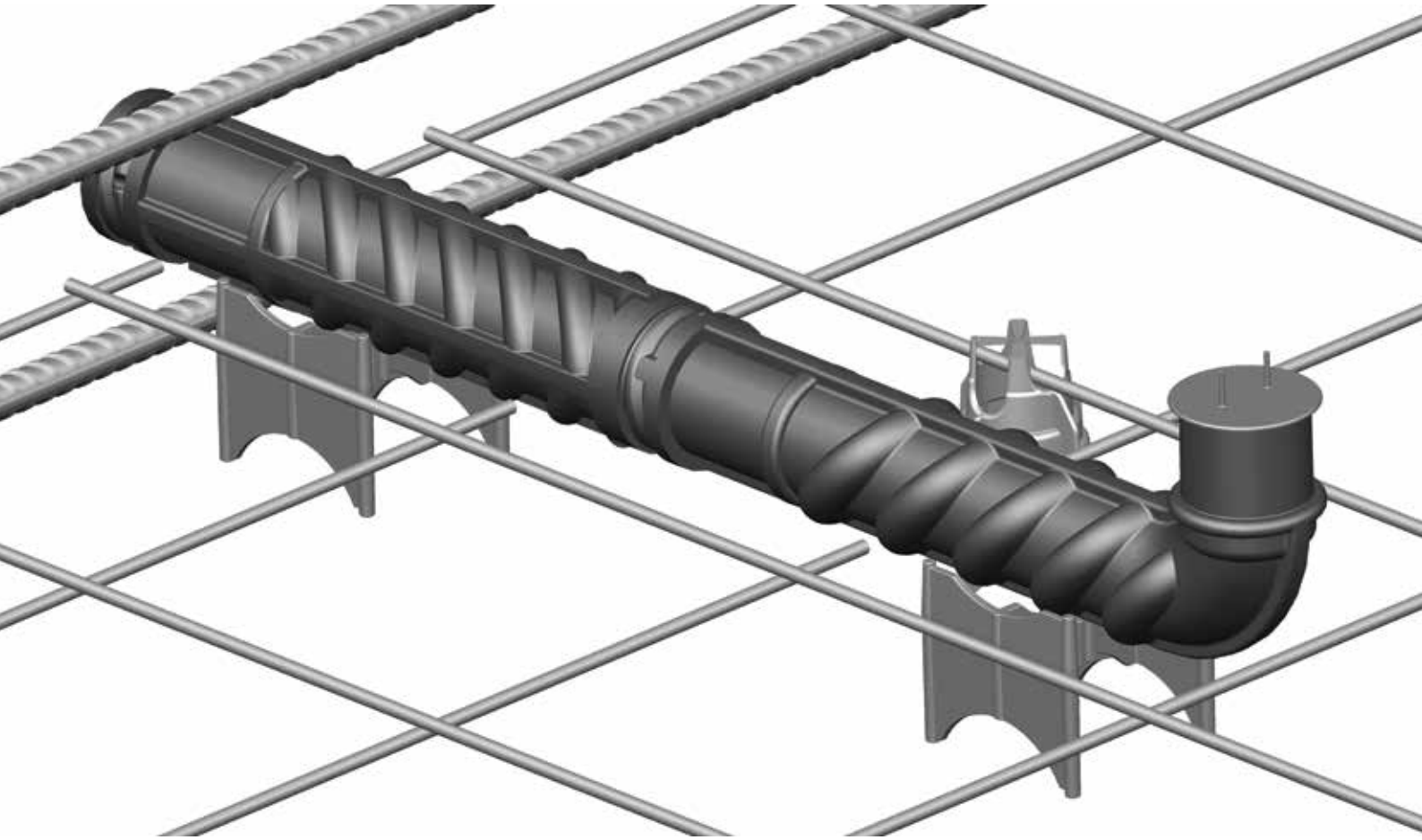
PSA

DESIGN GUIDE

GROUT TUBE SYSTEM



GROUT TUBE SYSTEM

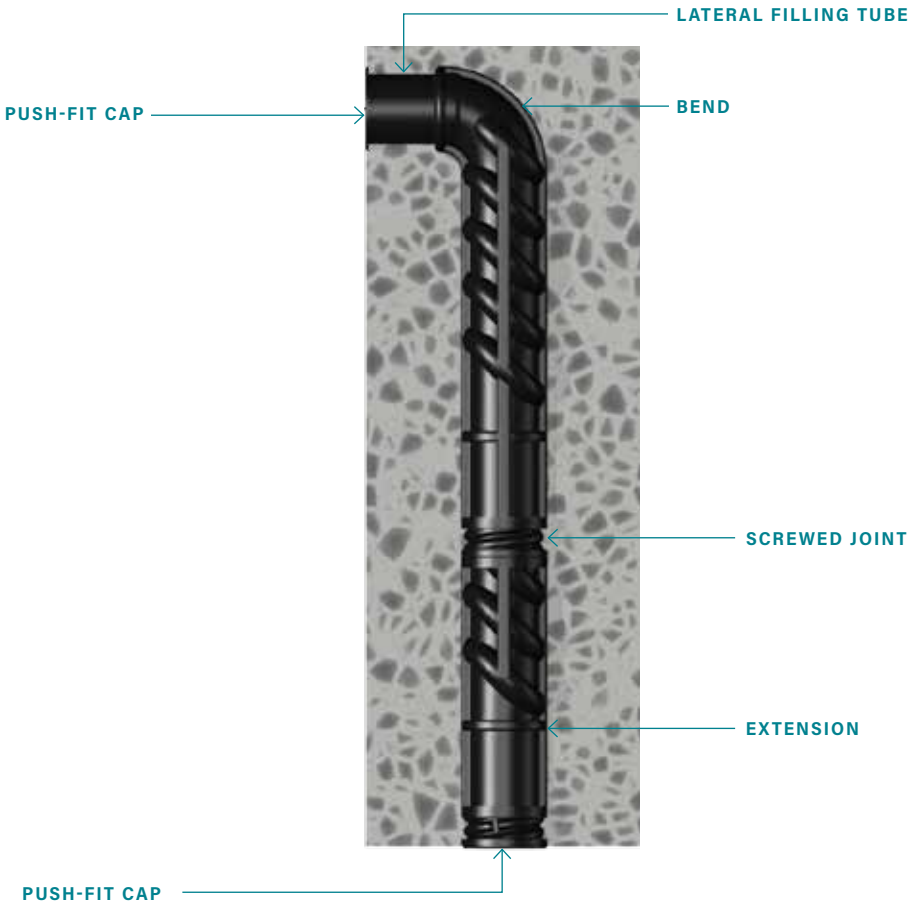
ABOUT PSA GROUT TUBE SYSTEM

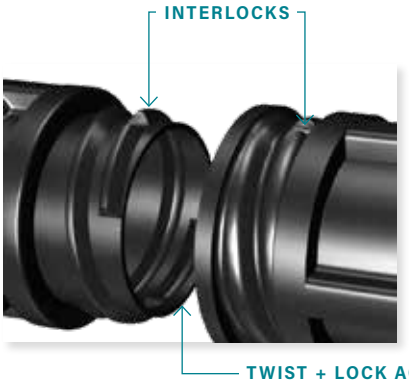
The Grout Tube System is supplied in both 50mm and 70mm diameter series, and as it is made from recycled high density polyethylene (HDPE), it avoids the risk of unsightly rust staining unlike metal tubes, appearing on concrete panels.

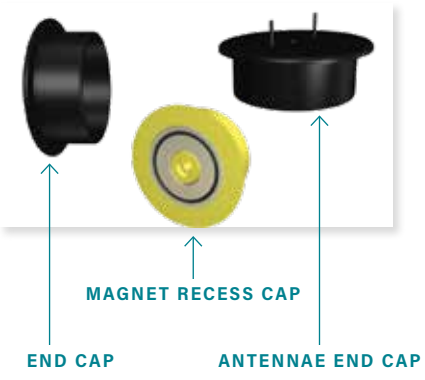
GT Bends are open-ended tubes, with each end sealed and supported during casting by push-fit caps. Bends and their Extensions are connected and sealed by screwed spigot and socket joints, utilising a unique twist and lock action. They are grouted through the lateral filling tube.

- The easy to assemble, range of bends and extensions, in both GT diameters will suit most applications
- Assembly is simply a twist and lock
- Eliminates cutting, deburring and taping
- Purpose made fixing and locator caps
- The GT system will not rust and mark panels
- All components fit conveniently onto a pallet to reduce freight costs and storage space
- Minimal bending without creasing
- No wastage or cleaning up
- The GT system is made from 100% recycled material
- Bends are supplied pre-cut to suit your panel thicknesses
- Patent protected and 100% owned and manufactured in Australia
- External NATA Laboratory pull-out tests, demonstrated improved performance, with bars failing.

