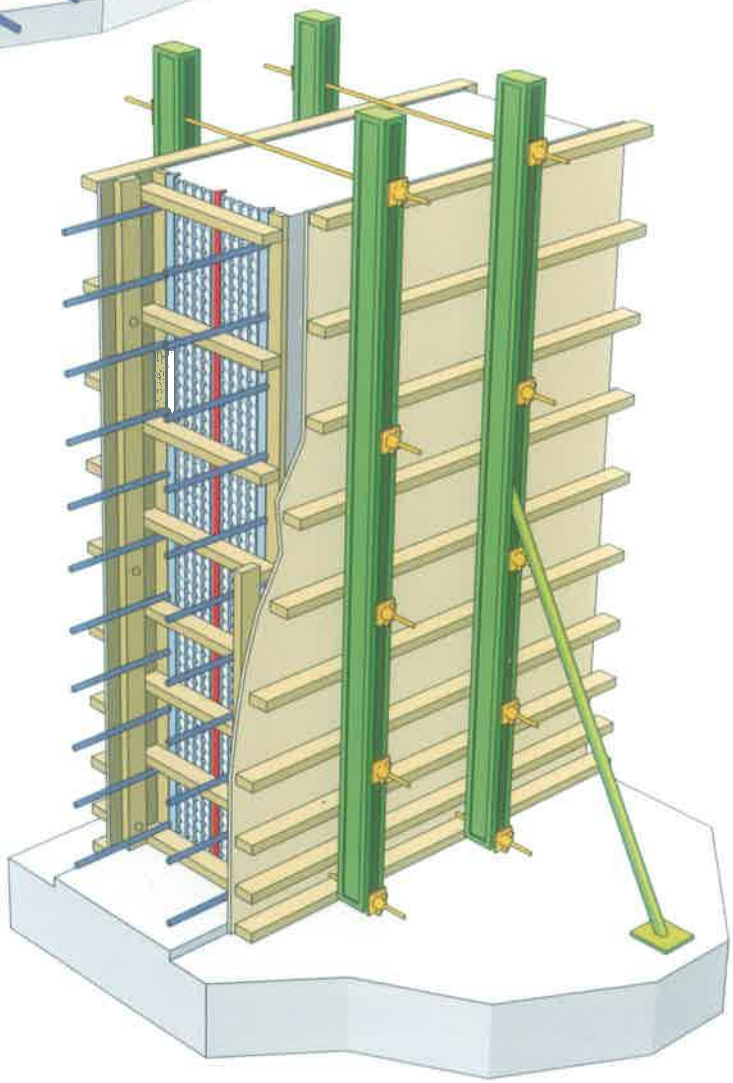
ORDER REQUIREMENTS:
Specify
Ribs In or Out
Radius and Arc Length
or
Chord Length and Rise

Dimensions to be given
to concrete face.

