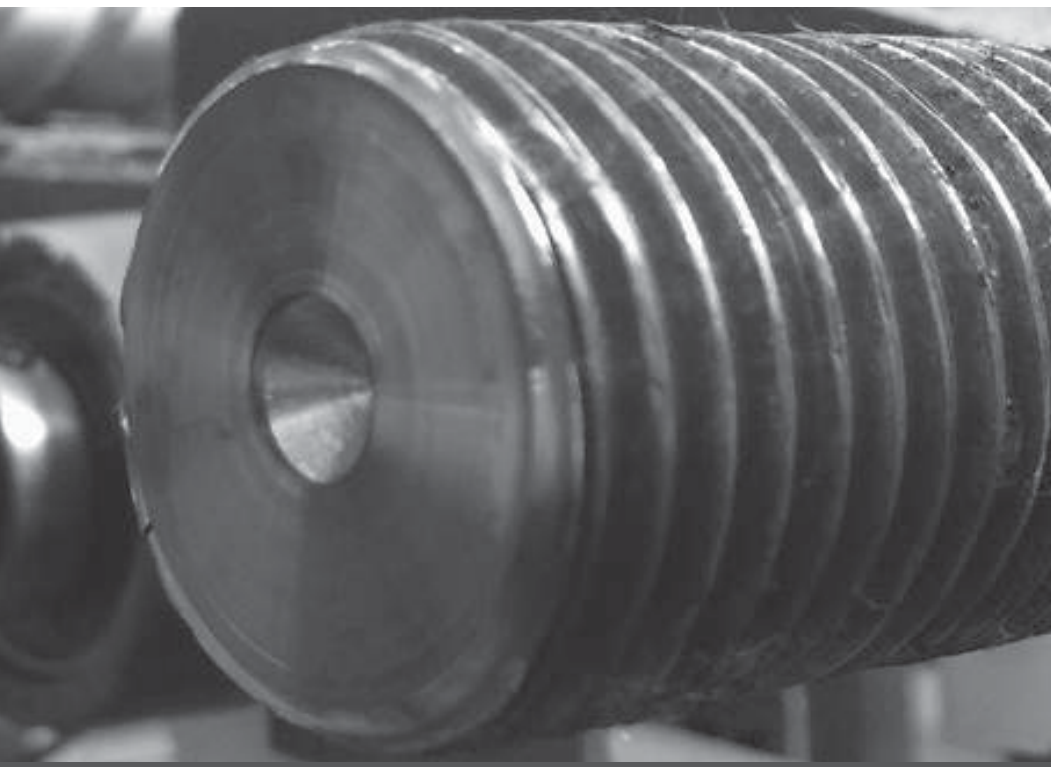


OVERCOME REINFORCING STEEL CONGESTION WITH CAGE BMS



PRODUCT
SPECIFICATIONS

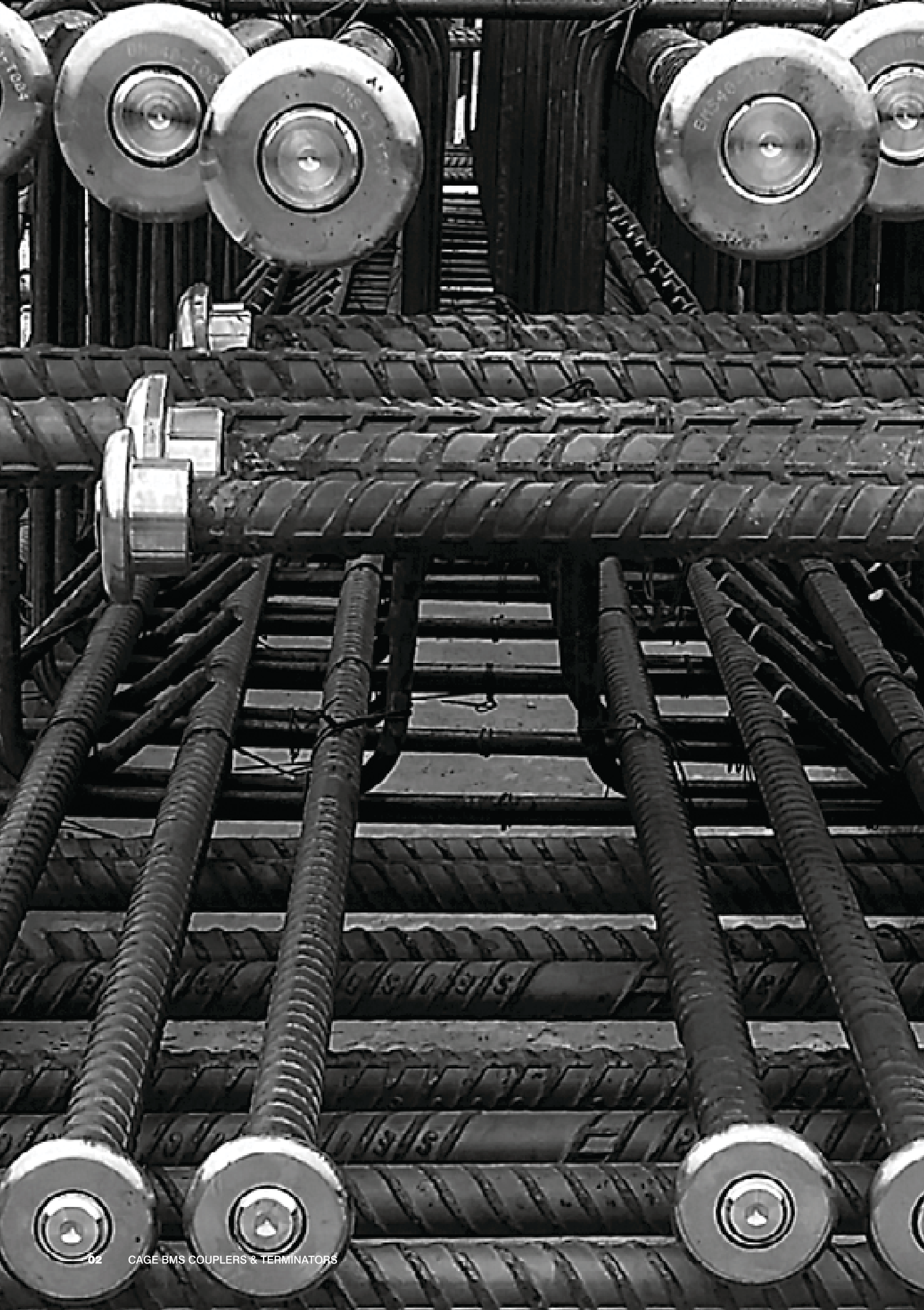
CAGE BMS



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COLD ROLLED. | FATIGUE RESISTANCE. | SUPERIOR PERFORMANCE.





ABOUT US

Cage BMS is a specialist manufacturer of steel reinforcing jointing solutions with the mission of delivering new and innovative high-end construction technology to the Australian concrete construction industry.

Cage BMS and its Directors brings together nearly 100 years of engineering and construction expertise in the Australian construction industry. This experience allows Cage BMS to be adaptive and proactive in generating engineered solutions to concrete construction challenges.

PRODUCT LIST

- BMS Couplers
- Multi Bolt (MBT) Couplers
- MBC Headed Anchors
- Steel Threaded Inserts & Nail Plates
- Ferrules & Nailing Plates
- Bar Break Threaded Starter Bars
- Stud Rail

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HIGH TENSILE STRENGTH CAGE BMS-BAR COUPLER

CAGE BMS-BAR COUPLER

The couplers are designed to provide high tensile flats, for easy gripping by hand tools; such as spanner, pipe wrench and chain wrench etc.

PROTECTED KNUCKLES – INCREASE BOND STRENGTH

The surface of the coupler has hexagonal shape knuckles, increasing bond strength.

BATCH MARKING

All products are marked with '1MBMS', size and production batch numbers.

REINFORCING RING

