DESIGN GUIDE

PSA S-CONNECTION

PSA S-CONNECTION OVERVIEW

PSA's S-Connection is a patented, grouted panel-to-panel connection engineered to replace traditional heavy cast-in plates (with capacities around 200 kN) and, in many cases, eliminate the need for full-height panel connections such as wet joints. By installing a series of S-Connections along the panel edge, the system distributes load capacity across the entire panel height, offering a streamlined and efficient alternative.

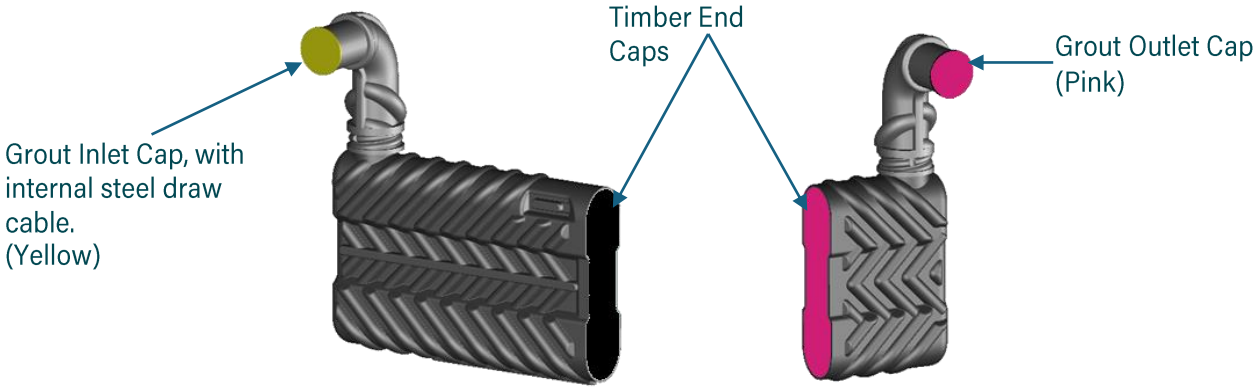
The S-Connection comprises two precision-moulded plastic inserts embedded into adjacent precast concrete panels. These inserts feature an engineered ribbed profile to ensure robust mechanical interlock with the surrounding concrete. The 'M' (Male) Insert contains a preassembled frame with two N24 horizontal dowels, forming the structural 'Bridge'. During installation, this bridge slides seamlessly into the 'F' (Female) Insert on the adjoining panel, completing the mechanical connection.

Once engaged, the connection is fully grouted using PSA's high-strength proprietary Connection Grout, ensuring structural integrity and long-term performance.

PSA S-CONNECTION FEATURES

+ Compliant to AS 3600:2018
+ Specifically designed connection with 2-part housing ('M' Male and 'F' Female) to maximise vertical shear capacity between precast elements
+ Utilises fully housed sub-assemblies incorporating the internal sliding frame and receiving assembly.
+ Internal sliding system makes it easy for the erection crew to complete the bridge connection and with a visual bridge positioning indicator, ensures correct positioning of the mechanism.
+ By incorporating the 'working parts' within the housing assemblies and centrally to the precast elements, the aesthetic finish any element is not compromised and connectivity is truly centrally aligned within the panel.

PSA S-CONNECTION SYSTEM COMPONENTS



End Cap Removal Tool

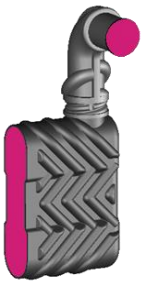
PSA Connection Grout

Seal – Backing Rod

PSA S-CONNECTION – ITEM CODES

PSA S-Connection Male and Female parts are manufactured to suit a variety of panel thicknesses (normally 200mm, 250mm and 300mm) and different orientations (L for left and R for right). A connection comprises one Male Part and one Female Partof opposite orientation.
'L' orientation means the component is on the left side of the joint looking on the panel surface with the grout opening, theitem with the code 'R' is located on the right of the joint.