THE GROUT TUBE SYSTEM







GROUT TUBE ASSEMBLIES

PSA Grout Tube Bends, when used in conjunction with straight extension pieces, offer an effective alternative to spiral ducts for creating recesses in prefabricated concrete elements such as panels. These recesses are designed to accommodate dowel bars and reinforcement bars for structural development. Both ends of the assembly can be fitted with a cover to prevent concrete ingress, allowing the grout tube to be filled with grout after the panel has been installed.

50 SERIES BEND ASSEMBLIES

The 50 Series Grout Tube Bends suit panels 125mm to 300mm thick. 50 Series Grout Tube Extensions at nominal lengths "L" of 100mm, 200mm, 300mm, 400mm, 500mm, 600mm and 700mm, can be added to the bend to extend the bend section.

The table below outlines the required Grout Tube Bends and Grout Tube Extensions used to assemble grout tube configurations for specific applications. All bends are supplied pre-cut. To order a Grout Tube Bend suitable for a particular panel thickness (tp), simply add the nominal panel thickness in mm to the part number of the bend.

NOMINAL LENGTH L (mm)	COMPONENTS		L_O (mm)	L_C (mm)
	CODE BEND	CODE EXTENSION		
200	20050GT t_p	none	250	225
300	30050GT t_p	none	350	325
400	30050GT t_p	50XT100	450	425
500	30050GT t_p	50XT200	550	525
600	30050GT t_p	50XT300	650	625
700	30050GT t_p	50XT400	750	725
800	30050GT t_p	50XT500	850	825
900	30050GT t_p	50XT600	950	925
1000	30050GT t_p	50XT700	1050	1025



70 SERIES BEND ASSEMBLIES

The 70 Series Grout Tube Bends suit panels 150mm to 300mm thick. 70 Series Grout Tube Extensions at nominal lengths "L" of 200mm, 400mm, 500mm, 600mm, 700mm, 800mm, 900mm and 1000mm, are available.

The table below outlines the required Grout Tube Bends and Grout Tube Extensions used to assemble grout tube configurations for specific applications. All bends are supplied pre-cut. To order a Grout Tube Bend suitable for a particular panel thickness (tp), simply add the nominal panel thickness in mm to the part number of the bend.

NOMINAL LENGTH L (mm)	COMPONENTS		L_O (mm)	L_C (mm)
	CODE BEND	CODE EXTENSION		
100	10070GT t_p	none	170	135
200	20070GT t_p	none	270	235
300	10070GT t_p	70XT200	370	335
400	20070GT t_p	70XT200	470	435
500	10070GT t_p	70XT400	570	535
600	20070GT t_p	70XT400	670	635
700	20070GT t_p	70XT500	770	735
800	20070GT t_p	70XT600	870	835
900	20070GT t_p	70XT700	970	935
1000	20070GT t_p	70XT800	1070	1035
1100	20070GT t_p	70XT900	1170	1135
1200	20070GT t_p	70XT1000	1270	1235

GT VOIDS + EXTENSIONS

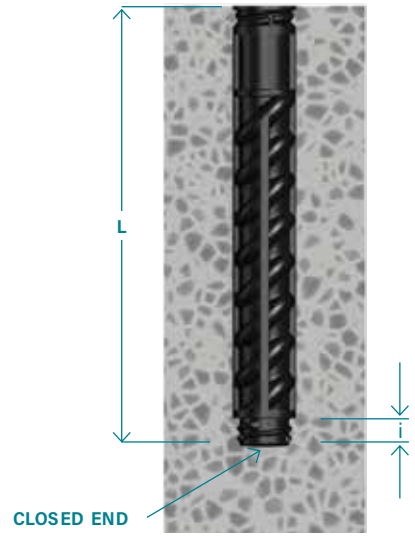
Straight pieces of the PSA Grout Tubes are available as Grout Tube Extensions with an open end for applications where the straight is used as an extension to another grout tube. For applications requiring a closed end on a straight section—such as the straight tubes positioned at the top of a panel—special straight sections with sealed ends, called Grout Tube Voids, are also available.



Nominal length "L" includes an increase "i " to allow for the closed end.