The centre section form adds strength to the coupler without increasing diameter. It is suitable for ultra high strength reinforcing steel bars.

HEXAGONAL SEAT FOR GRIPPING TOOL

Spanner seats are provided at both ends for easy connection by fixing tools.

CAGE BMS-BAR

NORMAL-TEMPERATURE SWAGED BAR COUPLER



PERFORMANCE IS ENSURED

Attributes:

- Meets AS3600 when used with AS4671
- Patent registration No.0316435
- No heat applied, no upsetting, no thread cutting
- Through normal-temperature swaging, original stress-resistance in tension and compression force is ensured
- Concrete placement is easy thanks to the small diameter and short length of the coupler
- Couplers are available for dissimilar sizes on request
- Full destructive tests show compliance to ACI349, ASME III, Div Z (ACI359), ACI318

TYPICAL TEST RESULTS-BS 8100 / HOT ROLLED BARS BS.4449

NOMINAL BAR SIZE	YIELD STRESS (N/mm ²)	ULTIMATE STRESS	PERMANENT ELONGATION (0.6fy) mm	FAILURE MODE
50	516	651	0.0820	BAR BREAK
40	537	628	0.0721	BAR BREAK
32	526	638	0.0518	BAR BREAK
28	533	653	0.0480	BAR BREAK
24 (25)	540	638	0.0014	BAR BREAK
20	505	618	0.0021	BAR BREAK
16	507	621	0.0048	BAR BREAK
12	521	638	0.0040	BAR BREAK

5 TURN DOUBLE HELIX COUPLER

TIGHTEN 2 x QUICKER THAN SINGLE PITCH THREAD COUPLERS



Thanks to the BMS two start threading system, rotating the coupler ONLY 5 TURNS is enough to complete the connection of two re-bar threads. Single pitch threaded couplers require 10 turns or more to complete connection. BMS couplers are designed with high tensile flats, for easy gripping by hands tools (eg. spanners, wrenches, etc).