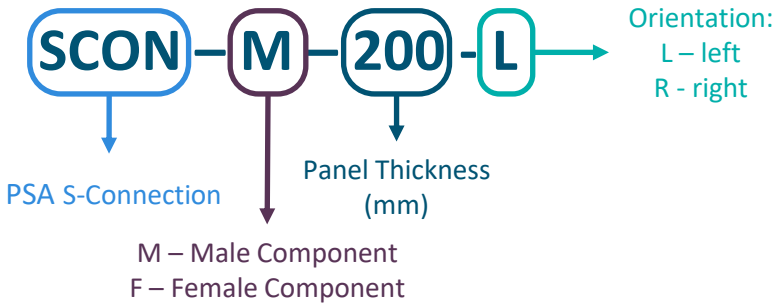
PSA S-Connection
'M' Male – 'L' - Left



PSA S-Connection
'F' Female – 'R' - Right

PSA S-Connection
'F' Female – 'L' - Left

PSA S-Connection
'M' Male – 'R' - Right



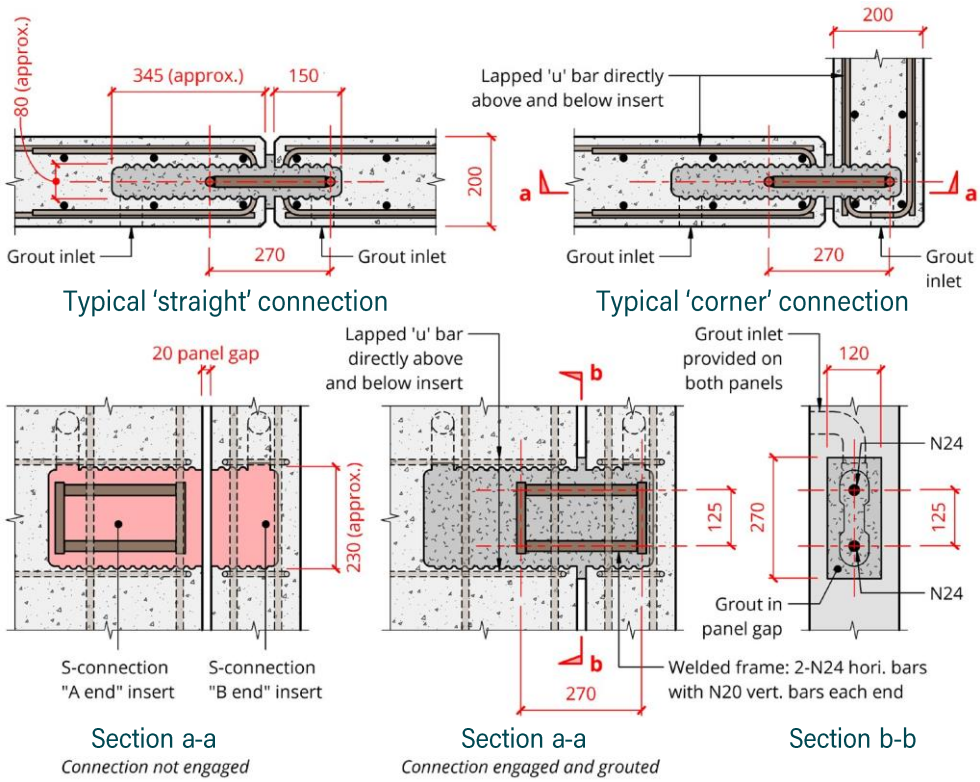
For connections around corners PSA offers a female Parts 'DB' with the grout opening on the same surface as the main opening that receives the dowel. These items are available in two different orientations 'R' (grout opening on the right sideof the main opening) and 'L' (grout opening on the left side of the main opening).

The SCON-F-DB parts work for all panels up to a thickness of 300mm.

