Introduction
BRICK AND BLOCK ANCHORING

Brick & Block Anchoring

Ramset™ provides a range of concrete anchors for anchoring into pre-manufactured masonry units from lightweight fixtures to heavy structural connections including stud types and hex bolt finishes.

Anchoring into pre-manufactured masonry units such as concrete blocks, wire cut extruded clay brick and pressed solid bricks requires a different approach to anchoring into solid in-situ concrete or precast concrete units. The anchor must firmly clamp a fixture to the face of the substrate without splitting it or causing other damage. The capacity of the anchors is frequently limited by the strength of the substrate, and the strength of the various units available on the market varies from manufacturer to manufacturer and from region to region within any one manufacturer. Also being discrete units rather than a continuous slab means the anchor will always be in close proximity to an edge of that individual unit whilst also possibly being centrally placed within the overall structure.

Ideally all anchors into these pre-manufactured masonry units should be in the centre of the block or brick and in the case of hollow units such as wire cut bricks and concrete blocks the anchors should be placed in the solid section of the unit, but it is not always practical to position fixtures to ensure this.

This section provides performance information to aid design of connections to pre-manufactured masonry units. It assists design by recognising that positioning anchorage points in the centre of a masonry unit is not always possible by providing capacities for zones rather than specific points and we have also endeavoured to provide a realistic evaluation of the anchor's performance in the poorest performing section within these zones.

Please note that as the performance information on

pre-manufactured masonry substrates is provided by the various manufacturers in Working Load Limit format our anchor performance data in this section is also provided in Working Load Limit format.

For lightweight applications into Brick and Block a number of alternate **Ramset™** Concrete Anchors may be considered.

1. ShureDrive™ (refer to Tech Data Sheet).
2. EasyDrive™ Nylon Anchors (refer to Tech Data Sheet).

The performance of the above anchors is not dependent on the substrate and therefore you may refer to the performance figures detailed in the Tech Data Sheets available from the Ramset Website.

Anchoring into core filled hollow blocks

In hollow block masonry, where the cores are filled with concrete grout, **Ramset™** anchors may be designed and specified similarly as in concrete, provided the designer assesses the effective strength of the masonry including the joints.
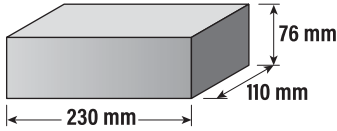
However it is not advisable to use certain heavy duty anchors, such as Spatec™ Xtrem™, Boa™ Coil , DynaSet™ , and Maxima™ Capsule anchors. Note that DynaBolt™ Plus, TruBolt™ Xtrem™ and WERCS AnkaScrew™ anchors should be limited to 12mm anchor size and ChemSet™ Injection anchors should be no greater than M16.
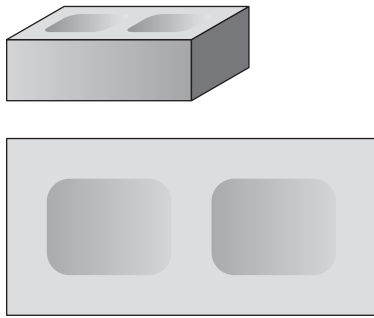
Typical Masonry
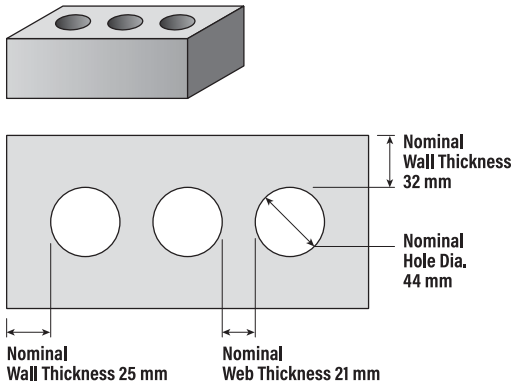## UNITS
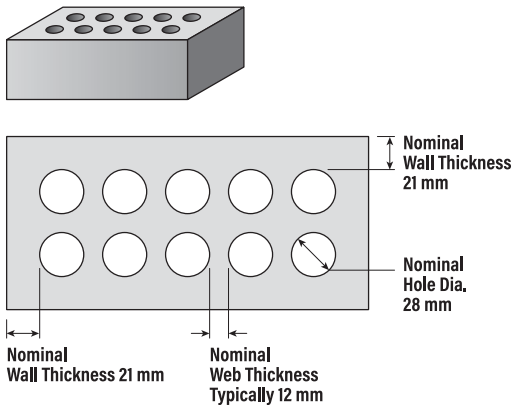
TYPICAL MASONRY UNITS

