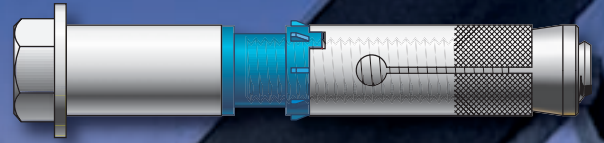
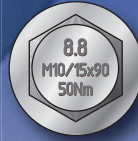
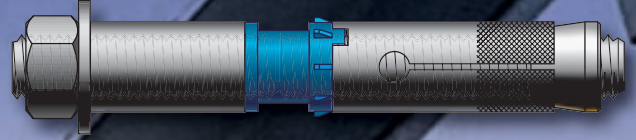


Zinc plated



Mechanically galvanised



PSA anchor

**heavy duty
vibration resistant
removable**



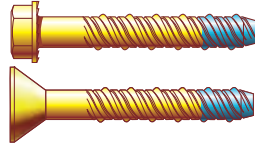
Powers offers the widest range of mechanical and adhesive fasteners in the market place. Powers products cover the full traditional anchoring range while specialising in innovative products that provide the architect, engineer and end user with aesthetic, high performance, labour saving fastening solutions.

For fast technical advice, free samples and free on site demonstrations, visit our web site www.powers.com.au

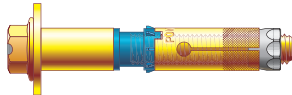
Powers adhesive systems



V12
High performance.
Fast curing
Styrene free



Blue-Tip SCREW-BOLT™
Simple to install
Removable
Vibration resistant



PBI BRACE-IT anchor
High performance
Economical
Versatile



PF PRO
Heavy duty
Odourless
Epoxy anchoring
adhesive
Environmentally friendly

Support



Training Facility
Melbourne



In-house Product &
Application Testing
Service
Melbourne



National on Site
Anchor Testing
Service



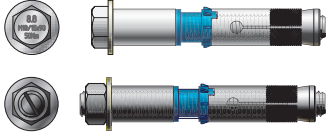
National On Site
Service
Powers Training
Vehicles (PTV)

Contents

<i>Description</i>	4
<i>Material specifications</i>	5
<i>Installation procedure</i>	5
<i>Anchor sizes and styles</i>	6
<i>Performance data</i>	7
<i>Slip loading</i>	9
<i>Design criteria</i>	9
<i>Suggested specification</i>	11

PSA Anchor

Introduction



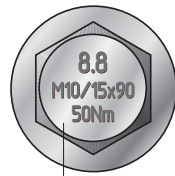
The new Proprietary PSA Anchor is a heavy-duty thick sleeve expansion anchor. It is vibration resistant and removable. The anchor is available in a finished hex head zinc plated version and a bolt projecting galvanised version which can be used in concrete, stone and some types of solid brick and core filled blockwork. The diameter of the PSA anchor is the same as the drilled hole, which eliminates layout or hole spotting.

Description

PSA Anchor

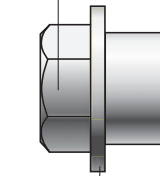
The PSA Anchor is a torque (load) controlled thick sleeve expansion anchor, which is suitable for all applications requiring high performance with minimal slip. Its unique design ensures efficient load carrying capacity in both tension and shear.

Class 8.8 bolt projecting nut and washer version in mechanically galvanised finish



Unique head markings for easy product traceability and effective on site inspection

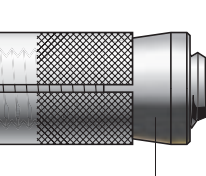
Zinc plated hex head class 8.8 bolt for high performance in both tension and shear applications.



Heavy-duty washer

Nylon compression ring ensures positive grip of anchor in drilled hole. Compression ring also provides fixture clamp down against base material for dynamic loading applications.

Thick expansion sleeve generating high slip resistance and maximum lateral wedging effect in drilled hole.



Hardened tapered cone with optimum geometric design for maximum anchor expansion.