SCON-F-DB-R

SCON-F-DB-L

PSA S-CONNECTION – TYPICAL DETAILS FOR 200MM THICK PANEL



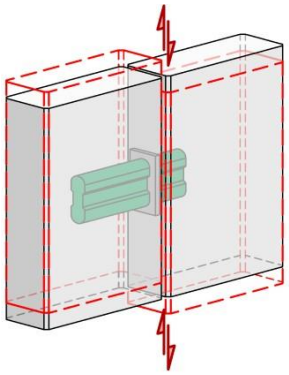
PSA S-CONNECTION SYSTEM REINFORCEMENT CONFIGURATIONS

HORIZONTAL U-BAR DIAMETER AND MIN. COVER	MAXIMUM VERTICAL BAR SIZE	
	200mm Thick Panels	250mm Thick Panels
N12 bar and 20mm cover	N24	N28
N12 bar and 25mm cover	N20	N28
N12 bar and 30mm cover	N16	N28
N16 bar and 30mm cover	Not Suitable	N28

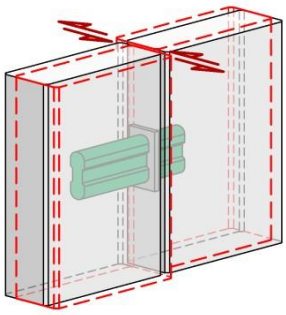
PSA S-CONNECTION – DESIGN CONSIDERATIONS

TYPICAL PRECAST APPLICATION	
Minimum Panel Thickness	200mm
Minimum Concrete Strength	40MPa
Minimum Reinforcement	2-N16 vertical Each Face / N12 U-Bars Top and Bottom of the connection
Minimum Edge Distance	500mm from top and bottom Edge of panel (40 MPa Concrete, 200mm Panel)
Minimum Spacing Between Connections	700mm centre Spacings (40 MPa Concrete, 200mm Panel)
Grout	PSA Connection Grout (High strength, Class C cementitious grout with a compressive strength of 100MPa)

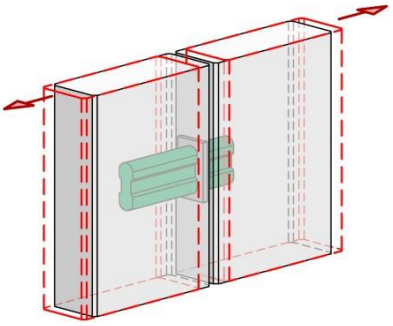
S-CONNECTION DESIGN CAPACITIES IN 40MPa CONCRETE AT SPACINGS EXCEEDING 700MM	
In-plane Vertical Shear	195.0kN
Out-of-plane Shear	16.7kN
Axial Tension	40.0kN
Connection Stiffness	105 kN/mm



In-plane (vertical) Shear



Out-of-plane Shear



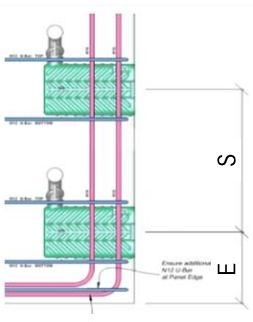
Axial Tension

Precast panels must be cast in accordance with the requirements listed above and incorporated into 'Approved for Construction' shop drawings under AS 3850.

The S-Connection requires a minimum 2-N16 vertical bars each face, approx. 100mm pitch, along with an N12 U-Bar (min) directly above and below the housing, at a nominal 250mm pitch.