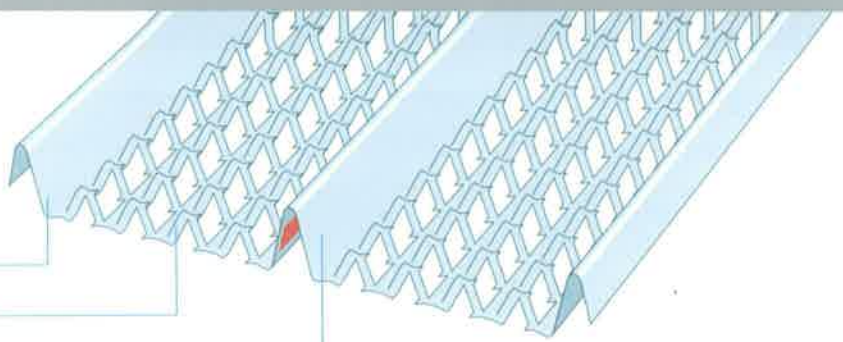
SLAB CONSTRUCTION JOINTS



WALL CONSTRUCTION JOINTS



Xpa Form Rib DEFINITIONS

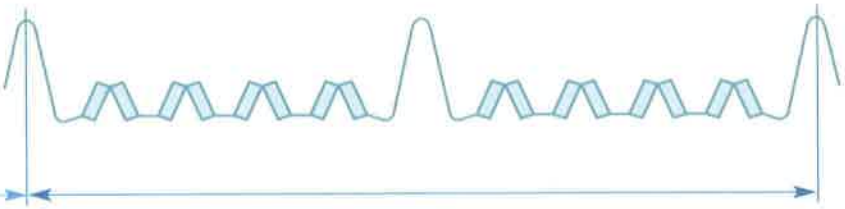


Edge Rib

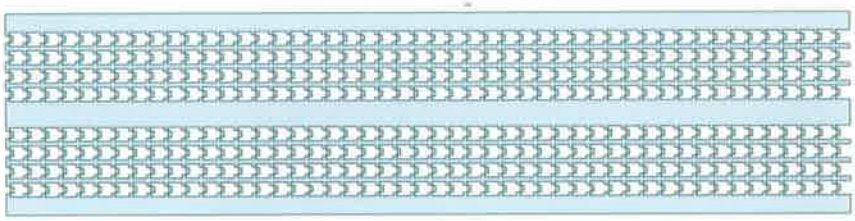
Tangs

Inner Rib

MEASURING POINTS



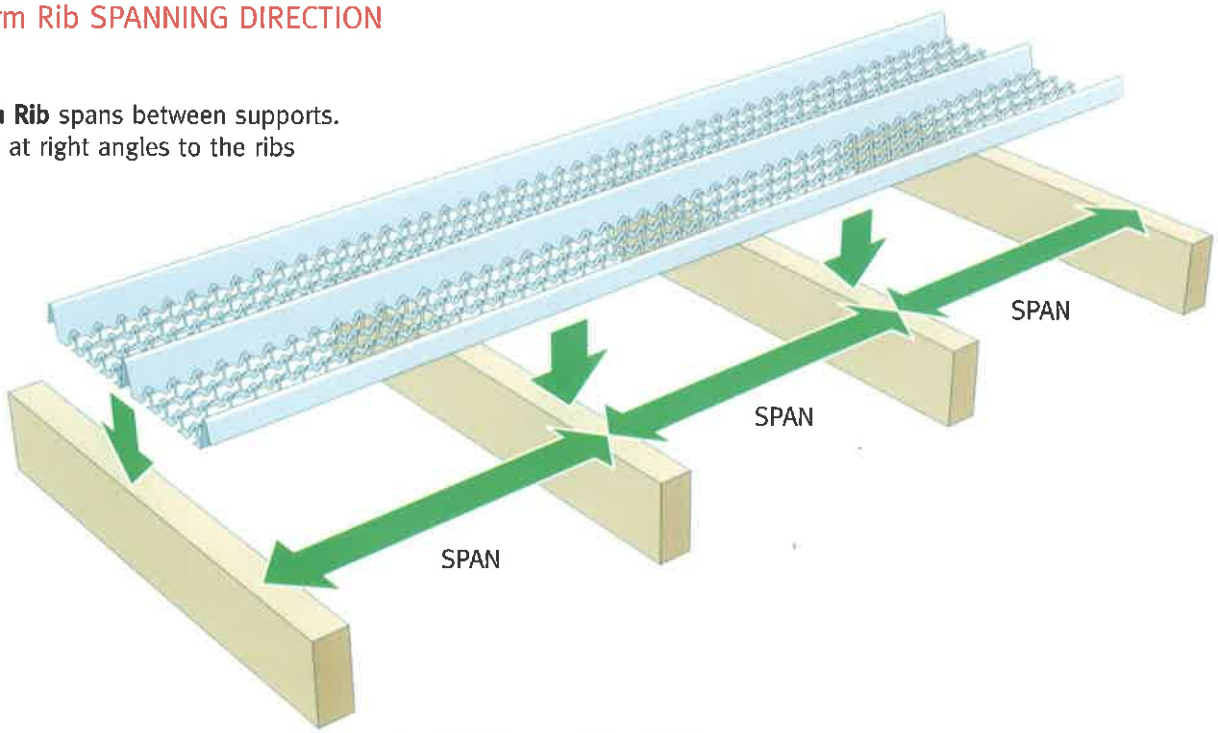
Sheet width based on
edge rib to edge rib centres



Sheet length

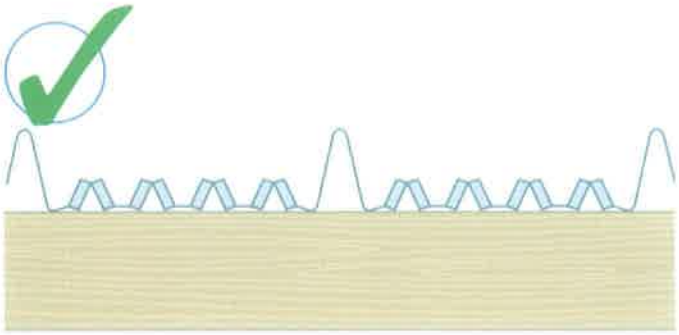
Xpa Form Rib SPANNING DIRECTION

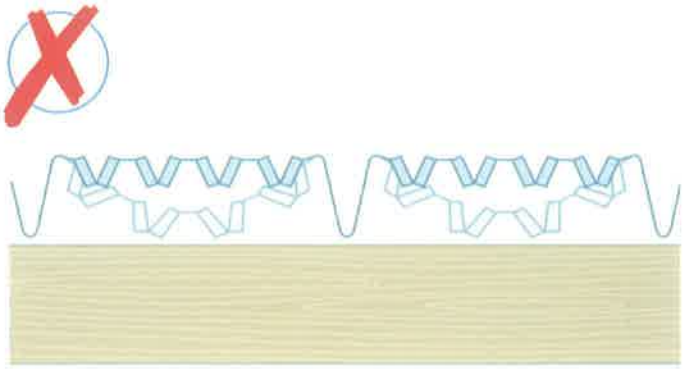
Xpa Form Rib spans between supports.
Supports at right angles to the ribs



FIXING Xpa Form Rib TO BACKING SUPPORT

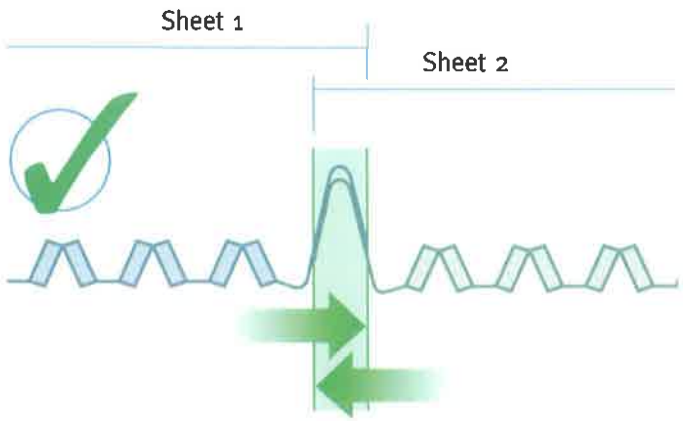
- ✓ Xpa Form Rib sits flat on support
- ✓ Ribs point into first phase pour
- ✓ Tangs embed in first pour
- ✓ Colour coding facing outside