Typical Applications:

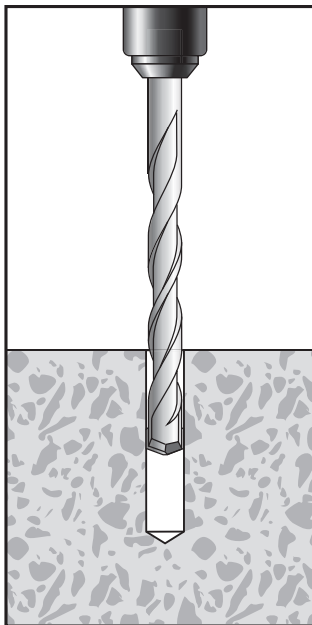
- Structural connections including column bases, beam supports etc.
- Scaffolding tie back to concrete and masonry
- Heavy machinery
- Racking tie down

Material specifications

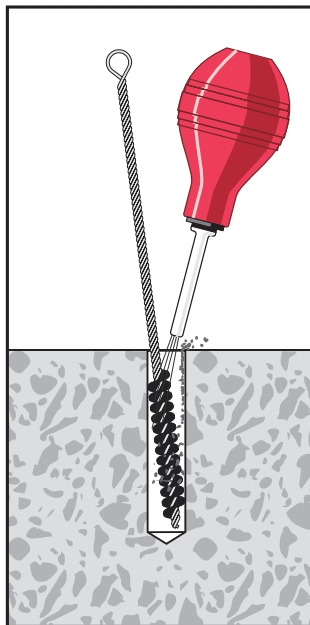
Anchor components	Carbon Steel
Bolt	Class 8.8 (UTS = 800 MPa min. / Y.S. = 640MPa min.)
Washer	C1040 (heat treated)
Expander sleeve	C1022
Extention sleeve	C1022
Expander cone	C1040 (heat treated)
Compression ring	Nylon
Plating (Zinc)	5microns (min.) zinc plated in accordance with AS1789-2003
Plating (Galvanised)	* 25 microns (min.) GALZIN [®] coating/ (Zinc Alum corrosion resistant coating applied by a mechanical plating process)
Head style	Finished Hex Head and Bolt projecting
Socket size (Hex head and bolt projecting)	M10 = 17mm
	M12 = 19mm
	M14 = 22mm
	M16 = 24mm

* GALZIN[®] corrosion resistant coating is superior to hot dip galvanised coating. (Refer to GALZIN[®] brochure.)

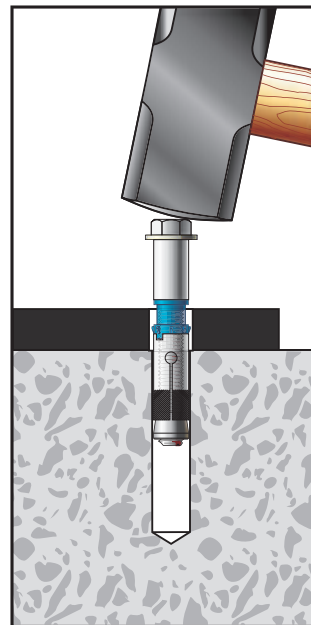
Installation procedure



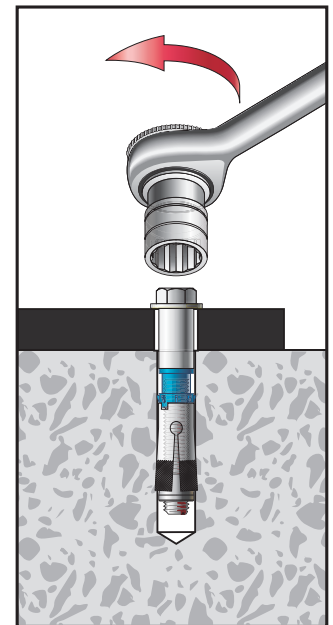
Using the proper diameter bit, drill a hole into the base material to the depth required. This must be no more than 80% of the base material thickness



Blow and brush the hole clean of dust and other material. Position the fixture. Do not expand the anchor prior to installation.



Drive the anchor through the fixture into the anchor hole until the bolt head is firmly seated against the fixture. Be sure the anchor is driven to the required embedment depth.



Tighten the anchor by turning the head 3 to 4 turns or by applying the guide installation torque from the finger tight position.

Anchor sizes and styles

The anchor length published for the standard threaded PSA anchor is measured from under the washer to the bolt end. To select the proper length, first determine the embedment depth required to obtain the desired load capacity. Then add the thickness of the fixture, including any spacers or shims, to the embedment depth. This will be the minimum anchor length required.

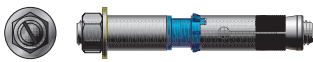
Zinc plated carbon steel, hex head PSA anchor



The PSA anchor is manufactured from carbon steel which is plated with commercial bright zinc and a supplementary chromate treatment.