50 SERIES GROUT TUBE VOIDS	
CODE	L
50XT100U	135
50XT200U	235
50XT300U	335
50XT400U	435
50XT500U	535
50XT600U	635
50XT700U	735

70 SERIES GROUT TUBE VOIDS	
CODE	L
70XT200U	245
70XT400U	445
70XT500U	545
70XT600U	645
70XT700U	745
70XT800U	845
70XT900U	945



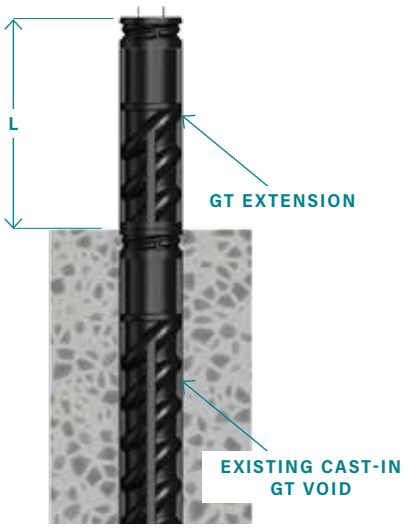
'i' = 27mm for 50mm GT and 'i" = 42mm for 70mm GT.

At the spigot end, GT Extensions are locked and sealed to GT Bends, GT Voids, or to other GT Extensions, by the screwed spigots & sockets.

50 SERIES GROUT TUBE EXTENSIONS	
CODE	L
50XT100	100
50XT200	200
50XT300	300
50XT400	400
50XT500	500
50XT600	600
50XT700	700

70 SERIES GROUT TUBE EXTENSIONS	
CODE	L
70XT200	200
70XT400	400
70XT500	500
70XT600	600
70XT700	700
70XT800	800
70XT900*	900
70XT1000	1000

** Sizes available as special order*



TENSILE TESTING OF GROUT TUBE SYSTEMS

To verify that PSA Grout Tubes offer comparable performance to commonly used metal spiral ducts, a series of comparison tests were conducted. These tests involved N20 reinforcement bars grouted into both 70mm PSA Grout Tubes and 70mm Spiral Ducts. The testing, carried out at the NATA-accredited laboratory of Melbourne Testing Services, confirmed that both systems exhibited failure through bar necking—a typical mode of failure under tensile stress. The testing conditions are described below.

Test Specimen: Nominal 2000mm x 2000mm x 180mm thick, reinforced with SL82 each face and N16 perimeter bars each face.

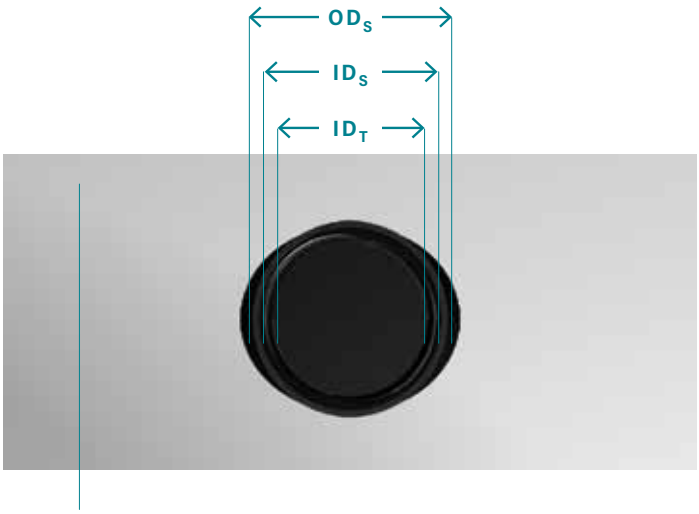
Objective: To compare the performance of the plastic and metal grout tube systems in a pull-out test, until failure of either the tube, grout, concrete or starter bar.

		PLASTIC	METAL
GROUT TUBES	NOM. DIA. & WALL THICKNESS (mm)	70 x 1.7	70 x 0.7
	NOM. RIB SPACING & HEIGHT (mm)	34 x 6	27 x 2
STARTER BARS	TYPE	N20	N20
	EMBEDMENT LENGTH (mm)	800	800
	MEAN TENSILE STRESS (MPa)	632	632
CONCRETE STRENGTH	MEAN TEST (MPa)	34.5	34.5
GROUT STRENGTH	MEAN TEST (MPa)	60.4	60.4
TEST	DAY	1 to 2	1 to 2
BAR YIELD	MAX (kN)	201	202
CRACKING	MAX WIDTH (mm) AT ULTIMATE LOAD	0.3	0.3
RESULT	FAILURE	Bar Necking	Bar Necking

Notes: For all testing the grout tubes did not withdraw from the concrete test panel. The materials and configuration of the test panels were produced in a precast yard and were representative of a typical 180mm thick concrete panel. Embedment lengths nominated were based on the practical size of test panels, with consideration to starter bars protruding 400mm and transport limitations.