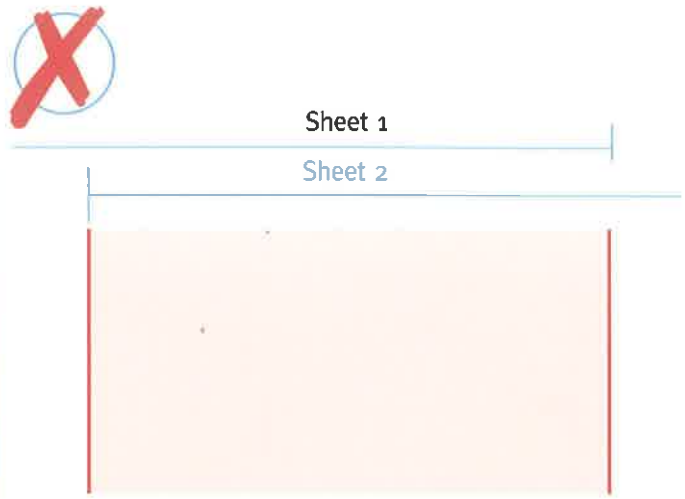




SIDE LAPPING OF Xpa Form Rib SHEETS

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

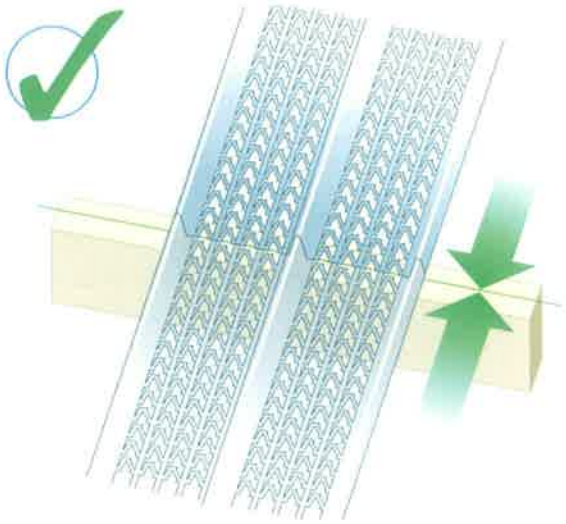




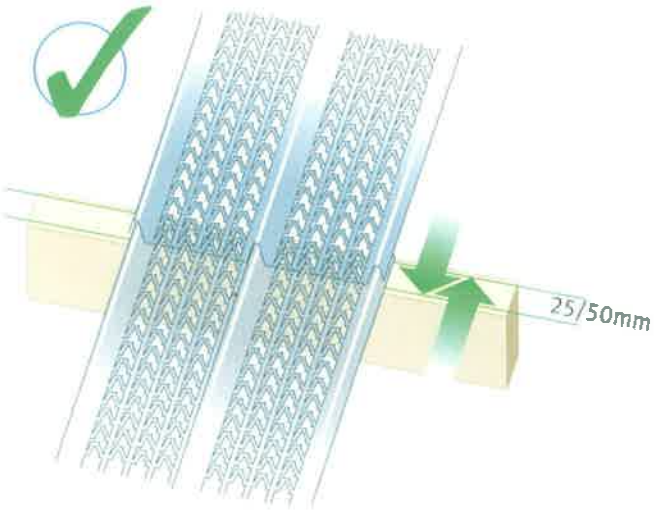
END LAPPING OF Xpa Form Rib SHEETS

Typical end lapping of Xpa Form Rib sheets for wall stop ends and construction joints.

✓ **Butt ends together:** zero overlap



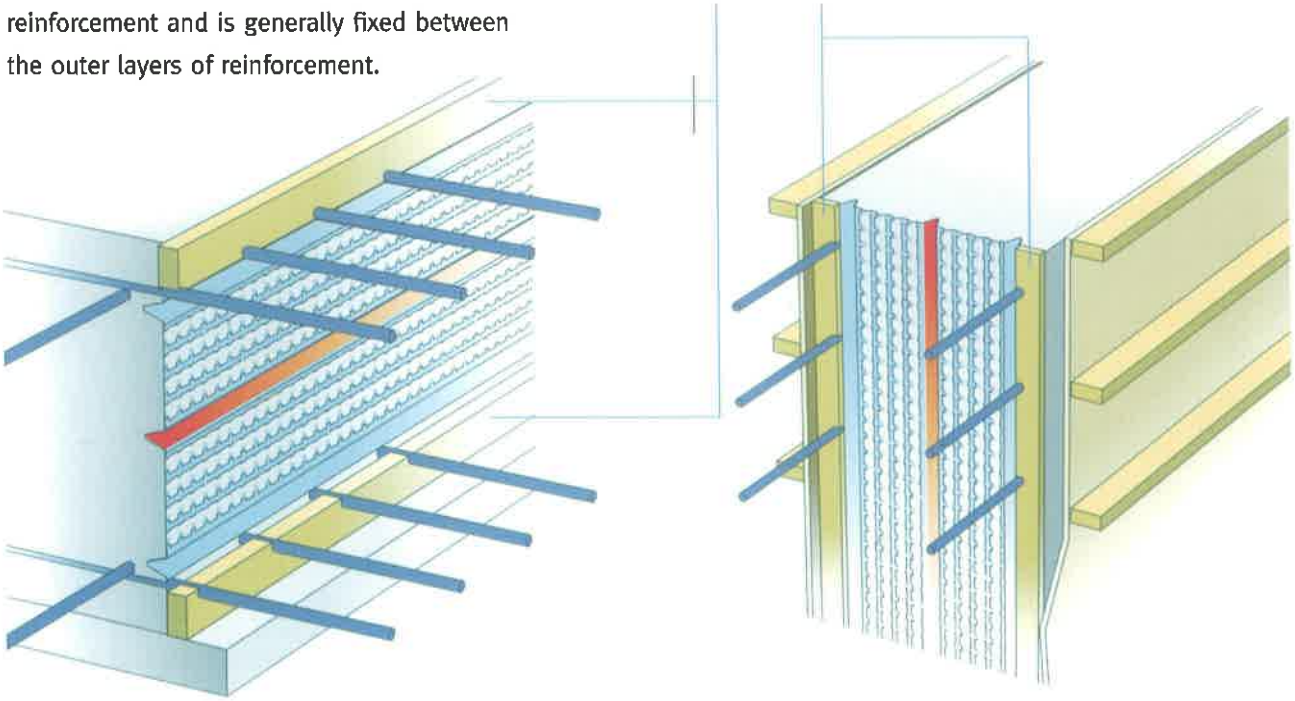
✓ **Small overlap** - 25mm - 50mm
✓ Tie sheets tightly together to minimize gap
✓ Nail or tie Xpa Form Rib to supports