- High strength, slip resistant Cage BMS-BAR coupler.
- Cut construction cycle time - tighten 2 x quicker than single pitch thread couplers.
- Reduces labour fatigue
- Reduces labour exposure to injury
- Diminishes potential WH&S damages
- Fast installation = improving availability and flexibility of site labour
- Lowers the potential for liquidated damages

PROTECTED KNUCKLES – INCREASE BOND STRENGTH

The surface of the coupler has hexagonal shape knuckles, increasing bond strength.

REINFORCING RING

The centre section form adds strength to the coupler without increasing diameter. It is suitable for ultra high strength reinforcing steel bars.



BATCH MARKING

All products are marked with 'IMBMS', size and production batch numbers.

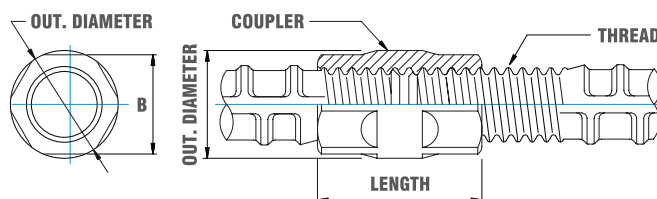
HEXAGONAL SEAT FOR GRIPPING TOOL

Spanner seats are provided at both ends for easy connection by fixing tools.

COUPLER SIZE

METRIC

BS.4449									
NOMINAL BAR SIZE (Ømm)	12	16	20	24(25)	28	32	36	40	50
COUPLER DIAMETER (mm)	19	23	31	38	43	48	51	60	75
HEXAGON-B (mm)	17	21	29	36	40	46	48	56	70
COUPLER LENGTH	30	38	46	58	65	70	75	86	110

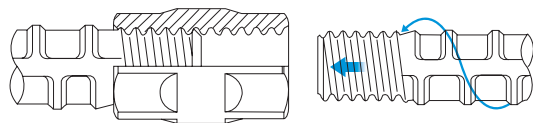


CAGE BMS-BAR INSTALLATION AND APPLICATION

TYPE A

APPLICATION

- Used where the continuity bar can be rotated. Final tightening is by wrench, spanner etc.



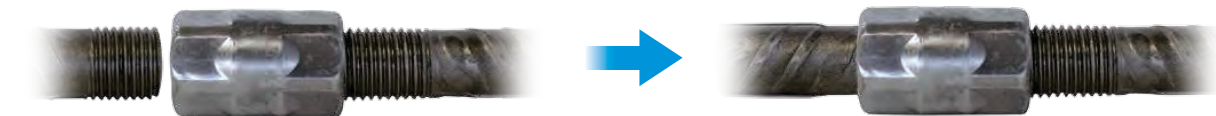
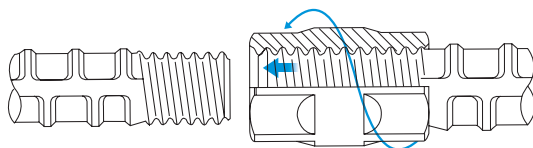
INSTALLATION

1. Screw the coupler onto the existing bar till back of thread is reached and firmly tighten.
2. Screw the continuity bar all the way into the coupler and then firmly tighten.

TYPE B

APPLICATION

- Used in application of large sized long bars (for slip-form, column, post applied in the site) where bars can be rotated but may be difficult to do so.



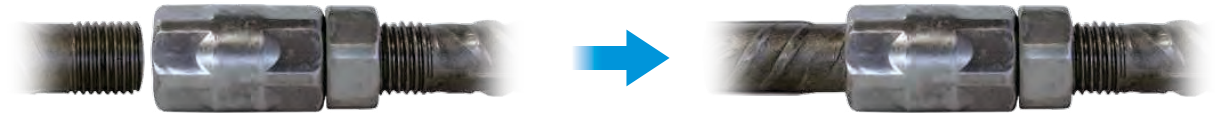
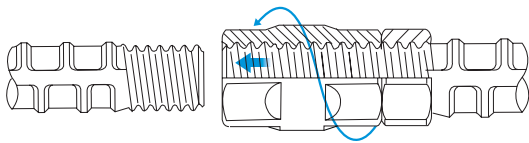
INSTALLATION

1. Screw the coupler onto the extended bar thread till the end of the coupler is flush with the bar end.
2. Place the two bar ends against each other.
3. Rotate the coupler back onto the short thread end of the second bar to form the connection.
4. Firmly tighten connection with wrench, spanner, etc.

TYPE C

APPLICATION

- Used for construction of prefabricated cages, or fixing hooked/cranked bars.



INSTALLATION

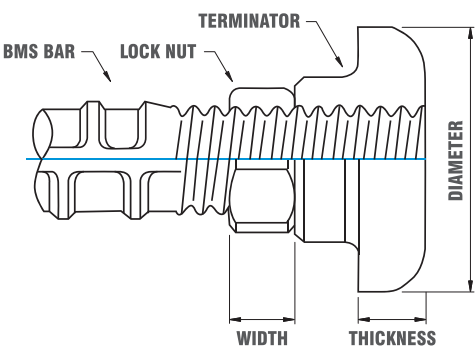
1. Screw the locking nut first and then the coupler onto extended thread end till the coupler is flush with the bar end.
2. Place the two bar ends against each other.
3. Rotate the coupler back onto the short thread end of the second bar to form the connection.
4. Firmly tighten the coupler onto the short thread end using a wrench, spanner, etc.
5. Rotate the locking nut back against the now fixed coupler and firmly tighten the locking nut against the coupler using a wrench, spanner, etc.