TYPICAL DIMENSIONS

CLAY BRICK – Overall

76 mm
110 mm
230 mm

SOLID BRICK

THREE HOLE BRICK

Nominal
Wall Thickness
32 mm

Nominal
Hole Dia.
44 mm

Nominal
Wall Thickness 25 mm

Nominal
Web Thickness 21 mm

TEN HOLE BRICK

Nominal
Wall Thickness
21 mm

Nominal
Hole Dia.
28 mm

Nominal
Wall Thickness 21 mm

Nominal
Web Thickness
Typically 12 mm

CONCRETE BLOCK – Overall

190 mm
190 mm
390 mm

CONCRETE BLOCK

Nominal
115 mm

Nominal
138 mm

Nominal
Wall Thickness 37.5 mm

Note: Due to the manufacturing process, the internal cavities have tapered walls. Wall thickness indicated is a nominal dimension only, taken from the centre of the block.

CHARACTERISTIC UNCONFINED COMPRESSIVE STRENGTH

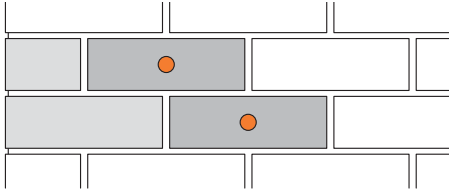| Solid Clay Brick	Three Hole Clay Brick	Ten Hole Clay Brick	Concrete Block
> 10 MPa	> 30 MPa	> 15 MPa	> 8 MPa

Typical Masonry
UNITS

INSTALLATION RECOMMENDATIONS

Corner – Brick

- One anchor per brick.
- Minimum edge distance = one brick.

Top of Wall – Brick

- One anchor per brick.
- Three clear courses down from top of wall.
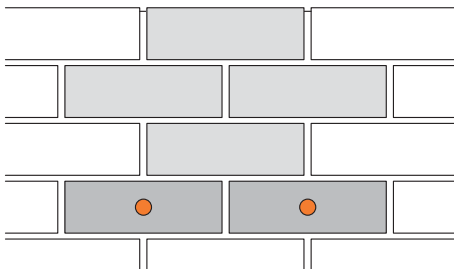
Corner – Block

- One anchor per cavity.
- Minimum edge distance = 1/2 block.

Top of Wall – Block

- One anchor per cavity.
- Two clear courses down from top of wall.
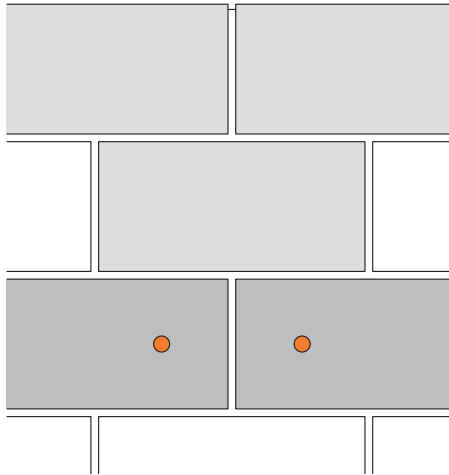
MINIMUM EDGE DISTANCES

CLAY BRICK

See page 311 and 313

≥ 20 mm

≥ 20 mm to centre of hole. Typical for all clay bricks.