COVER TO Xpa Form Rib ON CONSTRUCTION JOINTS

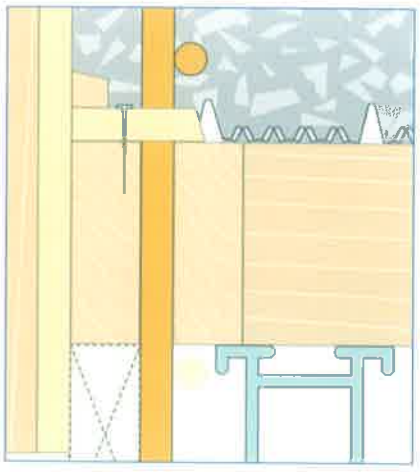
Xpa Form Rib must have the same cover as the reinforcement and is generally fixed between the outer layers of reinforcement.

Temporary timber used to form cover zones



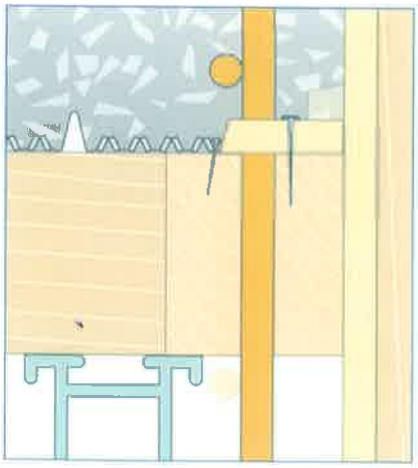
Xpa Form Rib SHEET EDGE DETAILS

Xpa Form Rib butted to plywood comb

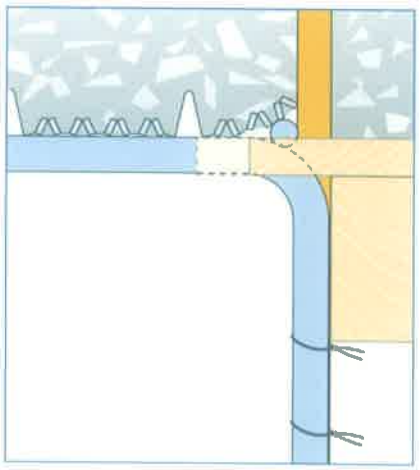


Taper edge of comb to ease strike

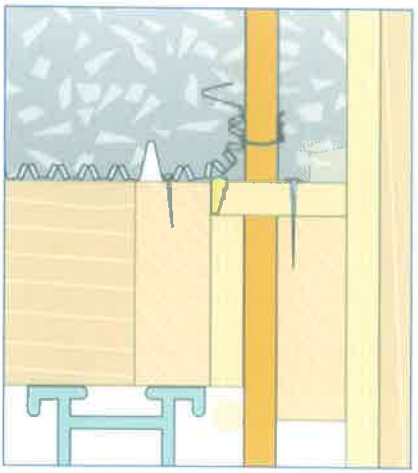
Large Xpa Form Rib sheet cut to size



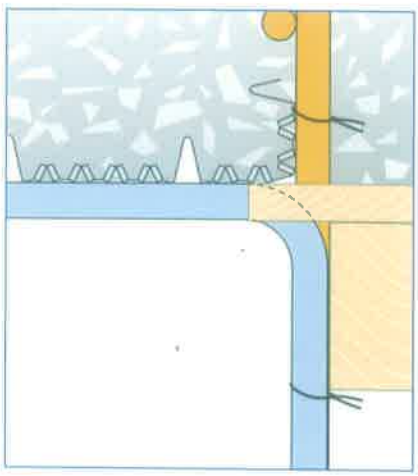
Ensure the cut edge is supported by timber or additional steel bar