Part No	Description	Drill Ø mm	Fixture clearance Ø mm	Embed. depth mm	Fixture thickness mm	Tightening torque Nm	Box qty	Carton qty
PSA15-10/90	M10 x 90mm	15	17	80	10	50		
PSA15-20/110	M10 x 110mm			90	20			
PSA18-10/85	M12 x 85mm	18	20	75	10	80	25	75
PSA18-20/105	M12 x 105mm			85	20			
PSA18-25/130	M12 x 130mm			105	25			
PSA20-25/110	M14 x 110mm	20	22	85	25	150	10	40
PSA24-25/130	M16 x 130mm	24	26	105	25	180	10	40
PSA24-25/145	M16 x 145mm			120	25			

Mechanically galvanised carbon steel PSA anchor



The PSA anchor is manufactured from carbon steel which is mechanically galvanised to Class 3 in accordance with AS 3566.2 - 2002

Part No	Description	Drill Ø mm	Fixture clearance Ø mm	Embed. depth mm	Fixture thickness mm	Tightening torque Nm	Box qty	Carton qty
PSA15-10/90G	M10 x 90mm	15	17	80	10	50		
PSA15-20/110G	M10 x 110mm			90	20			
PSA18-10/85G	M12 x 85mm	18	20	75	10	80	25	75
PSA18-20/105G	M12 x 105mm			85	20			
PSA18-25/130G	M12 x 130mm			105	25			
PSA20-25/110G	M14 x 110mm	20	22	85	25	150	10	40
PSA24-25/130G	M16 x 130mm	24	26	105	25	180	10	40
PSA24-25/145G	M16 x 145mm			120	25			

Performance data (Zinc plated PSA)

Load controlled expansion anchors for structural connections.

Working stress design

Allowable working load capacities for carbon steel PSA anchor (Zinc plated)									
Anchor hole size mm	Anchor bolt size mm	Embedment depth mm	Guide torque mm	20 MPa concrete		32 MPa concrete		40 MPa concrete	
				Tension kN	Shear kN	Tension kN	Shear kN	Tension kN	Shear kN
15	M10	80	50	9.3	14.8	11.8	18.7	13.2	20.9
		90		10.7	15.2	13.5	19.2	15.1	21.5
18	M12	75	80	9.5	15.9	11.9	20.1	13.4	22.5
		85		12.8	16.9	16.2	21.5	18.1	24.0
		105		15.5	20.2	21.2	25.6	22.0	28.6
20	M14	85	150	13.5	20.7	17.1	26.2	19.1	29.3
		100		16.3	26.6	22.3	33.6	23.2	37.6
24	M16	105	180	18.1	27.4	22.9	34.7	25.6	38.8
		120		22.5	38.7	28.4	49.0	31.7	54.8

NOTE: Incorporated safety factor (Tension and shear) $F_{sc} = 3$ (concrete).



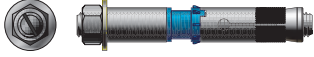
Limit state design

Limit state design load capacities for carbon steel PSA anchor (Zinc plated)									
Anchor hole size mm	Anchor bolt size mm	Embedment depth mm	Guide torque mm	20 MPa concrete		32 MPa concrete		40 MPa concrete	
				Tension kN	Shear kN	Tension kN	Shear kN	Tension kN	Shear kN
15	M10	80	50	16.7	26.6	21.2	33.7	23.7	37.7
		90		19.2	27.4	24.3	34.6	27.2	38.7
18	M12	75	80	17.1	28.6	21.4	36.2	24.1	40.5
		85		23.1	30.4	29.2	38.7	32.6	43.2
		105		28.1	36.4	38.2	46.1	39.7	51.5
20	M14	85	150	24.4	37.3	30.8	47.1	34.4	52.7
		100		29.6	47.9	40.3	60.6	41.8	67.7
24	M16	105	180	32.6	49.4	41.2	62.5	46.1	69.9
		120		40.4	69.7	51.1	88.2	57.1	98.6

NOTE: Incorporated strength reduction factor (Tension and shear) $\phi = 0.6$.

Performance data (mechanically galvanised PSA)

Load controlled expansion anchors for structural connections.