CONCRETE BLOCK

≥ 60 mm

≥ 60 mm
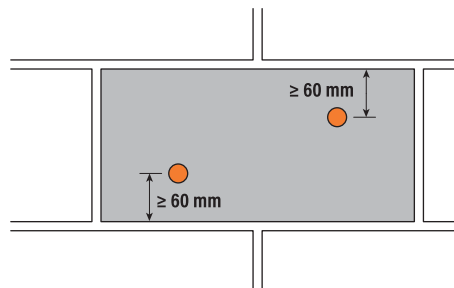
Typical Masonry
UNITS

FIXINGS PER BRICK/BLOCK

SOLID BRICK

70 mm
minimum
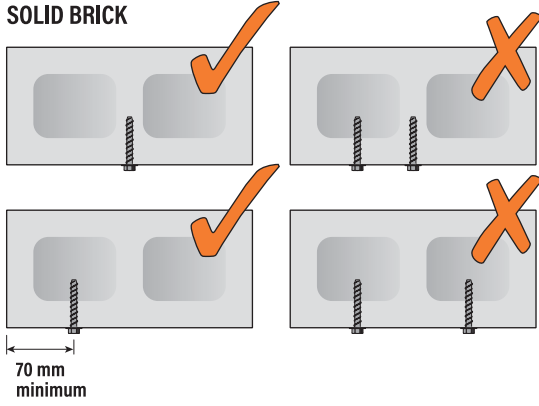
THREE HOLE BRICK

TEN HOLE BRICK
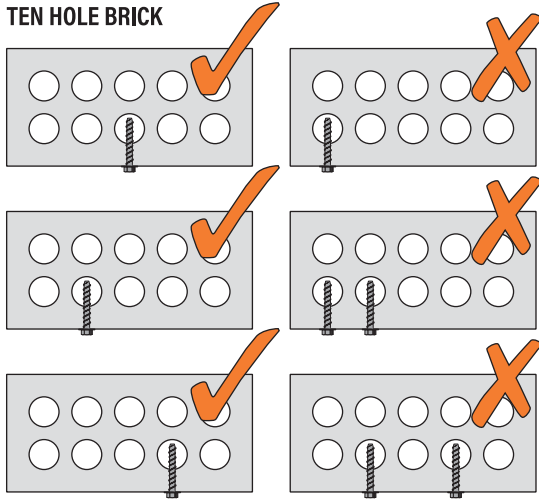
CONCRETE BLOCK
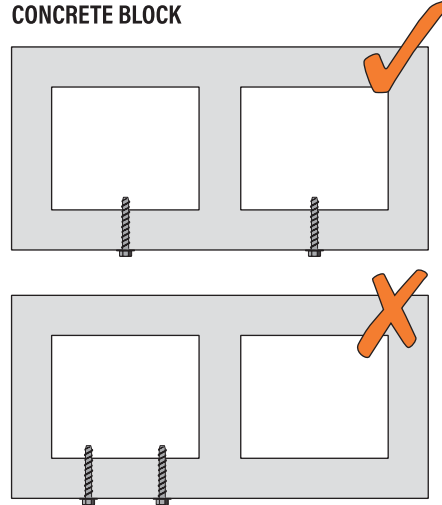
ChemSet™ 101 PLUS
CHEMICAL INJECTION ANCHORING

Ramset™

Brick & Block Anchoring

GENERAL INFORMATION

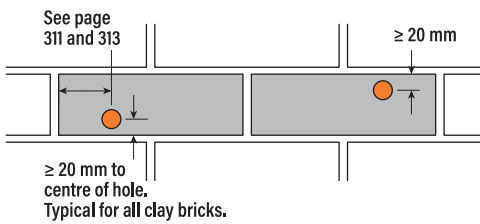| Performance Related	Material Specification	Installation Related

Zn GAL A4 316

Product

ChemSet™ Injection 101 PLUS is a medium duty, peroxide initiated injection anchor.

Benefits, Advantages and Features

Fast installation:
▪ Load in 50 min. (at 20°C).
Versatile:
▪ Suitable for anchoring into pre-manufactured masonry units.
Australian Made