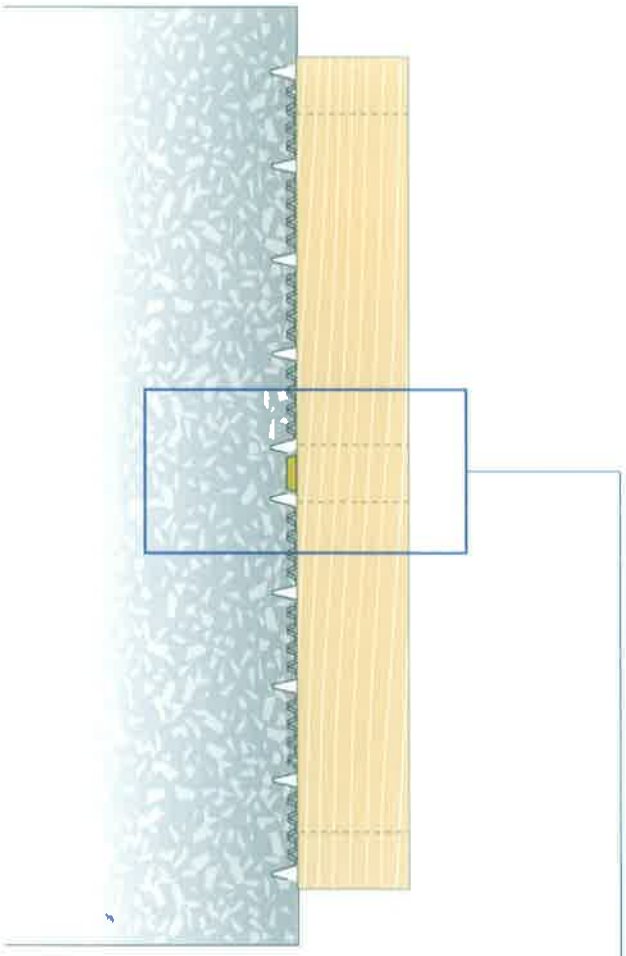
Slightly oversized Xpa Form Rib sheet



Fold and tie small return into pour

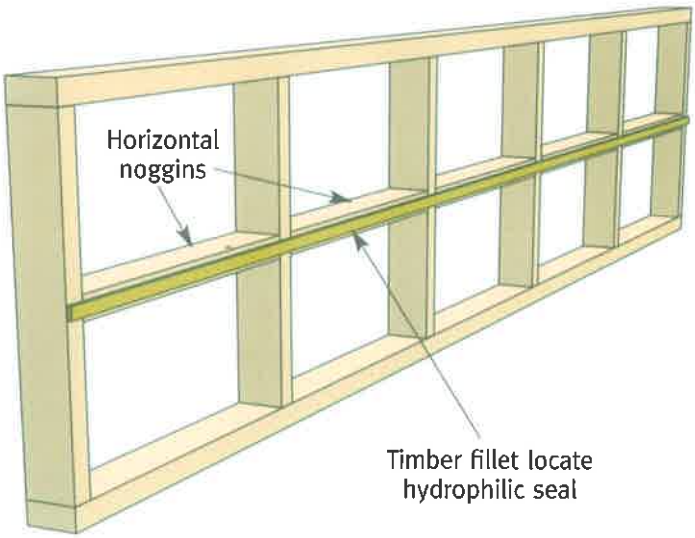


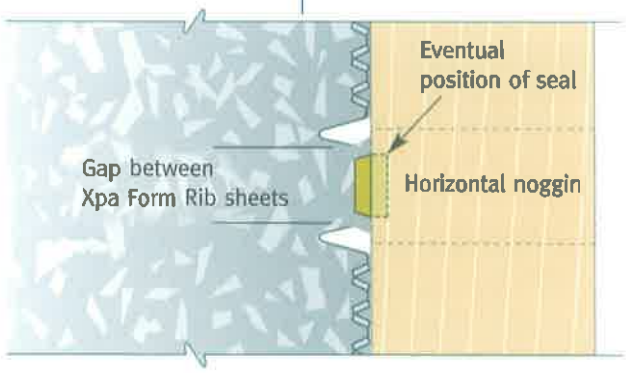
FITTING A HYDROPHILIC SEAL TO A CONSTRUCTION JOINT SUPPORTED BY TIMBER



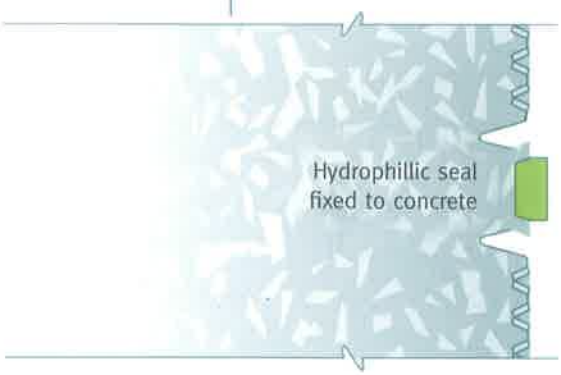
Fit noggins between vertical Xpa Form Rib support timbers at the position where the hydrophilic seal will need to be located.

