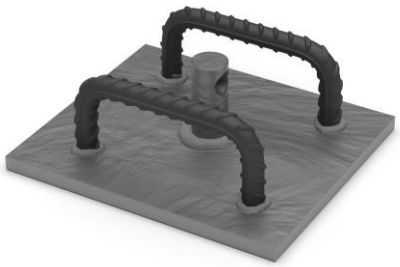
PSA

PSA CAST-IN PLATES

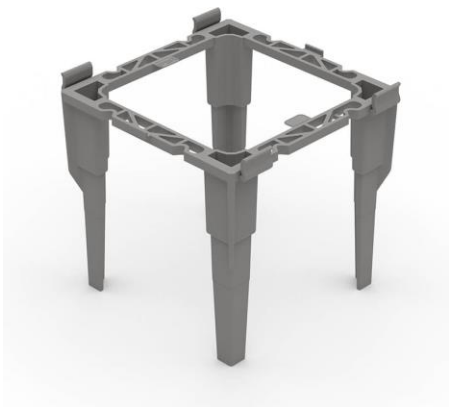
INTRODUCTION

PSA Cast-In Plates provide an effective solution for welded structural connections widely utilised by the precast concrete industry in Australia. Cast-in plate connections are typically used for precast panel to panel, precast panel to structural steel and precast panels to in-situ slab connections. This document scopes the full range of PSA typical cast-in plate sizes.

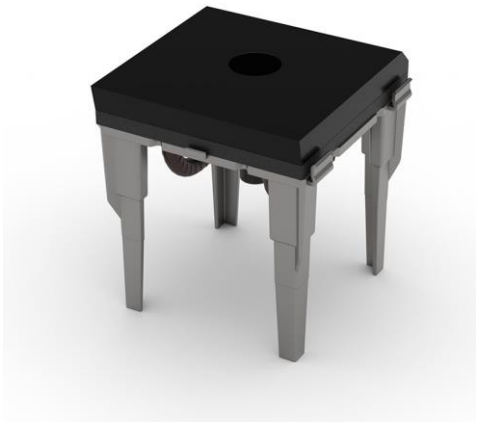
PSA cast-in plates are tested and reviewed for conformance to AS3850, AS4100, AS1554.3 and associated industry standards for buildings. In addition, thermal heat loading and on-site field serviceability for welding has been conducted, for approvals in use with the PSA plastic cast-in plate chair. 200mm x 200mm cast-in plates have been designed to be used with the patented PSA chair for near face applications, (for larger plates the support clips snap off to allow the plate to sit on the chairs side by side).



Cast-in Plate



Cast-in Plate Chair

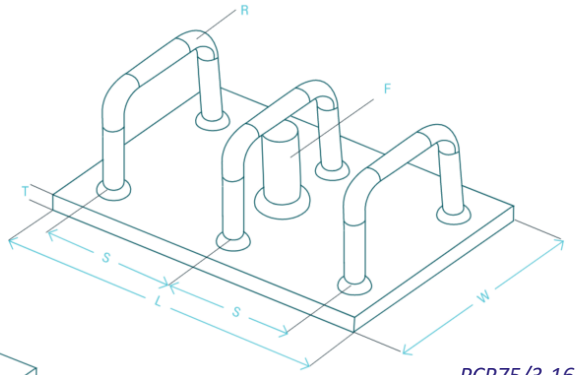


Cast-in Plate with Void Former and Chair

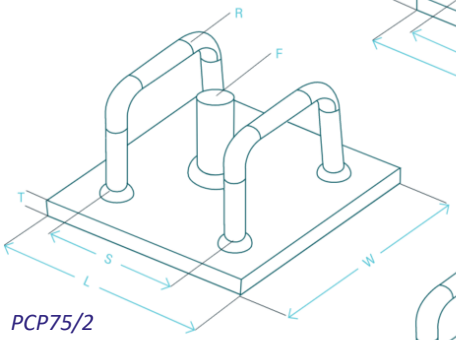
MATERIAL PROPERTIES - STEEL	
Steel Grade	250
Yield Strength	250 MPa
Ultimate Tensile Strength	410 MPa