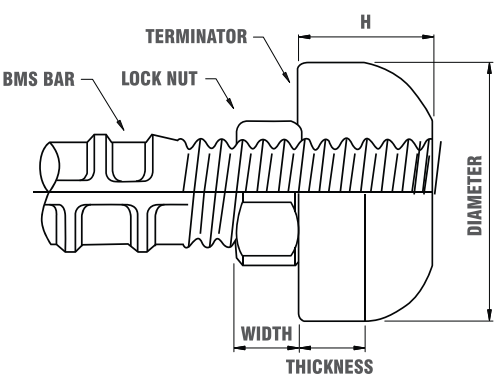
Tools for tightening.

TERMINATORS

LONGITUDINAL RE-BARS



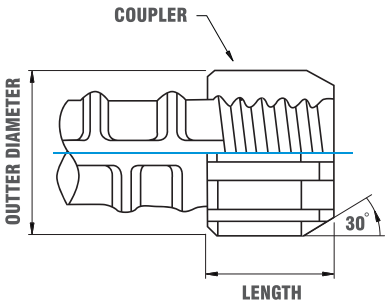
SHEAR RE-BARS



METRIC

BS.4449										
BAR SIZE		12	16	20	24 (25)	28	32	36	40	50
LONGITUDINAL RE-BARS	DIAMETER	29	36	45	56	65	72	79	90	112
	THICKNESS	6	7	8	9	10	10	12	18	20
	H	15	19	23	29	32	35	39	43	55
SHEER RE-BARS	DIAMETER	32	51	64	80	89	102	114	127	159
	THICKNESS	8	8	13	14	16	18	19	22	26
LOCK NUT	WIDTH	(8)	10	13	18	(18)	18	20	25	(30)

BMS WELDABLE COUPLER SIZE



- Weldable couplers allow unrestricted and easy placing of re-bar to steel piles, forms, etc.

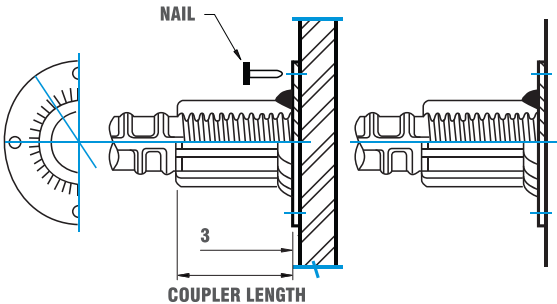
METRIC

BS.4449									
BAR SIZE	12	16	20	24 (25)	28	32	36	40	50
COUPLER DIAMETER (mm)	19	23	31	38	43	48	51	60	75
COUPLER LENGTH	15	19	23	29	33	35	41	43	55

IMPERIAL

ASTM A615 / A615M											
BAR DESIGNATION (#)	3(10)	4(13)	5(16)	6(19)	7(22)	8(25)	9(29)	10(32)	11(36)	14(43)	18(57)
COUPLER DIAMETER (mm)	18	20	24	28	32	38	42	48	55	65	85
COUPLER LENGTH	22	30	38	45	50	58	65	70	78	95	125

BMS FORM SAVER



- Coupler has an attached nail plate for accurate and easy fixing to wooden form.

METRIC

BS.4449									
BAR SIZE	12	16	20	24 (25)	28	32	36	40	50
COUPLER DIAMETER (mm)	19	23	31	38	43	48	51	60	75
COUPLER LENGTH	30	38	46	58	65	70	75	86	110

MULTI-BOLT COUPLERS (MBT)

Cage BMS, using proven technology, provides a range of multi-bolt couplers to provide effective onsite solutions to mechanically splicing reinforcing bars.

Applications include repair, retrofit, precast and new construction.

Designed to suit:

- Closure pours
- Column splicing
- Beams
- Splicing to protrusions (eg. dowels)
- Splicing for extensions (eg. starter bars)
- Bridge works

Features:

- Meets or exceeds major international building code and Department of Transport requirements including AS3600 (Concrete Structures) and AS5100 (Bridge Code).
- Smaller than other bolted splices.
- Performs like a continuous piece of reinforcing bar.
- Meets slip criteria of less than 0.10mm
- Installs quick and easily using simple hand tools.
- Does not require specialised skilled labour.
- Allows for quick and simple visual inspection of correct installation.
- Can be used as a bar size reducer .