RECOMMENDED SPACINGS AND EDGE DISTANCES TO ACHIEVE FULL CAPACITY

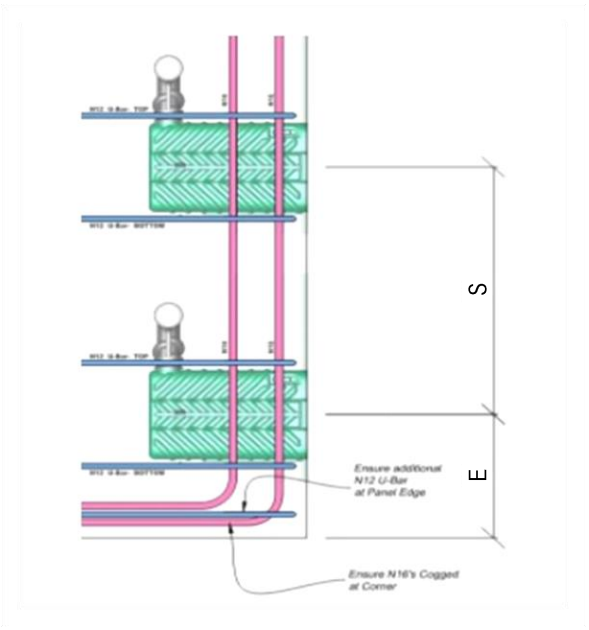
Concrete Strength (MPa)	Panel Thickness (mm)					
	200		250		300	
	Edge 'E'	Spacing 'S'	Edge 'E'	Spacing 'S'	Edge 'E'	Spacing 'S'
40	500	700	400	600	350	550
50	450	650	350	550	300	500
65	400	600	300	500	250	450



PSA S-CONNECTION – DESIGN CAPACITIES AT REDUCED SPACINGS

DESIGN CAPACITIES AT REDUCED CONNECTION SPACINGS

Concrete Strength (MPa)	Capacity (kN) at Panel Thickness (mm)											
	200				250				300			
	Edge 'E'		Spacing 'S'		Edge 'E'		Spacing 'S'		Edge 'E'		Spacing 'S'	
40	≥ 500	195.0	≥ 700	195.0	≥ 400	195.0	≥ 700	195.0	≥ 350	195.0	≥ 550	195.0
	450	185.3	650	185.3	350	175.5	650	175.5	300	175.5	500	175.5
	400	175.5	600	175.5	300	156.0	600	156.0	250	156.0	450	156.0
	350	156.0	550	156.0								
50	≥ 450	195.0	≥ 650	195.0	≥ 350	195.0	≥ 550	195.0	≥ 300	195.0	≥ 500	195.0
	400	185.3	600	185.3	300	175.5	500	175.5	250	175.5	450	175.5
	350	175.5	550	175.5	250	156.0	450	156.0				
	300	156.0	500	156.0								
65	≥ 400	195.0	≥ 600	195.0	≥ 300	195.0	≥ 500	195.5	≥ 250	195.0	≥ 450	195.0
	350	175.5	550	175.5	250	175.5	450	175.5			400	175.5
	300	156.0	500	156.0								