Principal Applications into Brick and Block

▪ Installing wall mounted signs, handrails, and gates

Installation
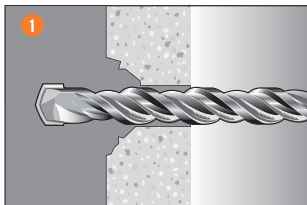
1. Drill recommended diameter and depth hole.
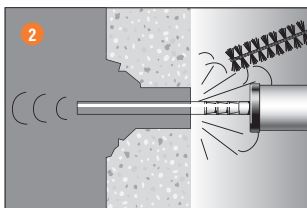
2. **Important:** Clean dust and debris from hole with stiff wire or nylon brush and blower in the following sequence: blow x 4, brush x 3, blow x 4, brush x 3, blow x 4.
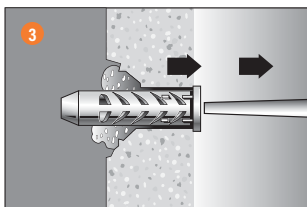
3. Insert mixing nozzle into sleeve or sieve. Dispense adhesive to waste until colour is uniform light grey (2-3 trigger pulls) Fill to 3/4 the sleeve/sieve depth slowly, ensuring no air pockets form. Insert **Ramset** ChemSet™ Anchor Stud to bottom of hole while turning.
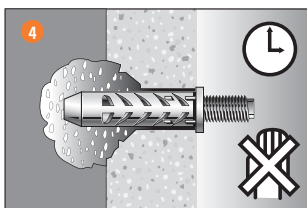
4. ChemSet™ Injection 101 Plus to cure as per setting times.
Attach fixture.

Recommended Installation Temperatures

	Minimum	Maximum
Substrate	5°C	40°C
Adhesive	5°C	40°C

Service Temperature Limits

-40°C to 80°C

Setting Times

Temperature of base material	Cartridge Temperature	Gel Time	Curing time in dry and wet concrete
5°C	5°C	18 min	145 min
10°C	10°C	10 min	85 min
20°C	20°C	6 min	50 min
25°C	25°C	5 min	40 min
+30°C	+30°C	5 min	35 min
Note: Cartridge temperature minimum +5°C			

ChemSet™ 101 PLUS
CHEMICAL INJECTION ANCHORING

Installation and Working Load Limit performance details:
ChemSet™ Injection 101 PLUS and ChemSet™ Anchor Studs

Anchor size, d_b (mm)	Substrate	Sleeve/Sieve Type	Installation details				Working Load Limit (kN)	
			Drilled hole diameter, d_h (mm)	Fixture hole diameter, d_f (mm)	Anchor effective depth, h (mm)	Tightening torque, T_r (Nm)	Solid Brick	
							Shear, V_a	Tension, N_a
M8	Solid Clay Brick	–	10	10	80	10	4.4	1.4
M10			12	12	85	20	4.8	1.5
M12			14	15	85	40	5.2	1.6
M16			18	19	85	95	5.2	1.7

Note: Use specified hole size for solid brick. Use of larger hole and/or sleeve/sieve will result in lower capacities.

Anchor size, d_b (mm)	Substrate	Installation details					Working Load Limit (kN)					
		Drilled hole diameter, d_h (mm)		Fixture hole diameter, d_f (mm)	Anchor effective depth, h (mm)	Tightening torque, T_r (Nm)	3 Hole Brick		10 Hole Brick		Concrete Block	
		Nylon Sleeve	S/S Sieve				Shear, V_a	Tension, N_a	Shear, V_a	Tension, N_a	Shear, V_a	Tension, N_a
M8	3 Hole Brick, 10 Hole Brick or Concrete Block	12	12	10	64	10	3.8	2.5	3.0	1.0	1.8	1.8
M10		14	16	12		20	4.6	2.5	4.6	1.0	2.0	1.8
M12		16	16	15		40	5.0	2.5	5.0	1.0	2.0	1.8
M16		–	22	19		95	5.0	2.5	5.0	1.0	2.0	1.8

For lower strength studs, refer to table for reduced steel capacity on page 322.

DESCRIPTION AND PART NUMBERS

Description	Cartridge Size	Part No.
ChemSet™ 101 PLUS Cartridge	380 ml	C101C
ChemSet™ 101 PLUS Jumbo Cartridge	750 ml	C101J
ChemSet™ 101 PLUS Kit	2 x 380 ml	ISKP
Mixer Nozzle for 101 PLUS	–	ISNP

Effective depth, h (mm)

Preferred h = h_n otherwise,

$$h = L_e - t$$

t = total thickness of material(s) being fastened.

To suit ChemSet™ Anchor Stud	Nylon Sleeve	Stainless Steel Sieve
M8	ISS08	-
M10	ISS10	-
M12	ISS12	ISM12
M16	-	ISM16

ENGINEERING PROPERTIES

Refer to "Engineering Properties" for ChemSet™ Anchor Studs.