BAR SIZE	OUTSIDE DIA.	LENGTH	BOLT QTY	BOLT SIZE	NET WEIGHT	ACTUAL TORQUE
12mm	35mm	127mm	6	M14	0.7kg	200-240 N-m
16mm	40mm	159mm	6	M14	1.1kg	250-270 N-m
20mm	45mm	191mm	8	M14	1.8kg	250-270 N-m
24mm	55mm	311mm	10	M16	4.0kg	560-590 N-m
28mm	60mm	311mm	10	M16	4.4kg	820-860 N-m
32mm	65mm	396mm	10	M21	7.3kg	820-860 N-m

* Larger sizes available. Contact Cage BMS for further information.



SIMPLE 1-2-3 INSTALLATION



1. Insert the BOLT coupler over the reinforcing bar.



2. Tighten bolts from the centre to the end to secure onto the first reinforcing bar.



3. Repeat Steps 1 and 2 with the second reinforcing bar on the other side of the coupler.

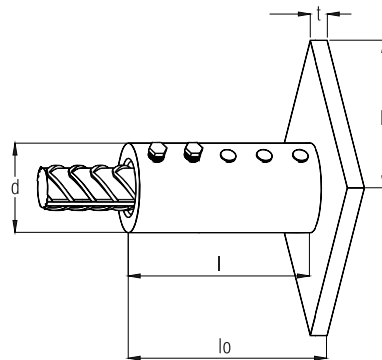
MBC HEADED ANCHORS

MBC HEADED ANCHORS ARE DESIGNED TO REDUCE CONGESTION AND ANCHOR BAR LENGTHS BUT ACHIEVE FULL TENSILE CAPACITY IN ON-SITE EXPOSED REINFORCING.

MBC Headed Anchors provide effective dead-end embedment and replace the necessity for hook end bars in areas of high congestion (eg. pile caps). MBC Headed Anchor utilises a bearing plate that is welded to one half of an MBC coupler to generate full tensile load in the bar.

MBC Headed Anchors just like our MBC Couplers are designed to be attached to pre-existing reinforcing bars. No special treatment of the institute bar end is required due to the unique design of our MBC coupler and the Headed Anchor is simply slipped on over the end of the bar. The bearing plate is designed with a hole in it to allow the Headed Anchor to be position anywhere on the existing bar. Once the Headed Anchor is located at the correct position then the protruding length of bar can be removed flush to the bearing plate if desired.

MBC Headed Anchors are designed to comply with AS3600 – Clause 13.1.4 which allows the effective development length of any size bar to be reduced to 6 times the bar diameter.



BAR SIZE	EXTERNAL DIAMETER	LENGTH	PLATE THICKNESS	PLATE WIDTH x HEIGHT	SOCKET SIZE	NUMBER OF BOLTS	WEIGHT
12	35	75	10	75 x 75	14mm	3	1.0kg
16	40	90	10	75 x 75	14mm	3	1.0kg
20	45	105	10	100 x 100	14mm	4	1.7kg
24	50	165	10	100 x 100	16mm	5	2.8kg
28	55	170	12	110 x 110	16mm	5	3.3kg
32	60	215	16	130 x 130	22mm	5	5.9kg

STEEL THREADED INSERTS & NAIL PLATES

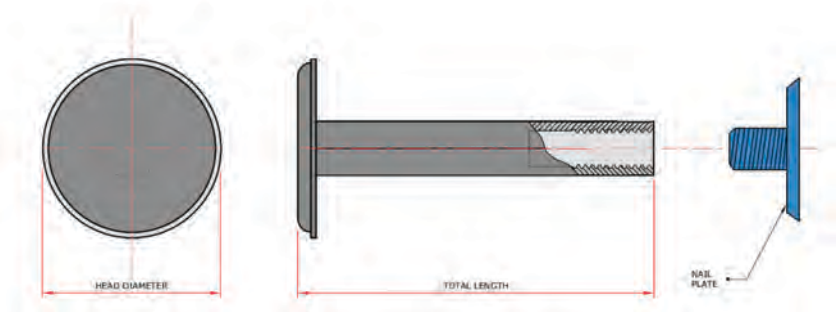


CAGE BMS STEEL THREADED INSERTS

for 12mm, 16mm & 20mm Threaded Reinforcing Bar

Cage BMS Steel Threaded Inserts are designed for use in both precast and onsite concrete construction. The inserts are an easy way to overcome buildability challenges by giving designers or constructors the ability to eliminate protruding reinforcing starter bars. Constructors can then install Cage BMS Threaded Starter bars at a later date when best suits the construction phase. Inserts are available in 3 sizes to accommodate most construction requirements.