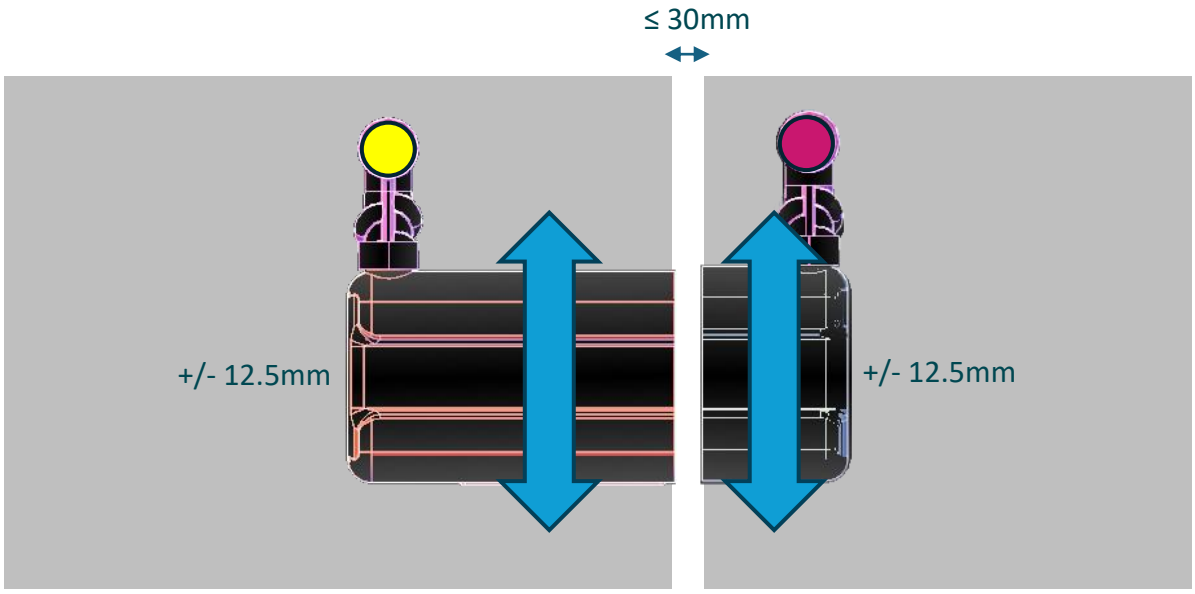


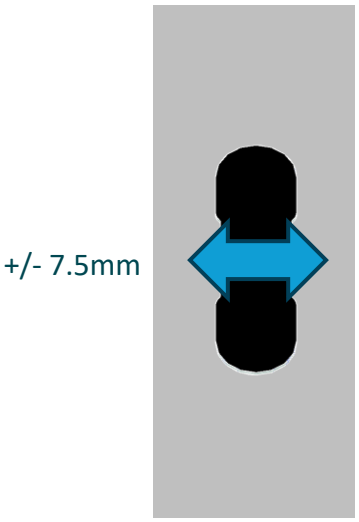
PSA S-CONNECTION – TOLERANCES

The PSA S-Connection has been designed to allow for normal construction tolerances that can be achieved in Precast. If the placement tolerances and gap width shown below are not achieved, the dowel might not be able to slide over into the female part of the connection or the capacity of the connection could be compromised.

If larger discrepancies than the ones mentioned below are found in the post-pour inspection, please contact PSA immediately for rectification advice.

The overall adjustability is ±25mm in the vertical direction and ±15mm in the horizontal direction.

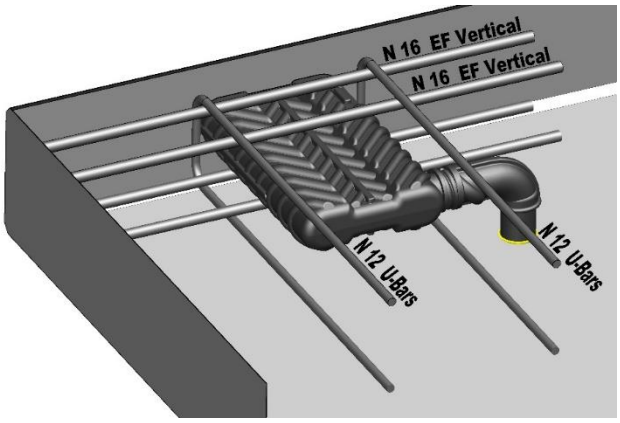




PSA S-CONNECTION – PRECAST YARD INSTALLATION GUIDE

Ensure S-Connection housings are installed level and central to the shutter, chaired and securely tied.
Similarly, ensure the elbow is secured in position, relative to its orientation, with end caps secure & flush to formwork.
For far face applications, the use of 58mm double sided tape disc (58DSTD) assists with a flush mount against the table and for near face application, the use of LVL across the panel face, can provide a flush mount, level with the concrete.