DIMENSIONS AND TOLERANCES FOR GROUT TUBE ASSEMBLIES

Below are the main dimensions and tolerances of the PSA Grout Tube Systems.



Top view GT Extension cap removed

Where:

OD_S = maximum OD at socket

ID_S = minimum ID at socket

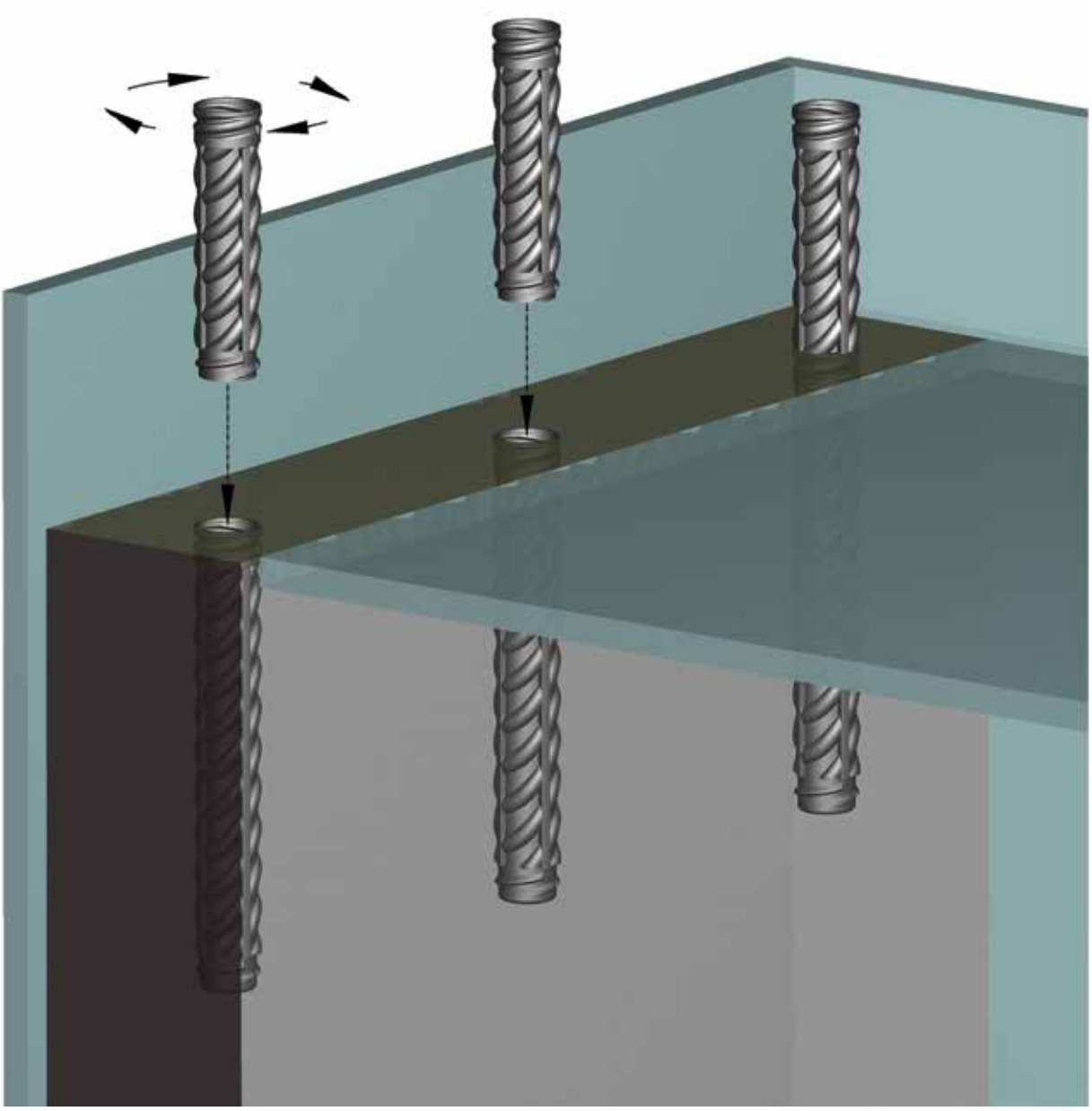
ID_T = minimum ID within tube

DIAMETERS GT EXTENSIONS (mm)			
SERIES	**OD_S**	**ID_S**	**ID_T**