- Meets seismic and slip requirements of ISO 15835:2009
- Meets all aspects of AS3600 when used with reinforcing bar to AS4671
- Meets the requirement of AS5100 (Bridge Code)



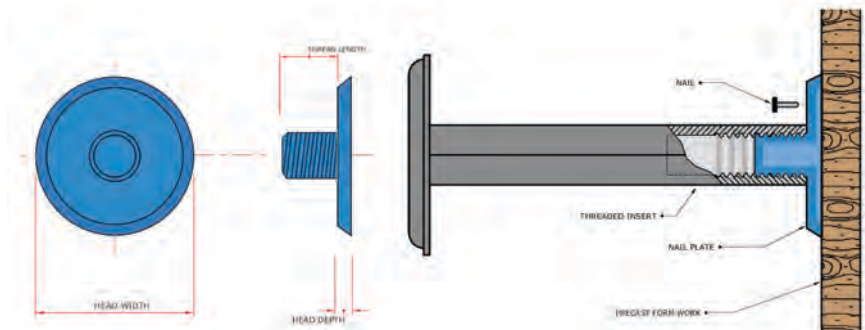
BAR DIA.	PRODUCT CODE	HEAD DIA.	TOTAL LENGTH
12mm	12BMS-TI	42mm	115mm
16mm	16BMS-TI	55mm	130mm
20mm	20BMS-TI	74mm	150mm

CAGE BMS NAIL PLATES

for 12mm, 16mm & 20mm Threaded Inserts

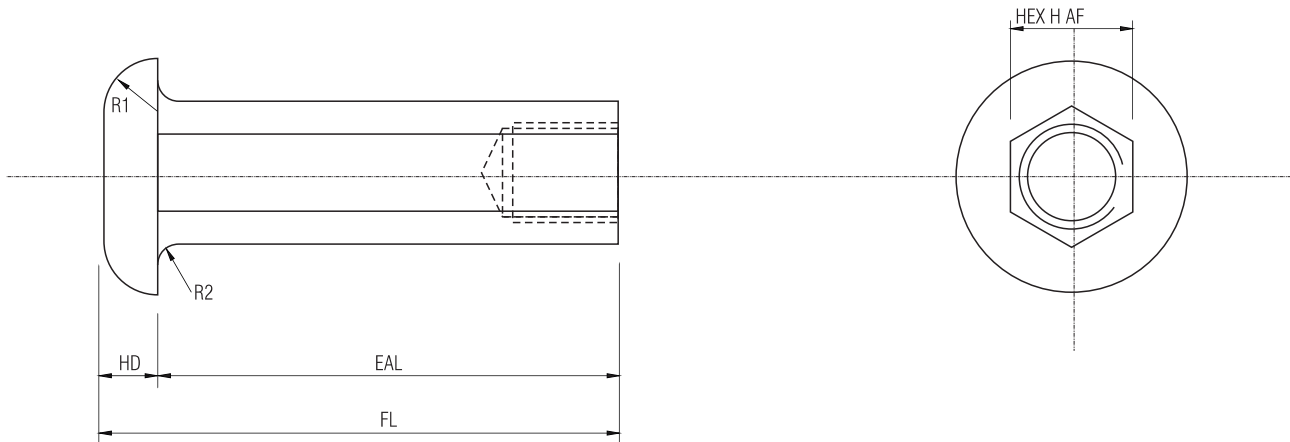
Cage BMS Nail Plates are designed to suit 12mm, 16mm and 20mm Cage BMS Threaded Inserts. Nail Plates are an effective way of ensuring correct positioning of Cage BMS Threaded Inserts. Nail Plates fixed to the inside of the concrete formwork. Once concrete has been poured and formwork removed the nail plates can be removed allowing easy installation of Cage BMS threaded starter bars.

- For use in conjunction with Cage BMS Threaded Inserts and other associated Cage BMS fittings.
- Plastic Nail plates are easily fixed to precast formwork.



HEAD DIA.	PRODUCT CODE	HEAD DEPTH	THREAD LENGTH
55mm	12BMS-NP	10mm	14mm
63mm	16BMS-NP	8mm	12mm
63mm	20BMS-NP	8mm	12mm

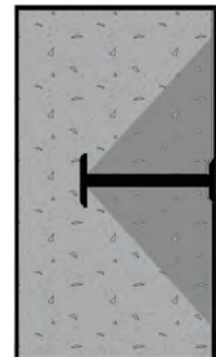
TECHNICAL INFORMATION FOR CAGE BMS THREADED INSERTS



PRODUCT CODE	HEAD DEPTH	R1	R2	HEX H AF
PC12TI	6mm	6mm	3mm	19mm
PC16TI	7mm	7mm	3mm	22mm
PC20TI	8mm	8mm	3mm	30mm

For threaded inserts located with nail-plate.

PRODUCT CODE	REBAR DIAMETER	INSERT LENGTH FL	TOTAL EMBEDMENT DEPTH EAL	INDIVIDUAL CHARACTERISTIC LOAD $N_{c,k}$ (kN)
PC12TI	12mm	115mm	119mm	91.8
PC16TI	16mm	130mm	133mm	108.5
PC20TI	20mm	150mm	152mm	132.5



For threaded inserts located without nail-plate.

PRODUCT CODE	REBAR DIAMETER	INSERT LENGTH FL	TOTAL EMBEDMENT DEPTH EAL	INDIVIDUAL CHARACTERISTIC LOAD $N_{c,k}$ (kN)
PC12TI	12mm	115mm	109mm	80.5
PC16TI	16mm	130mm	123mm	96.5
PC20TI	20mm	150mm	142mm	119.7



* Individual characteristic load values stated above are based off 32mpa non-cracked concrete strength.