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



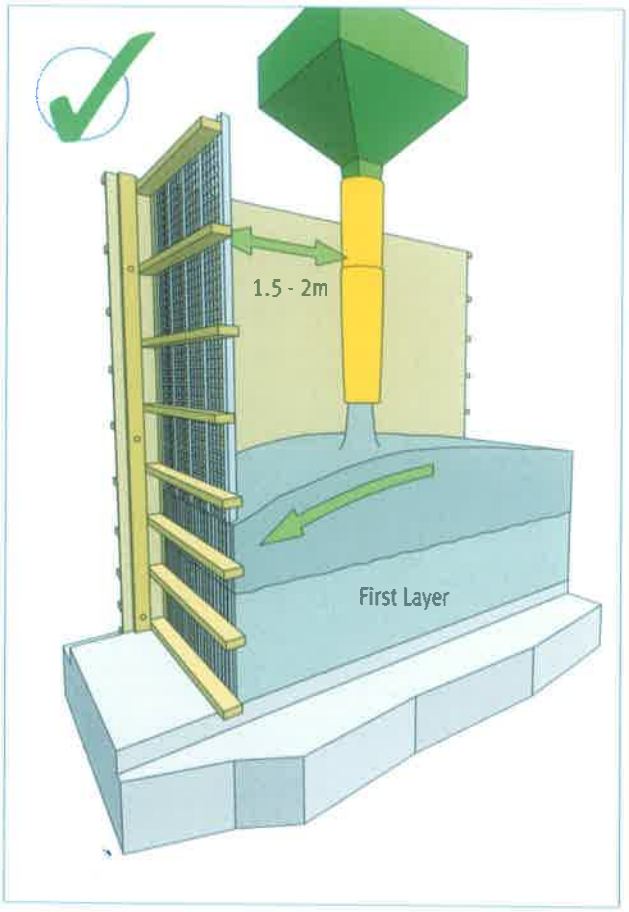


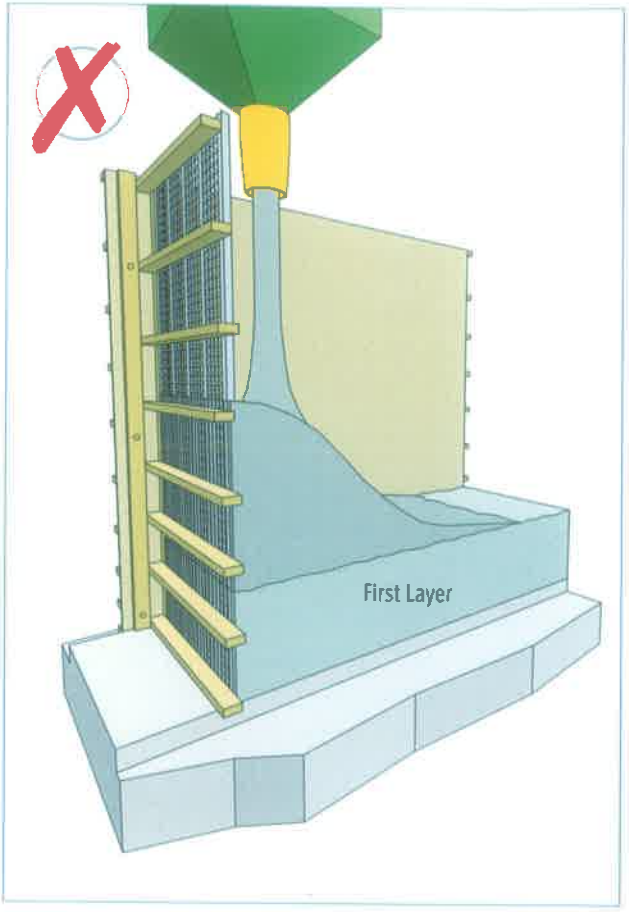
1. Leave a gap between adjacent Xpa Form Rib sheets in line with the edge of the noggins to ensure a flat concrete surface where the seal is to be located.



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.

This section illustrates current best practice for placement and compaction of concrete in proximity to Xpa Form Rib stop ends. 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.





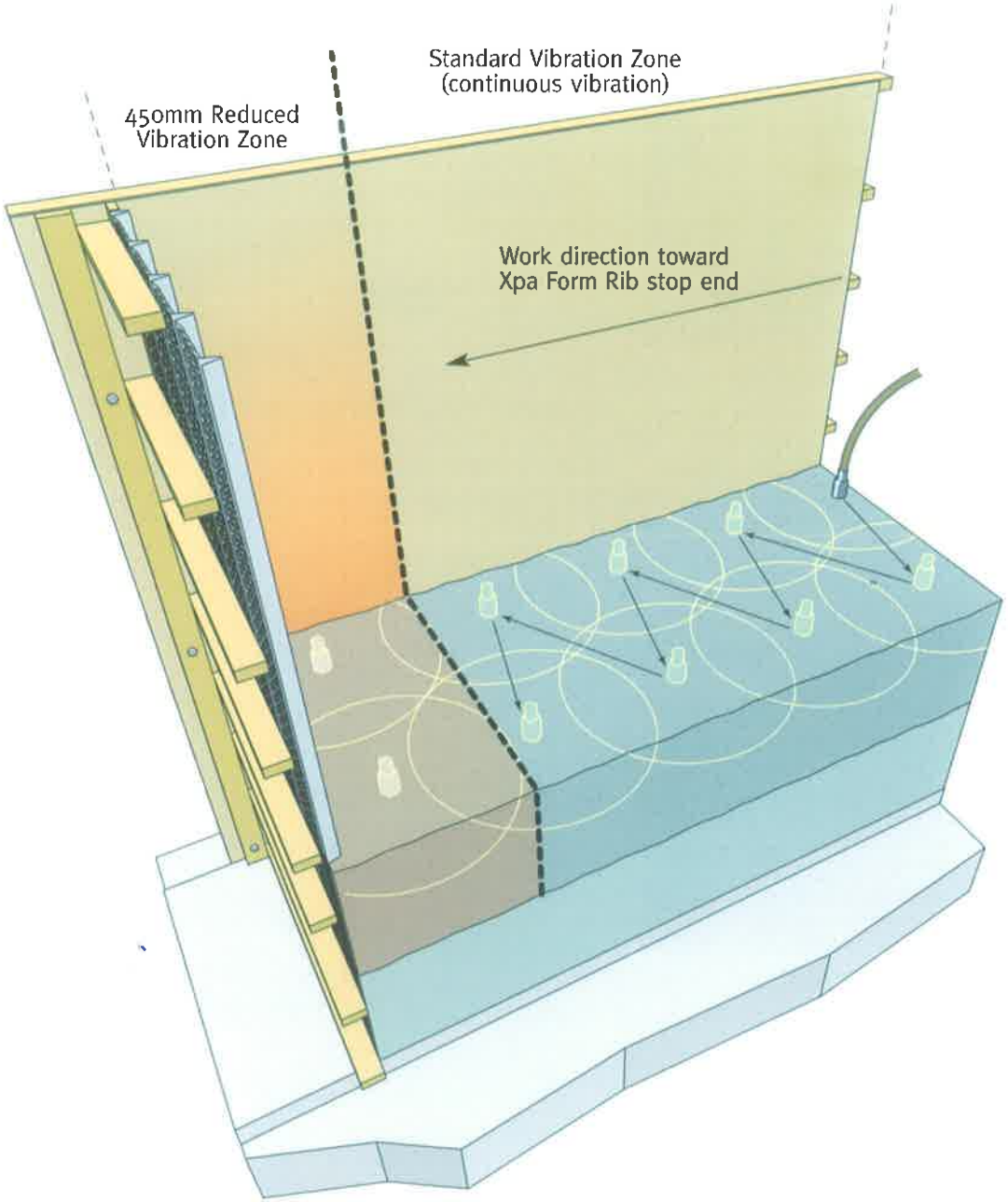
CONCRETE PLACEMENT ADJACENT TO STOP END: BEST PRACTICE DO'S AND DON'TS

Always follow standard good placement practice to avoid overloading any stop end.