50	61	50	47
70	74	67	62

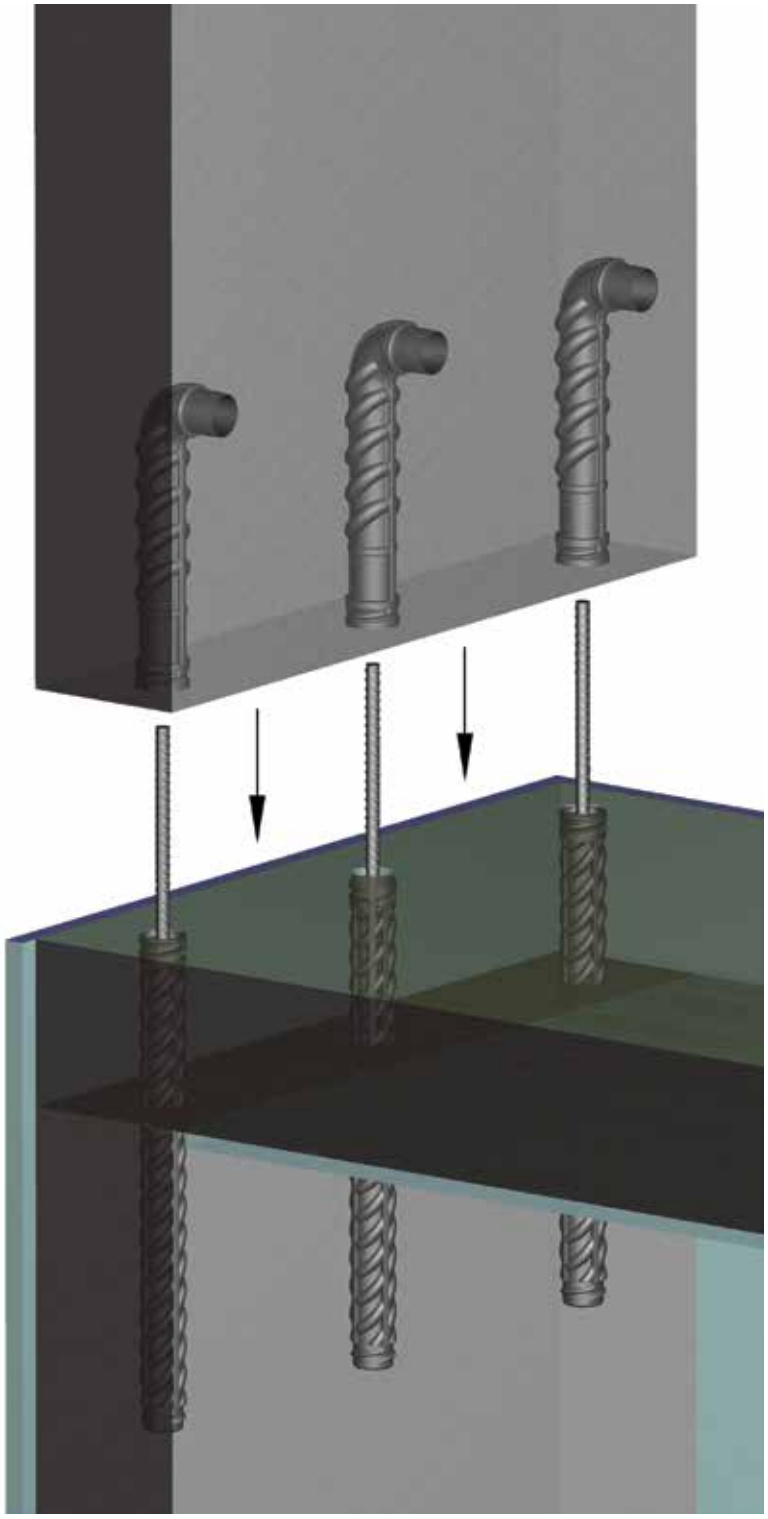
CONNECTIONS OF PRECAST PANELS THROUGH CAST-IN-SITU SLABS

For applications where Reinforcement Dowel Bars connect precast panels through cast-in-situ slabs, PSA Grout Tube Extensions can be used to form the required recess in the concrete slab and allow the dowel to connect through the slab.