WERCS AnkaScrew™
SCREW IN ANCHORS

Brick & Block Anchoring

GENERAL INFORMATION

Performance Related	Material	Installation Related

Zn MGAL

Product

The WERCS AnkaScrew˙ Anchor is a medium duty, rotation setting thread forming anchor.
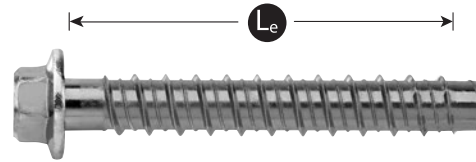
Benefits, Advantages and Features

Fast and easy to install:
- Simply screws into hole.

Fast and easy to remove:
- Screws out leaving an empty hole with no protruding metal parts to grind off.

Close to edge and for close anchor spacing:
- Does not expand and burst brick and block.

L_e

Principal Applications into Brick and Block

- **Wall mounted pipe brackets.**
- **Gate hinges.**

Installation
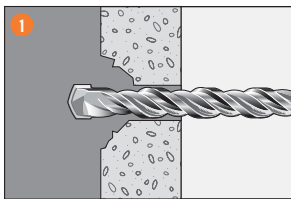
1. Drill hole to correct diameter and depth.
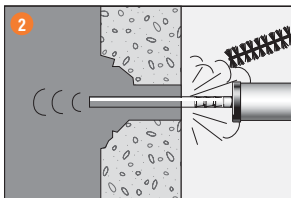
2. Clean thoroughly with brush. Remove debris by way of vacuum or hand pump, compressed air etc.

3. Using a socket wrench, screw the AnkaScrew˙ into the hole using slight pressure until the self tapping action starts.

4. Tighten the AnkaScrew˙. If resistance is experienced when tightening, unscrew anchor one turn and re-tighten. Ensure not to over tighten.

WERCS AnkaScrew™
SCREW IN ANCHORS

Installation and Working Load Limit performance details

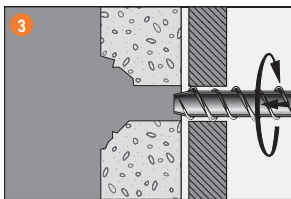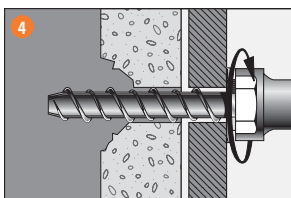| Anchor size, d_b (mm)	Installation details				Working Load Limit (kN)							
	Drilled hole diameter, d_h (mm)	Fixture hole diameter, d_f (mm)	Anchor effective depth, h (mm)	Tightening torque, T_r (Nm)	Solid Brick		3 Hole Brick		10 Hole Brick		Concrete Block	
					Shear, V_a	Tension, N_a	Shear, V_a	Tension, N_a	Shear, V_a	Tension, N_a	Shear, V_a	Tension, N_a
5	5	7	25	8	1.5	1.2	1.2	1.0	1.1	0.5	1.2	0.8
6	6	8	30	10	3.2	1.8	3.0	2.4	1.8	0.60	2.1	0.90
8	8	10	40	10	4.0	2.7	3.8	2.7	2.3	0.65	2.1	1.00
10	10	12	50	15	4.4	3.9	4.2	2.8	2.5	0.65	2.1	1.00
12	12	15	60	15	4.4	4.5	4.2	3.0	2.5	0.70	2.1	1.15

DESCRIPTION AND PART NUMBERS

Anchor size, d_b	Effective length, L_e (mm)	Part No.	
		Zn Hex Head	Gal Hex Head
5	24	AS05030	-
6	44	AS06050W100	AS06050WGM100
	69	AS06075W100	AS06075WGM100
	94	AS060100W100	AS060100WGM100
8	54	AS08060W100	AS08060WGM100
	69	AS08075W100	AS08075WGM100
	94	AS080100W100	AS08100WGM100
10	54	AS10060W50	AS10060WGM50
	69	AS10075W50	AS10075WGM50
	94	AS10100W50	AS10100WGM50
12	69	AS12075W50	AS12075WGM50
	94	AS12100W50	AS12100WGM50
	144	AS12150W20	AS12150WGM20