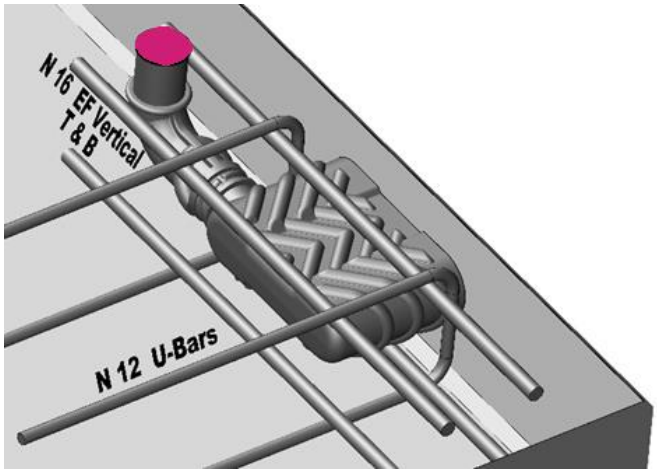
If any doubt, in relation to the possibility of slurry hindering cap removal, use silicone or similar sealer to minimise ingress.



The part shown is a 'M' male part with Orientation 'L' left. In this application the grout inlet is installed on the Far Face (FF) of the panel.

1. Select the correct S-Connection housing, relative to the precast shop drawing.
   - take particular note that the item code includes the correct panel thickness so that the connection is accurately centred within the panel.

2. The large heavier male housing, with the internal bridge mechanism, is supplied fully assembled with the elbow, braid and yellow cap as a complete unit.
   The position for the part 'M' Male will be either Left or Right of the cast panel wall with the grout inlet-elbow positioned either Near Face or Far Face.



3. The part 'B' Female housing is similarly installed.

   Note: The female component can have alternate orientations, relative to shop drawing requirements that will suit straight or corner connections.

   The housing itself, may require central positioning to either side of the formwork. Similar to that shown.

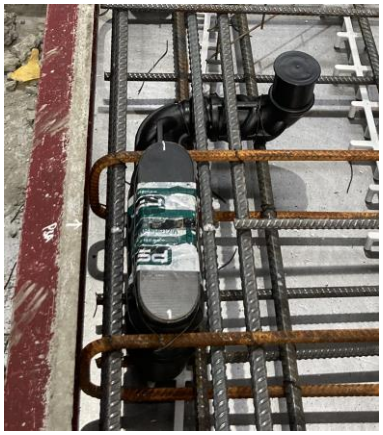
   The housing may also be positioned NF or FF, subject to corner requirements, with the elbow outlet positioned for visual access, to validate full filling.

PSA S-CONNECTION – PRE-POUR GUIDELINES

1. Ensure that the part numbers on the S-Connection matches the codes specified in the shop drawing to ensure that the correct items are installed.

> Proper installation of the correct components is essential to ensure that the connections align centrally within the panel and can be securely joined on site.

2. If correctly matched, the grout inlet/outlet orientation (NF, FF, SF) shown on the drawings should also be physically achieved. This can be used as an additional verification step.
3. Timber forms are recommended for panel edges where S-Connection components are installed. The timber end caps can be secured by driving screws through the timber shutters to ensure secure placement of the connection.
4. Adhere strictly to the specified locations on shop drawings and implement a robust QA process to prevent misplacement.
5. Unless otherwise noted, components fixed to panel edges should be centralised on the edge. Use suitable-height deck rail chairs or similar supports to secure the components at the correct height.
6. For corner connections, female components will typically be fixed on NF or FF faces (see below images). In such cases, ensure the timber cap is flush with the FF or NF and is firmly tied in or otherwise secured to prevent movement during the pour.



7. All grout inlets/outlets must be flush with the panel face. When installed correctly all grout inlets should be above the main body of the S-Connection in the direction how the panel is finally installed.
8. Ensure that all reinforcement detailed on the shop drawings is correctly installed in conjunction with the S-Connections.

> Please ask PSA for the detailed "S-Connection On-site Installation guide!

PSA S-CONNECTION – POST-POUR GUIDELINES

1. **DO NOT remove** the timber end cap (black) of **male components** during stripping. However, these caps should be cleared and made visible for easy access on site.
2. **DO NOT remove** the grout inlet cap (yellow) of **male components** during stripping. However, these caps should be cleared and made visible for easy access on site.
3. **REMOVE** the timber end cap (pink) of **female components** during stripping.
4. **REMOVE** the grout outlet cap (pink) of **female components** during stripping.
5. Conduct a post-pour inspection on all S-Connection components to confirm they have not shifted during the concrete pour.