PRODUCT DETAILS

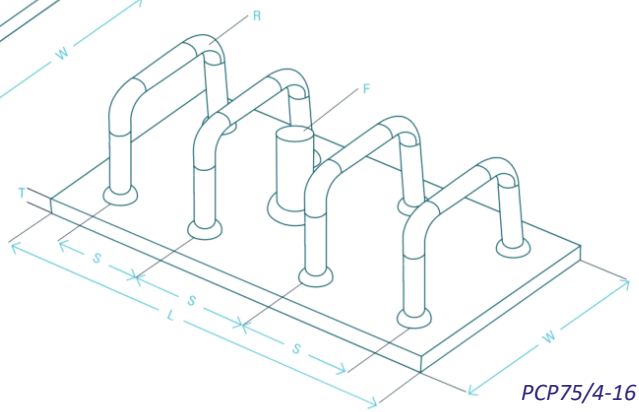
PSA PART NO.	PLATE DIMENSIONS			D-SHAPED REO BAR (R)			FERRULE SIZE (F)	EMBEDMENT DEPTH (h_{ef})
	L	W	T	NOs/SIZE	S	D		
	(mm)	(mm)	(mm)		(mm)	(mm)		(mm)
PCP75/1	200	200	12	2 x N16	100	120	M20 x 75	95
PCP75/1-16	200	200	16	2 x N16	100	120	M20 x 75	95
PCP75/2	200	200	12	2 x N16	100	120	M20 x 75	130
PCP75/2-16	200	200	16	2 x N16	100	120	M20 x 75	130
PCP75/3-16	300	200	16	3 x N16	120	120	M20 x 75	130
PCP75/4-16	400	200	16	4 x N16	113	120	M20 x 75	130



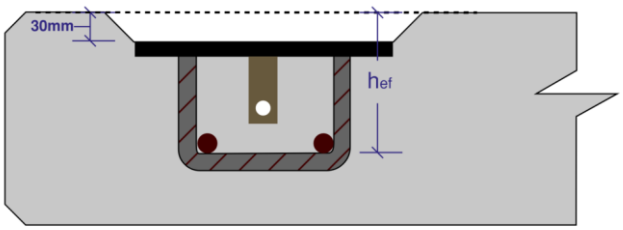
PCP75/3-16



PCP75/2
PCP75/2-16



PCP75/4-16



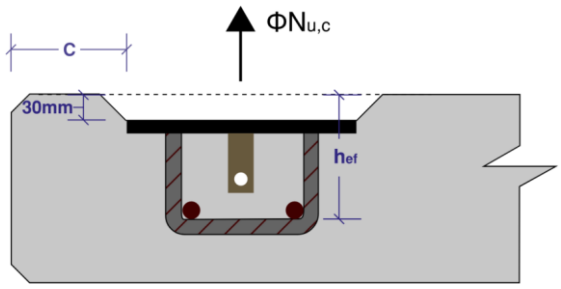
NOTES:

+ *Embedment depths (h_{ef}) given in the table are inclusive of 30mm recess*
+ *All cast-in plates are available in galvanized finish on request*

CONCRETE DESIGN CAPACITIES

In most occasions, capacities of welded stitch plate connections are governed by the concrete breakout capacity of the cast-in plates. Concrete breakout capacities to be used in engineering designs are given in the below tables.

CONCRETE BREAKOUT CAPACITY IN TENSION



REDUCED DESIGN CONCRETE TENSILE CAPACITY @ f'c = 32MPa			
PSA PART NO.	EFFECTIVE EMBEDMENT DEPTH	EDGE DISTANCE (C)	ΦNu,c
	(mm)	(mm)	(kN)
PCP75/1, PCP75/1-16	95	0	58.6
PCP75/1, PCP75/1-16	95	100	77.9
PCP75/2, PCP75/2-16	130	0	74.8
PCP75/2, PCP75/2-16	130	100	95.9
PCP75/3-16	130	0	96.2
PCP75/3-16	130	100	123.3
PCP75/4-16	130	0	111.3
PCP75/4-16	130	100	141.5

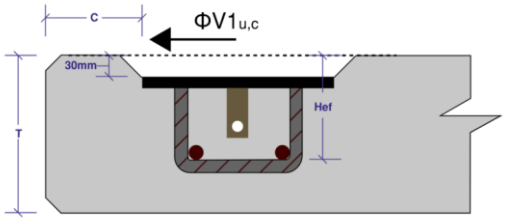
NOTES:

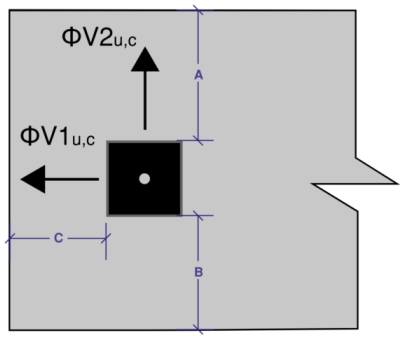
- *Effective embedment depths (h_{ef}) given in the table are inclusive of 30mm recess*
- *Ø = 0.6 included in the design capacity values*
- *Tensile load is assumed to be applied to the centre of the plate. Effect of eccentricity needs to be taken into account if applicable*
- *Concrete is assumed to be uncracked condition. Otherwise, use 0.7 reduction factor for cracked concrete capacities*
- *Concrete compressive strength is assumed as 32MPa for design capacity values. Use the design factors(β) in the below table to adjust the values to different concrete compressive strengths*

CONCRETE COMPRESSIVE STRENGTH ADJUSTMENT DESIGN FACTOR (β)					
f '$_c$ (MPa)	**20**	**25**	**32**	**40**	**50**
β	0.79	0.88	1	1.12	1.25

CONCRETE DESIGN CAPACITIES

CONCRETE BREAKOUT CAPACITY IN SHEAR





ΦV1u,c - REDUCED DESIGN CONCRETE SHEAR CAPACITY (kN) @ f'c = 32MPa						
C (mm)	Amin, Bmin (mm)	T (mm)	PCP75/1 PCP75/1-16	PCP75/2 PCP75/2-16	PCP75/3-16	PCP75/4-16
0	250	150	27.3	-	-	-
		175	29.5	31.2	38.7	44.1
		200	31.5	33.3	41.4	47.1
100	400	150	38.5	-	-	-
		175	41.6	43.6	50.5	55.4
		200	44.5	46.6	54.0	59.3
200	550	150	49.5	-	-	-
		175	53.5	55.7	62.3	67.1
		200	57.2	59.6	66.7	71.7
300	700	150	60.4	-	-	-
		175	65.2	67.7	74.1	78.7
		200	69.7	72.4	79.2	84.1

ΦV2u,c - REDUCED DESIGN CONCRETE SHEAR CAPACITY (kN) @ f'c = 32MPa					
C (mm)	A (mm)	PCP75/1 PCP75/1-16	PCP75/2 PCP75/2-16	PCP75/3-16	PCP75/4-16
0	300	39.4	41.0	48.4	54.6
	400	45.5	47.2	54.6	60.7
	500	51.6	53.3	60.7	66.8
100	300	44.2	45.9	53.2	59.3
	400	50.2	52.0	59.3	65.3
	500	56.2	58.0	65.3	71.4
200	300	48.9	50.8	57.9	63.9
	400	54.8	56.7	63.9	69.9
	500	60.7	62.7	69.9	75.9
300	300	53.6	55.7	62.7	68.6
	400	59.4	61.5	68.6	74.6
	500	65.3	67.4	74.6	80.5

CONCRETE DESIGN CAPACITIES

NOTES:

- *All cast-in plates are assumed to be 30mm recessed*
- *Ø = 0.6 included in the design capacity values*
- *$ØV2_{u,c}$ values are based on a minimum 200mm panel thickness*
- *Concrete is assumed to be uncracked condition. Otherwise, use 0.7 reduction factor for cracked concrete capacities*
- *Concrete compressive strength is assumed as 32MPa for design capacity values. Use the design factors(β) in the below table to adjust the values to different concrete compressive strengths*
- *Effect of combined loading shall be considered where cast-in plates are subjected to loads in multiple directions*

CONCRETE COMPRESSIVE STRENGTH ADJUSTMENT DESIGN FACTOR (β)					
f'_c (MPa)	**20**	**25**	**32**	**40**	**50**
β	0.79	0.88	1	1.12	1.25

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