Effective depth, h (mm)

$$h = L_e - t$$

t = total thickness of material(s) being fixed

ENGINEERING PROPERTIES

Anchor size, d_h (mm)	Stress area, A_s (mm²)	Yield strength, f_y (MPa)	UTS, f_u (MPa)
6	15.9	640	800
8	42.4	640	800
10	69.4	640	800
12	84.1	640	800

DynaBolt™ Plus
HEX BOLT

Ramset™

GENERAL INFORMATION

Performance Related		Material		Installation Related						

Zn   A4 316

Product

The DynaBolt™ Plus Anchor Hex Bolt is a medium duty, torque setting expansion anchor.

Features and Benefits

Ideal for hollow substrates:
▪ Cone nut pulls up in cavity to clamp fixture to substrate.

Neat finish:
▪ Low profile hex head.

High shear strength:
▪ High tensile Grade 8.8 Steel Bolt.

Fast installation:
▪ Through fixing eliminates marking out and repositioning of fixture.

Convenient to remove:
▪ No metal parts protrude from hole eliminating grinding.

Economical Zinc Plated or superior corrosion resistant

AISI 316 Stainless Steel.

L_e   d_h
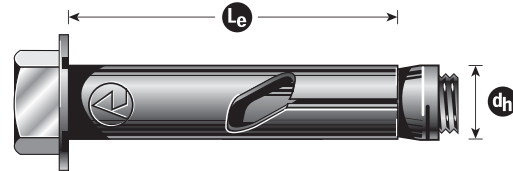
Principal Applications into Brick and Block

- **Electrical junction boxes**
- **Wall mounted pipe brackets**
- **Installing wall mounted signs, handrails and gates**
- **Roller door guide rails**

Installation
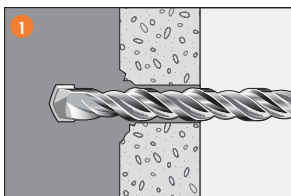
1. Drill hole to correct diameter and depth.
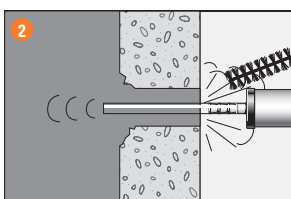
2. Clean thoroughly with brush. Remove debris by way of vacuum or hand pump, compressed air etc.

3. Insert DynaBolt™ Plus Anchor Hex Bolt through fixture, tap lightly with hammer until washer contacts fixture.

4. Tighten DynaBolt™ Plus Anchor Hex Bolt to specified assembly torque using torque wrench.

DynaBolt™ Plus
HEX BOLT

Installation and Working Load Limit performance details

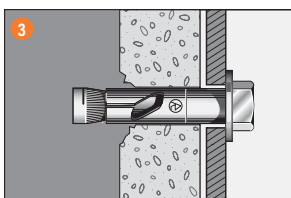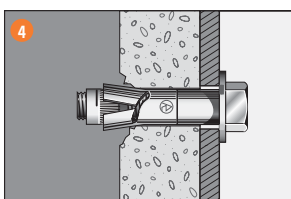| Anchor size, d_b (mm)	Installation details				Working Load Limit (kN)							
	Drilled hole diameter, d_h (mm)	Fixture hole diameter, d_f (mm)	Anchor effective depth, h (mm)	Tightening torque, T_r (Nm)	Solid Brick		3 Hole Brick		10 Hole Brick		Concrete Block	
					Shear, V_a	Tension, N_a	Shear, V_a	Tension, N_a	Shear, V_a	Tension, N_a	Shear, V_a	Tension, N_a
8	8	10	35	10	3.9	3.1	2.9	3.9	2.0	0.83	1.4	1.0
10	10	12	40	15	4.4	4.6	3.4	4.1	2.3	0.87	1.6	1.0
12	12	15	40	15	4.4	4.6	3.8	4.1	3.1	0.94	2.1	1.0

DESCRIPTION AND PART NUMBERS

Anchor size, d_h (mm)	Effective length, L_e (mm)	Part No.	
		Zn	S/S
8	34	DP08045H	DP08045HSS
	60	DP08070H	DP08070HSS
	86	–	–
10	34	DP10045H	DP10045HSS
	42	DP10055H	–
	56	–	DP10060HSS
	69	DP10080H	DP10080HSS
	96	DP10105H	DP10105HSS
12	47	DP12065H	–
	62	DP12075H	DP12075HSS
	90	DP12105H	–