- ✓ Use correct length of pipe trunking or tremie tube
- ✓ Place concrete at least 500mm from Xpa Form Rib Stop end
- ✓ Allow concrete to naturally flow up toward the Xpa Form Rib stop end

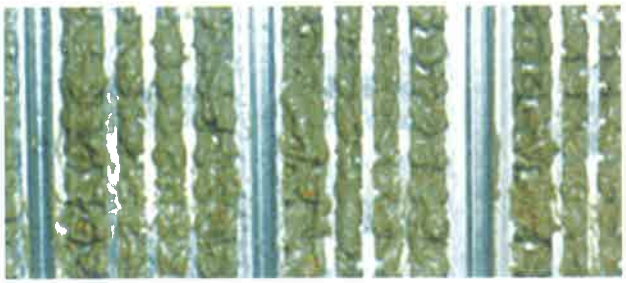
- ✗ Don't dump the concrete from excess height
- ✗ Don't discharge concrete directly against the Xpa Form Rib stop end
- ✗ Don't allow concrete to pile up against the Xpa Form Rib stop end

VIBRATION COMPACTION



- ✓ Where continuous vibration is used keep poker about 450mm from the Xpa Form Rib
- ✓ In close proximity to Xpa Form Rib stop end, 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 Xpa Form Rib face. This may result in excessive loss of concrete fines.
- ✗ Do not vibrate the stop end.
- ✗ External vibrators are not recommended for use with Xpa Form Rib
- ✗ Do not vibrate the steel reinforcement

CONCRETE FINISH



The ideal Xpa Form 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 Xpa Form Rib/concrete

✗ Never brush, scrape or jet-wash the fresh concrete / Xpa Form Rib face

CLEANING

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

✗ Do not disturb the fresh concrete / Xpa Form Rib face while removing any overspill and grout build up on the walling.

✗ Never brush, scrape or jet-wash the fresh concrete / Xpa Form 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 Xpa Form Rib stop ends to which a further pour will be connected (Many curing agents make excellent de-bonding agents!)

PREPARING THE JOINT FOR THE NEXT POUR

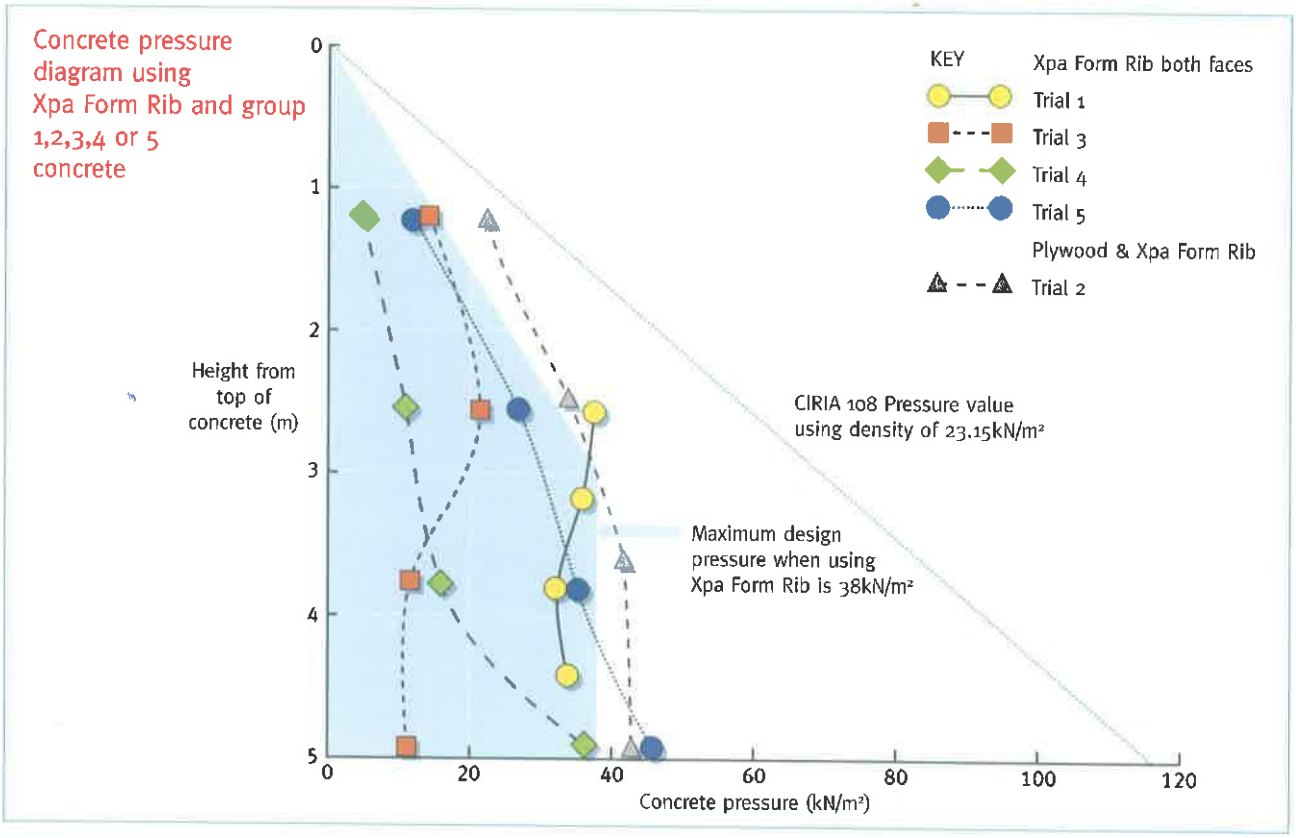
✓ Remove the timber cover zone strips and prepare the exposed concrete band, being careful not to damage the edge corners.

✓ The Xpa Form Rib surface itself needs little if any preparations before the next pour.
Remove any fins and obvious debris.

✗ Do not remove the Xpa Form Rib sheet it is permanent formwork!

REDUCTION IN THE PRESSURE OF CONCRETE ON Xpa Form Rib

The recommended reduction in design concrete pressure when using Xpa Form 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 Xpa Form 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 Xpa Form 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" categorizes 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.



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 Xpa Form Rib with the stiffer group 1 and 2 concretes using CEM I, CEM I/R or + SR with or without any admixture. Xpa Form 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 Xpa Form Rib to both faces.

PERFORMANCE OF Xpa Form Rib

Tests have been carried out to verify the performance of Xpa Form Rib at construction joints.
Assessment of shear, flexure and concrete strength at the joint confirms that the use of Xpa Form Rib can improve the load achieved at this location.
Examination of cores taken at concreted Xpa Form Rib joints shows full compaction around the Xpa Form Rib ribs and grout penetration at overlapping joints.