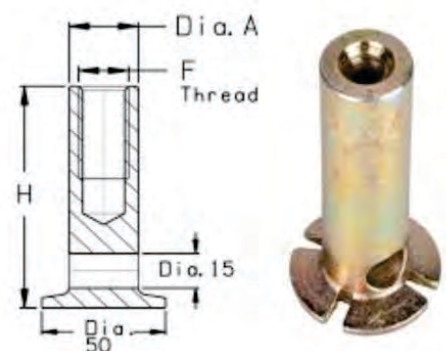
FERRULES & NAILING PLATES

FERRULES

CAGE BMS Ferrule are tested to AS3850, AS/NZS4671 and AS3600 and ACRS approved where applicable and further certified by our experienced and qualified engineering team. Available in Zinc, Gal, or special-order Stainless Steel.

FOOTED FERRULES

THREAD	HEIGHT H	OUTSIDE DIA. A	BOX
M12	50	20	50
M16	75	28	50
M20	75	28	50
M12	96	28	50
M16	96	28	50
M20	96	28	50
M24	96	32	50



ROUND FERRULES

THREAD	HEIGHT H	OUTSIDE DIA. A	BOX
M12	50	28	50
M16	75	28	50
M20	75	28	50
M12	96	28	50
M16	96	28	50
M20	96	28	50
M24	96	32	50



NAILING PLATES

Nailing Plates screw into the ferrule and are mechanically fastened to the formwork, leaving recess in the panel.

NAILING PLATE

DESCRIPTION	BOX
12mm Nailing Plates - Red	100
16mm Nailing Plates - Green	100
20mm Nailing Plates - Blue	100
24mm Nailing Plates - Yellow	100



BAR BREAK THREADED STARTER BARS

For many years industry has been told that only specially modified thread applied to reinforcing starter bars can achieve true full strength "bar break".

Cage BMS using the proven technology of the automotive and aero-space industries introduce a unique system of applying a standard metric thread to reinforcing bars and achieving true full strength "Bar Break" capacity.

This system utilises the benefits of applying a standard metric "Cold Rolled" thread onto reinforcing bar. The process is simple involving accurately rounding the reinforcing bar to the required nominal diameter, applying a lead-in chamfer from which the thread can start and precisely "Cold Rolling" the metric thread onto the bar.

The use of threaded starter bars is to form a structural tie typically between wall to slab or wall to wall connections. Threaded starter bars are commonly used in conjunction with cast-in ferrules and/or couplers to tie different concrete structural elements together.

- High strength.
- Cold rolled.

STOCK SIZES & LENGTHS:

- N12 x 600mm with 50mm thread.
- N16 x 650mm with 50mm thread.
- N20 x 850mm with 50mm thread.
- N24 x 1000mm with 50mm thread.
- N28 x 1150mm with 50mm thread.
- N32 x 1350mm with 50mm thread.
- N36 x 1500mm with 50mm thread.
- N40 x 1650mm with 50mm thread.

NOTE:

- CAGE BMS Couplers and Ferrules available.
- Threadbar system available in black and galvanised.
- Non-stock lengths available on request.
- CAGE BMS Threadbar system also available through selected reinforcing suppliers.



CAGE BMS STUD RAIL

Often when designing structures, Engineers need to address the issue of highly localised shear forces. These localised forces, if not addressed, can result in rapid undetectable localised punching shear failure.

Cage BMS Stud Rails are a method of effectively addressing these forces and prevent punching shear failure. Cage BMS Stud Rails allow the designer to increase the localised shear reinforcement but due to their design reduce congestion and increase ease of installation.

Cage BMS Stud Rails work by utilising double headed forged steel studs welded to a common rail which increase the area of effect of the structure responsible for transferring the loads. By distributing the load over an increased area of effect, advantages like thinner slab thickness can be utilised.

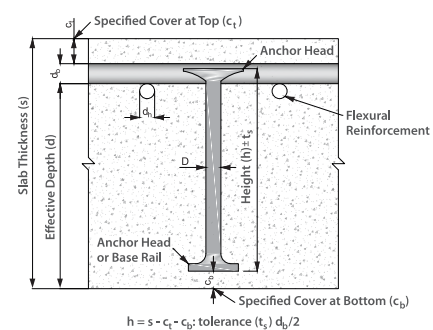
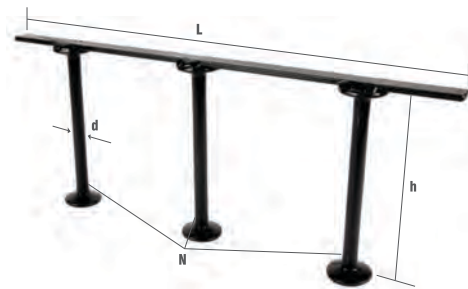
Cage BMS Stud Rails are locally manufactured and provide a solution to Engineers that can be tailor made to suit their specific project needs. Cage BMS Stud Rails are available with stud diameters ranging from 12mm to 24mm with lengths and spacings designed to suit specific project requirements. Cage BMS Stud Rails are designed to comply with all relevant Australian Standards.