Effective depth, h (mm)

$$h = L_e - t$$

t = total thickness of material(s) being fixed

ENGINEERING PROPERTIES

Anchor size, d_h (mm)	Thread size, d_b	Stress area, A_s (mm²)	Carbon steel		Stainless steel		Section modulus Z (mm³)
			Yield strength, f_y (MPa)	UTS, f_u (MPa)	Yield strength, f_y (MPa)	UTS, f_u (MPa)	
8	M6	20.1	640	800	480	600	12.7
10	M8	36.6	640	800	480	600	31.2
12	M10	58.0	640	800	480	600	62.3

®Ramset™

RamPlug™
ANCHORS

GENERAL INFORMATION

Performance Related	Material	Installation Related

NYLON

L_e

Product

The RamPlug™ Anchor is a light duty, rotation setting interference fit anchor.

Benefits, Advantages and Features
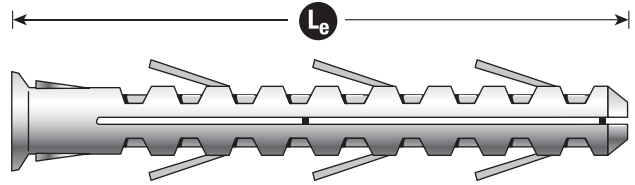
Fast and easy to install:
▪ Anchor simply hammered in and screw inserted with a screwdriver.
Convenient:
▪ Collar ensures anchor sits flush with fixture surface.
Versatile:
▪ Anchor accepts many types of screw.

Principal Applications into Brick and Block

▪ **Electrical fittings**

Installation
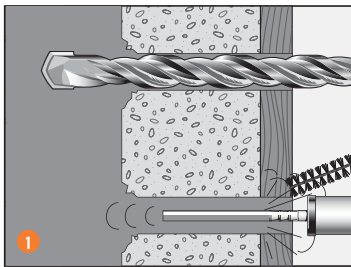
1. Drill hole to correct diameter and depth using the fixture as a template. Clean thoroughly with brush. Remove debris by way of vacuum or hand pump, compressed air etc.
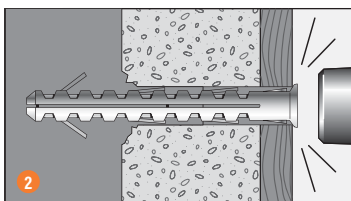
2. For long or ultralong RamPlug™
insert the RamPlug™ into hole until flush with the surface of the fixture.
For standard RamPlug™ insert the RamPlug™ into the hole until flush with the surface of the substrate.
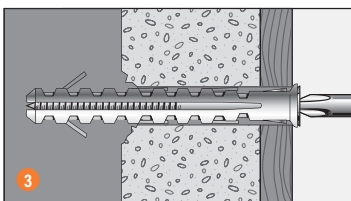
3. Insert screw into the RamPlug™. Tighten with screwdriver.
Note:
(1) For standard RamPlug™ Screw length = length of Ramplug™ + thickness of fixture
(2) For long RamPlug™   Screw length = length of Ramplug™ + thickness of fixture
(3) Ultra long plugs supplied with screw.

RamPlug™
ANCHORS

Installation and Working Load Limit performance details

| Anchor | Anchor size, d_b (mm) | Installation details | | | Working Load Limit (kN) | | | | | | | |
| | | Drilled hole diameter, d_h (mm) | Fixture hole diameter, d_f (mm) | Anchor effective depth, h (mm) | Solid Brick | | 3 Hole Brick | | 10 Hole Brick | | Concrete Block | |
					Shear, V_a	Tension, N_a	Shear, V_a	Tension, N_a	Shear, V_a	Tension, N_a	Shear, V_a	Tension, N_a
DNP05	5	5	6	25	0.40	0.30	0.40	0.20	0.70	0.16	0.40	0.13
DNP06	6	6	7	30	0.80	0.50	0.80	0.25	0.80	0.20	0.80	0.17
DNP07	7	7	7	30	1.10	0.65	1.10	0.32	0.80	0.25	1.10	0.18
DNP08	8	8	8	40	1.30	0.80	1.30	0.35	0.80	0.28	1.30	0.18
DNP10	10	10	9	50	2.40	1.10	1.90	0.45	0.80	0.36	1.90	0.19
DNP12	12	12	12	60	3.00	1.50	2.20	0.55	0.90	0.44	2.20	0.22
DLP08	8	8	8	70	1.30	0.80	Performance to be determined.					
DLP10	10	10	9	70	2.40	1.10						
DUP10080	10	10	9	70	2.40	0.60						
DUP10100	10	10	9	70	2.40	0.60						
DUP10135	10	10	9	70	2.40	0.60						
DUP10160	10	10	9	70	2.40	0.60						