1. Screw a Grout Tube Extension of length to match the floor thickness, into the socket of the GT Void located in the top of the lower panel.
2. Seal the top of the GT Extension with the End Cap or by applying duct tape.
3. Pour Concrete.
4. When the floor has cured and hardened sufficiently, remove the End Cap or duct tape to expose the opening.
5. Insert the specified steel reinforcing bar.



6. Place the upper panel, making sure to seal around the GT Bend and the GT Extension, and grout as specified.

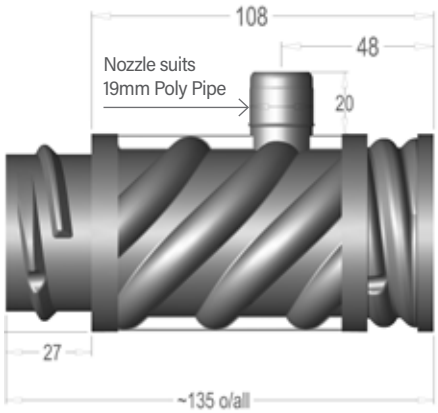


USE OF PSA GROUT TUBES WITH ADDITIONAL GROUTING OPENINGS

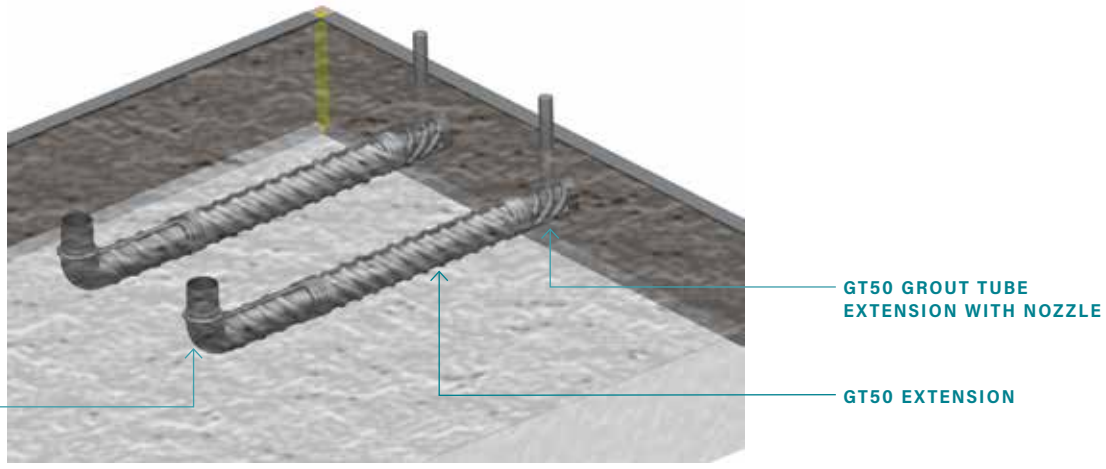
For applications requiring extra openings to vent grout tubes or to facilitate pressure grouting through hoses, PSA has developed a specialised connection piece featuring a grout inlet/outlet. This 110 mm component is fully compatible with all elements of the PSA 50 Series Grout Tubes, ensuring seamless integration and reliable performance.



GT50 Extension with Nozzle



The opening on the connection piece is designed to accommodate a 19mm Low Density Poly Pipe (Code 19LD200). The GT50 Extension with Nozzle features both male and female threads, ensuring secure attachment to all GT50 Bends and GT50 Extensions, and is fully compatible with end caps and antenna caps. This connection piece is ideal for applications such as slab-to-wall or slab-to-slab joints where initial movement occurs due to concrete shrinkage, but tension loads must be transferred once the movement has stabilised—such as in post-tensioned slab systems. GT50 Bends can serve as an additional grout vent, while GT50 Extensions allow the tube to be extended to the required length for full bar load development.



ITEM INFORMATION EXTENSION WITH NOZZLE

CODE	DESCRIPTION	LENGTH (mm)
50XT100BTO	50 Series 108mm Grout Tube Extension with Nozzle	108

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