PROPERTIES OF Xpa Form Rib

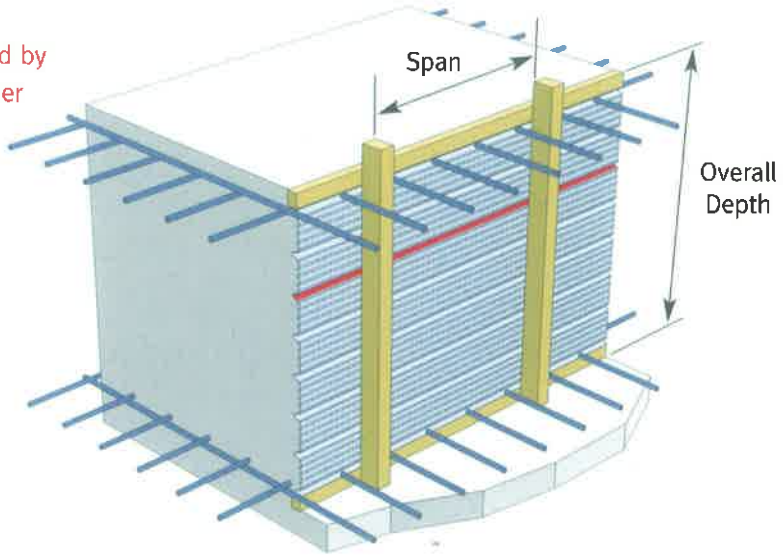
GRADE		634	427	339	COMMENT
Section Modulus					
Z_{joint}	mm^3/m	1710	1125	952	Rib in tension
Z_{span}	mm^3/m	2233	1488	1266	Face in tension
Moment of resistance	kNm/m	0.330	0.217	0.184	At supports (rib away from load)
(working) (fZ)	kNm/m	0.431	0.287	0.244	At midspan (rib towards load)
Bending stiffness (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 Xpa Form 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 Xpa Form 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 Xpa Form 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 Xpa Form Rib deflects.

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

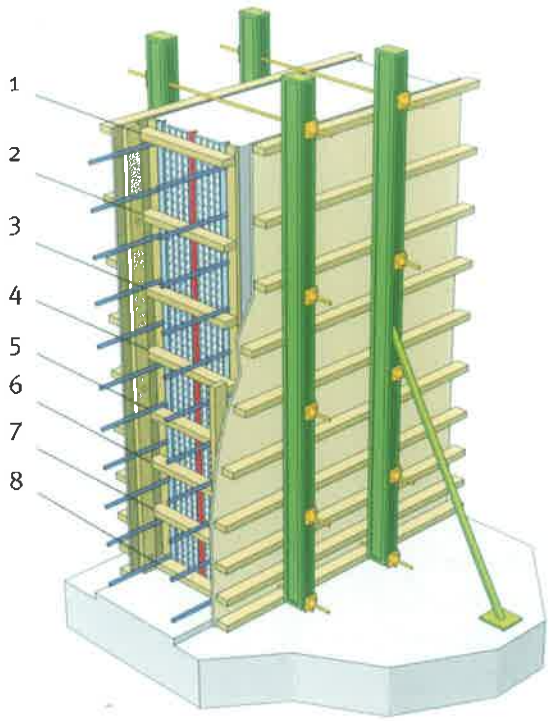
	MAXIMUM CONCRETE PRESSURE		CLEAR Xpa Form Rib SPAN BETWEEN SUPPORTS		
Overall depth of slab joint	Theoretical* Table 2 CIRIA 108	Assumed for Xpa Form Rib	Grade 634	Grade 427	Grade 339 Grade 339 S 304 Grade 339 S 316
mm	kN/m²	kN/m²	mm	mm	mm
250	6.25	3.20	1250	1025	950
500	12.50	6.30	900	725	675
750	18.75	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 Xpa Form 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 Xpa Form 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.

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 Xpa Form Rib AT A VERTICAL JOINT IN A WALL

	Centre to centre spacing of the supports (mm) and the approximate height of wall (mm)					
Position of the support measured from the top of the wall	Grade 634		Grade 427		Grade 339 Grade 339 S 304 Grade 339 S 316	
	support spacing	approximate wall height	support spacing	approximate wall height	support spacing	approximate wall height
1		see note 5		see note 5		see note 5
2	650	see note 5	575	see note 5	550	see note 5
3	575	see note 5	525	see note 5	500	see note 5
4	525	1750	475	1575	450	1500
5	475	2225	425	2000	400	1900
6	425	2650	375	2375	375	2275
7	375	3025	325	2700	325	2600
8	375	3400	300	3000	275	2875
Load in the supports	approximately 14.3 kN/m		approximately 11.4 kN/m		approximately 10.5 kN/m	

Notes:

1. The Xpa Form 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 Xpa Form Rib are horizontal and are a minimum of 50mm wide.
4. The approximate load per meter of the supporting members is given as a guide only.
5. It is assumed that the Xpa Form 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.

Xpa Form Rib HEALTH AND SAFETY DATA SHEET

1. IDENTIFICATION

Emirates Specialities Co. LLC
P.O Box 6156
Sharjah,
United Arab Emirates
Tel: +971 6 542 0220
Fax: +971 6 542 0211

2. COMPOSITION

Galvanized 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 cut from steel edge.
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 Xpa Form Rib sections.
Assess manual handling risks before lifting.
Bundles of Xpa Form 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

FormRib is supplied in various lengths, widths and gauges.
Metallic grey appearance.

10. STABILITY AND REACTIVITY

Xpa Form Rib is stable under normal conditions but if subjected to high temperatures, fumes are produced.

11. TOXICOLOGICAL INFORMATION

Abrasive cutting of Xpa Form 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

Xpa Form Rib is an article therefore not subject to CHIP3.

16. OTHER INFORMATION

All products must be installed in accordance with Xpa Form Rib Building Products' published instructions.
The Xpa Form 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.

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