DESCRIPTION AND PART NUMBERS

| Anchor size, d_b (mm) | Effective length, L_e (mm) | Part No. | | | |
		Standard	Long	Ultra Long - C/S Pozi*	Ultra Long - Hex Head
5	25	DNP05	–	–	–
6	30	DNP06	–	–	–
7	30	DNP07	–	–	–
8	40	DNP08	–	–	–
	80	–	DLP08	–	–
10	50	DNP10	–	–	–
	80	–	DLP10	DUP10080F	DUP10080H
	100	–	–	DUP10100F	DUP10100H
	135	–	–	DUP10135F	DUP10135H
	160	–	–	DUP10160F	DUP10160H
12	60	DNP12	–	–	–

* No. 3 Pozi Bit.

Typical Bolt
PERFORMANCE INFORMATION

Ramset™

Tabulated below are nominal reduced ultimate characteristic capacities for bolts manufactured in accordance with **ISO 898-1**.

The expected capacity of bolts should be independently checked by the designer based on the bolt manufacturers published performance information.

It is recommended that Stainless Steel bolts be lubricated and that tightening torque be applied in a smooth, continuous manner. Impact wrenches (rattle guns) are not suitable for the tightening of Stainless Steel fasteners.

STRENGTH LIMIT STATE DESIGN INFORMATION

Tension

Reduced nominal bolt tensile capacity, ϕN_{tf} (kN), $\phi_n = 0.8$

Bolt type	M6	M8	M10	M12	M16	M20	M24
Grade 4.6 Carbon Steel	6.4	11.7	18.6	27.0	50.2	78.4	113.0
Grade 8.8 Carbon Steel	13.3	24.3	38.5	56.0	104.2	162.7	234.4
Stainless Steel A4-70 (AISI 316)	11.3	20.5	32.5	47.2	87.9	137.2	–

Shear

Reduced nominal bolt shear capacity, ϕV_{sf} (kN), $\phi_v = 0.8$

Bolt type	M6	M8	M10	M12	M16	M20	M24
Grade 4.6 Carbon Steel	3.3	6.1	9.8	14.4	27.4	43.0	62.0
Grade 8.8 Carbon Steel	6.6	12.4	20.0	29.3	56.1	88.3	127.2
Stainless Steel A4-70 (AISI 316)	5.6	10.5	16.8	24.7	47.4	74.5	–

WORKING LOAD LIMIT DESIGN INFORMATION

Tension

Allowable tensile load steel (kN), $F_{ss} = 2.2$

Bolt type	M6	M8	M10	M12	M16	M20	M24
Grade 4.6 Carbon Steel	3.6	6.6	10.6	15.3	28.5	44.5	64.2
Grade 8.8 Carbon Steel	7.6	13.8	21.9	31.8	59.2	92.4	133.2
Stainless Steel A4-70 (AISI 316)	6.4	11.6	18.5	26.8	49.9	77.9	–

Shear

Allowable shear load steel (kN), $F_{sv} = 2.5$

Bolt type	M6	M8	M10	M12	M16	M20	M24
Grade 4.6 Carbon Steel	1.7	3.1	4.9	7.2	13.7	21.5	31.0
Grade 8.8 Carbon Steel	3.3	6.2	10.0	14.7	28.1	44.2	63.6
Stainless Steel A4-70 (AISI 316)	2.8	5.3	8.4	12.4	23.7	37.3	–

Notes
TYPICAL BOLT PERFORMANCE INFORMATION