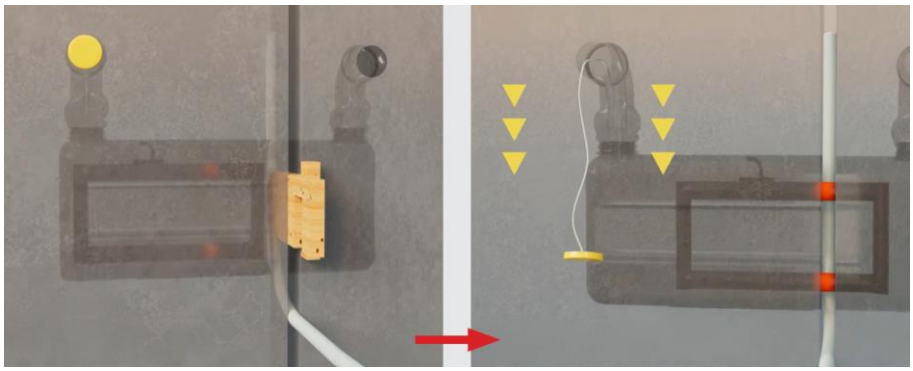
If any components have moved during concrete pour, please contact PSA immediately for rectification advice.

PSA S-CONNECTION – ON-SITE INSTALLATION GUIDE

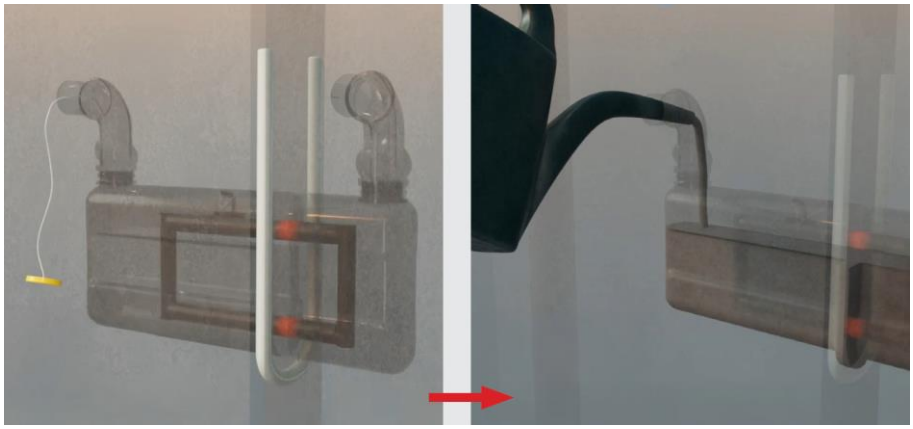
1. Once the panel is rotated into its final orientation, remove the black end caps of the S-Connection 'M' Male parts using the End Cap Removal Tool. (The pink caps and the pink grouting caps should already have been removed in the precast yard).

> All black and pink caps need to be removed prior to the final placement of neighbouring panels as they cannot be removed once the panels are placed.

2. Insert a backing rod on the far side of the panel gap (leave the near side open to observe).
3. Gently remove the yellow cap from the 'M' Male housing.



4. Holding the cap, pull the braid cord until the welded 'Bridge' fully transfers from the Panel containing the 'M' Male unit of the S-Connections into the 'F' Female panel housing. Check that the red part of the dowel is visible in sits in the panel joint.



5. Insert the backing rod around the connection to create a grout pocket (minimum 120mm wide and 270mm high).
6. Fill the entire housing with grout, using the grout opening of the 'M' Male Component. Fill gently until the grout flows through the connection to the 'F' Female grout outlet and visual evidence of the grout is observed.
7. The yellow cap may then be discarded.

> Please ask PSA for the detailed "S-Connection On-site Installation guide!"

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