Working stress design

Allowable working load capacities for carbon steel PSA anchor (Mechanically galvanised)									
Anchor hole size mm	Anchor bolt size mm	Embedment depth mm	Guide torque mm	20 MPa concrete		32 MPa concrete		40 MPa concrete	
				Tension kN	Shear kN	Tension kN	Shear kN	Tension kN	Shear kN
15	M10	80	50	8.1	14.8	10.3	18.7	11.5	20.9
		90		9.0	15.2	11.4	19.2	12.8	21.5
18	M12	75	80	8.1	15.9	10.1	20.1	11.4	22.5
		85		10.9	16.9	13.8	21.5	15.4	24.0
		105		11.6	20.2	15.9	25.6	16.5	28.6
20	M14	85	150	11.0	20.7	13.9	26.2	15.5	29.3
		100		13.0	26.6	16.4	33.6	18.3	37.6
24	M16	105	180	14.5	27.4	18.3	34.7	20.5	38.8
		120		18.0	38.7	22.7	49.0	25.4	54.8

NOTE: Incorporated safety factor (Tension and shear) $F_{sc} = 3$ (concrete).

Limit state design

Limit state design load capacities for carbon steel PSA anchor (Mechanically galvanised)									
Anchor hole size mm	Anchor bolt size mm	Embedment depth mm	Guide torque mm	20 MPa concrete		32 MPa concrete		40 MPa concrete	
				Tension kN	Shear kN	Tension kN	Shear kN	Tension kN	Shear kN
15	M10	80	50	14.6	26.6	18.5	33.7	20.7	37.7
		90		16.2	27.4	20.5	34.6	23.0	38.7
18	M12	75	80	14.6	28.6	18.2	36.2	20.5	40.5
		85		19.6	30.4	24.8	38.7	27.7	43.2
		105		20.9	36.4	28.6	46.1	29.7	51.5
20	M14	85	150	19.8	37.3	25.0	47.1	27.9	52.7
		100		23.4	47.9	29.5	60.6	32.9	67.7
24	M16	105	180	26.1	49.4	32.9	62.5	36.9	69.9
		120		32.4	69.7	40.9	88.2	45.7	98.6

Slip loading

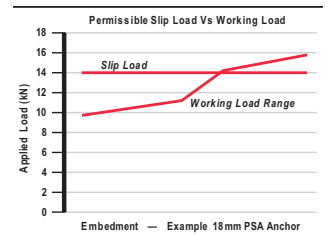
Torque controlled expansion anchor slip loading design

Where it is necessary in fixing applications to design around a slip load (0.1 mm displacement) it is critical that the Recommended Guide Torque be precisely applied, to ensure accurate performance characteristics from the fixing. The Final Preload of an anchor is considered to be the point at which negligible slip occurs (0.1mm)

Final Preload = Slip Load

To achieve the Permissible Slip Load of a fixing, it is recommended that the applied load be limited to 65% of the Final Preload, as described in AS 3850-2003 (Tilt-up concrete and precast concrete elements for use in buildings).

Permissible Slip Load = 65% Of Final Preload



PSA slip loading

ANCHOR HOLE SIZE mm	ANCHOR BOLT SIZE mm	MIN. DEPTH OF EMBEDMENT mm	GUIDE TORQUE Nm	Hex Bolt (zinc) version		Bolt projecting (gal) version	
				FINAL PRELOAD kN	PERMISSIBLE SLIP LOAD kN	FINAL PRELOAD kN	PERMISSIBLE SLIP LOAD kN
15	M10	80	50	18.3	11.9	17.8	11.6
18	M12	75	80	22.9	14.9	22.1	14.3
20	M14	80	140	27.2	17.7	25.2	16.4
24	M16	105	180	34.3	22.3	30.9	20.1

NB: The Working Load Conditions of an anchor should never be exceeded.

Design criteria

Base material thickness

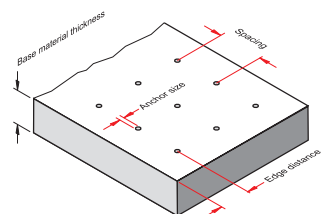
The minimum recommended thickness of base material, BMT, when using the PSA anchor is 125% of the embedment to be used. For example, when installing an anchor to a depth of 100mm, the base material thickness should be 125mm.

Spacing and edge distance criteria listed below should be considered when calculating the performance capabilities of the PSA anchor.

Spacing between anchors

To obtain the maximum load in tension or shear, a spacing, S, of 10 anchor diameters (10d) should be used. The minimum recommended anchor spacing, S, is 5 anchor diameters (5d) at which point the load should be reduced by 50%. The following table lists the load reduction factor, Rs, for each anchor diameter, d, based on the center to center anchor spacing.