Benefits:

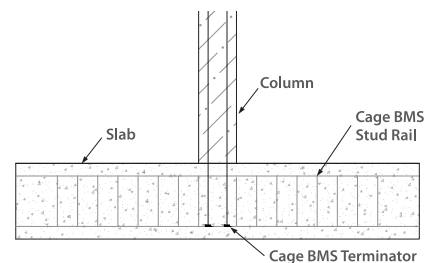
- Engineered product designed to meet specific project needs.
- Higher shear load resistance than stirrups.
- Simple and fast on-site installation.
- Eliminates column caps.
- Allows greater utilisation of floor to ceiling space.
- Reduces project costs.

Specification:

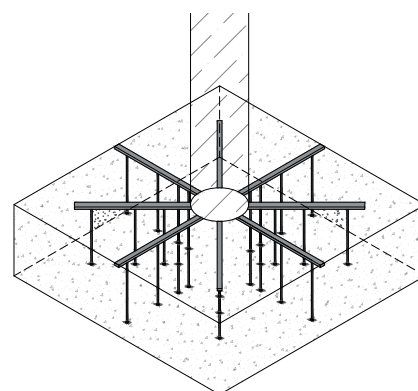
- Cage BMS Stud Rails are designed to meet specific project requirements and thus information on stud diameter, stud spacing, rail length, stud height are all required as per detailed right.



STUD RAIL DETAIL



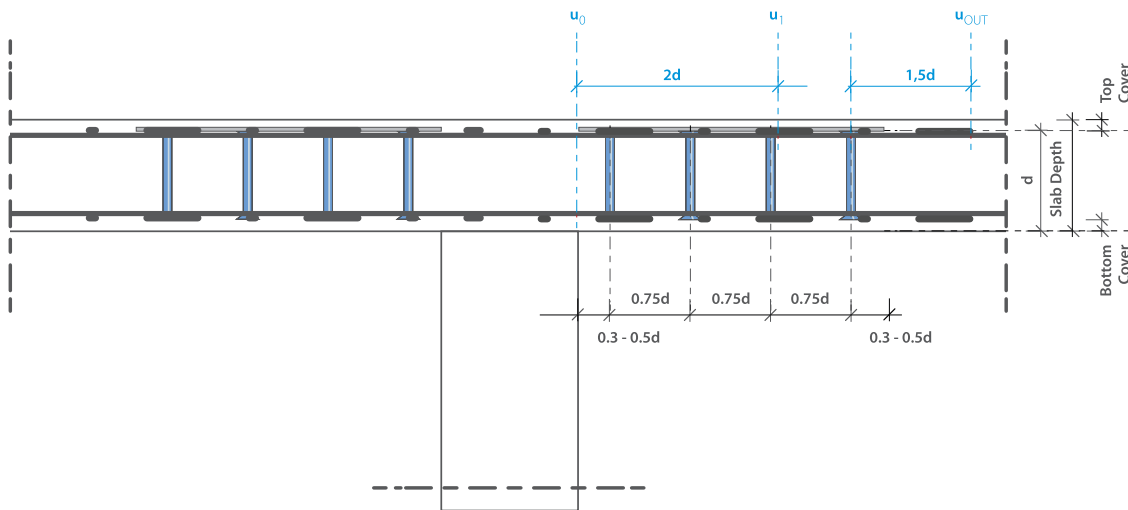
TERMINATOR COUPLER DETAIL



ISOMETRIC



BS EN 1992, EUROCODE 2: “DESIGN OF CONCRETE STRUCTURES” PROCEDURES FOR STUD RAIL DESIGNS



- 1 The direct shear at the edge of the loaded area (column or pile) is checked and satisfied.

$$V_{Ed\ 0} \leq V_{Rd,max} \quad u_0 \text{ perimeter must be calculated in accordance with Ec2}$$

- 2 The punching shear stress at the control perimeter u_1 is determined; if it's within punching stress resistance no punching reinforcement is required and no further action is required. However, if the limit is exceeded, punching shear reinforcement is required.

$$V_{Ed\ 1} \leq V_{Rd,c} \quad u_1 \text{ perimeter is } 2d \text{ from loaded area in accordance with Ec2}$$

- 3 If the concrete stress is exceeded, additional punching shear reinforcement can be added to increase the effective resistance of the slab.

$$V_{Ed\ 1} > 2 V_{Rd,c} \quad \text{However, it has been established from full scale tests that with Shearail® this may be increased to } 2.5 V_{Rd,c}$$

- 4 Perimeters of additional punching shear reinforcement are required to within 1.5 x the effective depth of where the normal reinforced slab is able to resist the applied shear loads (u_{OUT}).

$$A_{sw} = (V_{Ed\ 1} - 0.75 V_{Rd,c}) u_1 s_r / (1.5 f_{ywd,ef}) \text{ or } A_{sw,min} = 1.5 / (s_r s_t) \times 0.08 \sqrt{f_{ck}} / f_{yk}$$

The calculated reinforcement is projected out to within 1.5d of the u_{OUT} perimeter



CAGE BMS



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