ANCHOR HOLE SIZE Ø mm	Spacing distance, S (mm) Tension and Shear					
	10d	9d	8d	7d	6d	5d
15	150	135	120	105	90	75
18	180	162	144	126	108	90
20	200	180	160	140	120	100
24	240	216	192	168	144	120
Rs	1.00	0.90	0.80	0.70	0.60	0.50



Edge distance – Tension

An edge distance, E, of 12 anchor diameters (12d) should be used to obtain the maximum tension load. The minimum recommended edge distance, E, is 5 anchor diameters (5d) at which point the tension load should be reduced by 20%. The following table lists the load reduction factor, Re, for each anchor diameter, d, based on the anchor centre to edge distance.

ANCHOR HOLE SIZE Ø mm	Edge distance, E (mm) Tension only							
	12d	11d	10d	9d	8d	7d	6d	5d
15	180	165	150	135	120	105	90	75
18	216	198	180	162	144	126	108	90
20	240	220	200	180	160	140	120	100
24	288	264	240	216	192	168	144	120
Re(t)	1.00	0.97	0.94	0.91	0.89	0.86	0.83	0.80

Edge distance – Shear

For shear loads, an edge distance, E, of 12 anchor diameters (12d) should be used to obtain the maximum load. The minimum recommended edge distance, E, is 5 anchor diameters (5d) at which point the shear load should be reduced by 50%. The following table lists the load reduction factor, Re, for each anchor diameter, d, based on the anchor centre to edge distance.

ANCHOR HOLE SIZE Ø mm	Edge distance, E (mm) Shear only							
	12d	11d	10d	9d	8d	7d	6d	5d
15	180	165	150	135	120	105	90	75
18	216	198	180	162	144	126	108	90
20	240	220	200	180	160	140	120	100
24	288	264	240	216	192	168	144	120
Re(s)	1.00	0.93	0.86	0.79	0.71	0.64	0.57	0.50

Design criteria

Combined loading

Anchors loaded in both tension and shear must satisfy the following equations:

Working stress design

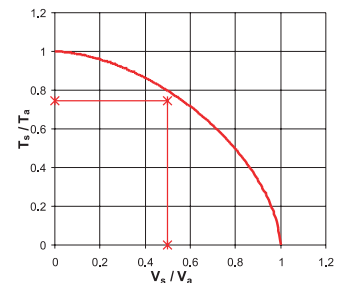
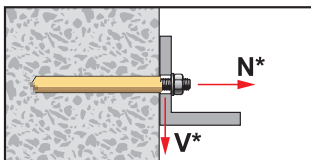
$$\frac{T_S}{T_A}^{5/3} + \frac{S_S}{S_A}^{5/3} \leq 1$$

Where:
 T_S = Applied Tension Load
 T_A = Allowable Tension Load
 S_S = Applied Shear Load
 S_A = Allowable Shear Load

Limit state design

$$\left(\frac{N^*}{\phi N_A} \right)^{5/3} + \left(\frac{V^*}{\phi V_A} \right)^{5/3} \leq 1$$

Where:
 N^* = Design Tension Force
 ϕN_A = Anchor Design Tension Capacity
 V^* = Design Shear Force
 ϕV_A = Anchor Design Shear Capacity



Design parameters for anchors in precast and tilt-up concrete panels

Part No	Description	Drill Ø mm	Drill depth mm	Concrete panel thickness (min.) mm
PSA15-10/90	M10 x 90mm	15	85	125
PSA15-20/110	M10 x 110mm		95	125
PSA18-10/85	M12 x 85mm	18	80	100
PSA18-20/105	M12 x 105mm		90	125
PSA18-25/130	M12 x 130mm		110	150
PSA20-25/110	M14 x 110mm	20	90	125
PSA24-25/130	M16 x 130mm	24	115	150
PSA24-25/145	M16 x 145mm		130	175



Never drill deeper than 80% of panel thickness, always clean the drilled hole and always use the correct length load controlled expansion anchor. This will prevent blow out in panels and eliminate costly repairs.

Suggested specification

	Example
Product name	PSA anchor
Part number	PSA 24-25/145
Size	M24 x 145mm
Embedment depth	120mm
Minimum spacing and edge distance	Spacing: 240mm, Edge distance: 288mm
	Product to be installed in accordance with published installation procedure



Contact Information for Powers Fasteners Australasia

Head Office

Address : Factory 3, 205 Abbots Road
Dandenong South VIC 3175

Telephone : (03) 8795 4600

Fax : (03) 8787 5899

Website : www.powers.com.au

E-mail : info@powers.com.au

Distributor: