

STRYPE

SIMPLIFY. SOLVE.



FORTIS Bolt Coupler

MECHANICAL SPLICING WITHOUT COMPROMISE

Full-strength mechanical rebar splicing with NO threading, NO welding and NO off-site bar-end preparation.

The Basics of Rebar Splicing

Reinforcing bar (rebar) splicing is the process of creating a continuous load path between two reinforcing bars. Splices are required whenever the available bar length is insufficient to achieve the required member length, where construction sequencing demands a connection between two bars or where existing structures are being strengthened, repaired or modified.

A correctly designed and installed splice must develop the full strength of the bars, maintain structural integrity and satisfy code requirements for slip and load transfer. Load transfer may occur through concrete bond, mechanical bearing, thread engagement, metallurgical fusion, or a combination of these mechanisms.

Modern construction utilises a variety of splice technologies, each offering advantages and limitations depending on structural demands, construction methodology, reinforcement congestion, project economics and construction program.



The Growing Role of Mechanical Couplers

As structures become taller, more heavily reinforced and increasingly complex, mechanical couplers are rapidly replacing traditional lap splices in many applications. Their ability to develop full bar strength while reducing congestion, minimizing steel consumption and improving constructability has made them the preferred solution for many modern structural and infrastructure projects.

Mechanical couplers transfer load directly between reinforcing bars through a mechanical connection. Unlike lap splices, mechanical couplers do not rely on concrete bond to transfer force.

Among mechanical splice technologies, FORTIS Bolt Couplers offer a particularly versatile solution as they eliminate the need for off-site bar end preparation and advance rebar scheduling, making them exceptionally well suited to both new construction and retrofit applications.



Reinforcing Connection Redefined

FORTIS Bolt Couplers are high-performance mechanical couplers designed for the joining of **AS/NZS 4671:2019** Grade 500N rebar from N12 to N40 (inclusive) in applications where it is not practical to have the ends of the rebar prepared off-site.

Designed to deliver exceptional strength, simplicity and reliability, FORTIS Bolt Couplers provide a fast, site-friendly solution for new construction, retrofit and remedial applications.

The bars are locked in place by special lock-shear bolts. The heads of these bolts shear off when the required tightening torque is reached, allowing for visual verification of correct installation.

The performance of these couplers has been verified by destructive testing in Australian laboratories, mitigating the need for complex Engineering calculations.



N12-N40

Available to Suit the Full Grade 500N Rebar Range

No End Prep

No Proprietary Off-Site Bar End Preparation Required

No Rotation

No On-Site Bar Rotation Required For Installation

Visual

Allows Visual Verification of Correct Installation

Compliant

Satisfies Stringent Australian Standards & Specifications

No Advance

Advance Rebar Scheduling Not Required

Reliable

Performance is Independent of Concrete Quality

Versatile

Suitable for Prefabricated & Pre-Bent Rebar Applications

Tested

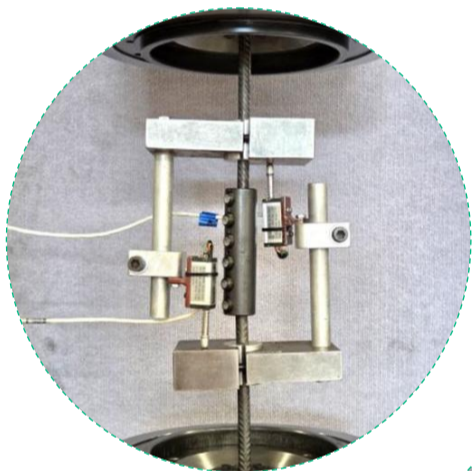
Independently Tested in NATA-Accredited Labs

Proven Strength & Reliability

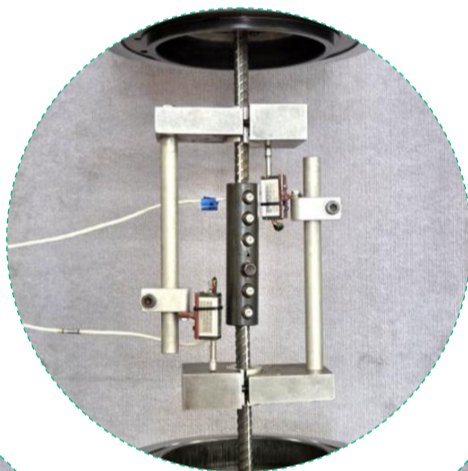
All FORTIS Bolt Couplers have been independently tested by third-party NATA-Accredited Australian laboratories to demonstrate compliance with relevant Australian standards and Road Authority Specifications when used with **AS/NZS 4671:2019** Grade 500N reinforcing bar.

All FORTIS Bolt Couplers meet or exceed the following standards and specifications:

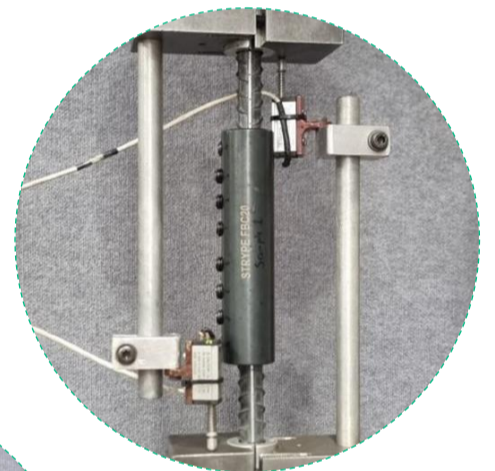
- *Transport for New South Wales Document No. SF2013/184115, Issue 4, October 2022*
- *VicRoads Bridge Technical Note BTN 025, Version 2.1, published 3 October 2022*
- **AS3600:2018** *Concrete Structures, Clause 13.2.6: Welded or Mechanical Splices*
- **AS 5100.5:2017** *Bridge Design, Part 5: Concrete*
- **AS/NZS 4671:2019** *Steel for the Reinforcement of Concrete*
- **ISO 15835-1:2018** *Steels for the Reinforcement of Concrete - Reinforcement Couplers for Mechanical Splices of Bars, Clause 5.3: Strength and Ductility Under Static Forces & Clause 5.4: Slip Under Static Forces*



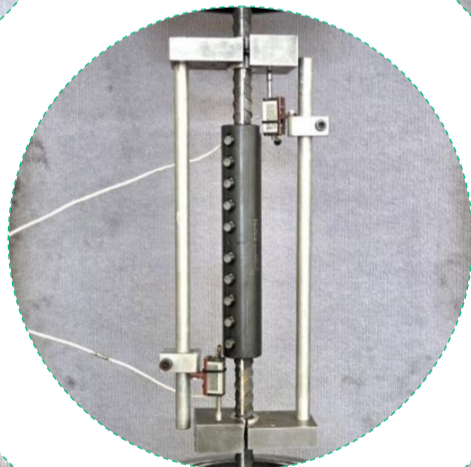
FBC12



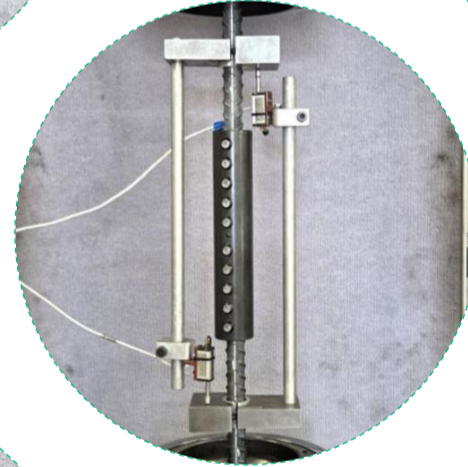
FBC16



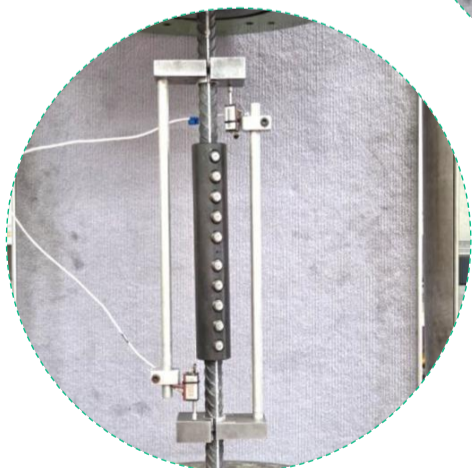
FBC20



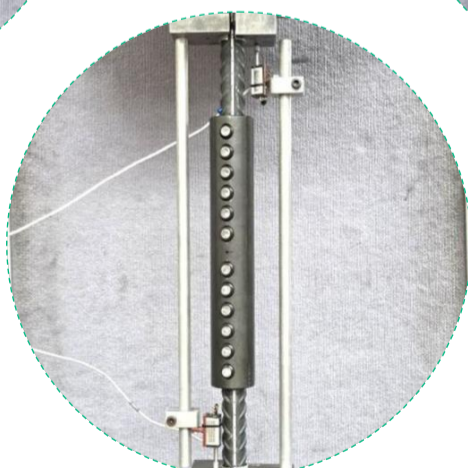
FBC24



FBC28



FBC32



FBC36



FBC40

Further details regarding compliance of the FORTIS Bolt Coupler system may be provided on request.

FORTIS Bolt Coupler Range

FORTIS Bolt Couplers are offered in eight (8) sizes to suit all standard sizes of **AS/NZS 4671:2019** Grade 500N reinforcing bar, from N12 to N40 (inclusive).

Each coupler is uniquely designed to optimise strength while minimising installation complexities, with attributes such as length, diameter, bolt quantity and bolt sizing all varying by coupler size.

All FORTIS Bolt couplers are imprinted with specific batch numbers corresponding to the batch in which they were manufactured. Batch-specific material certificates are provided following delivery of the products to site. This ensures full traceability of the product and its raw materials right back to the origins of manufacture.



Refer to the standalone *FORTIS Bolt Coupler Installation Guide* for details on the required installation methodology.

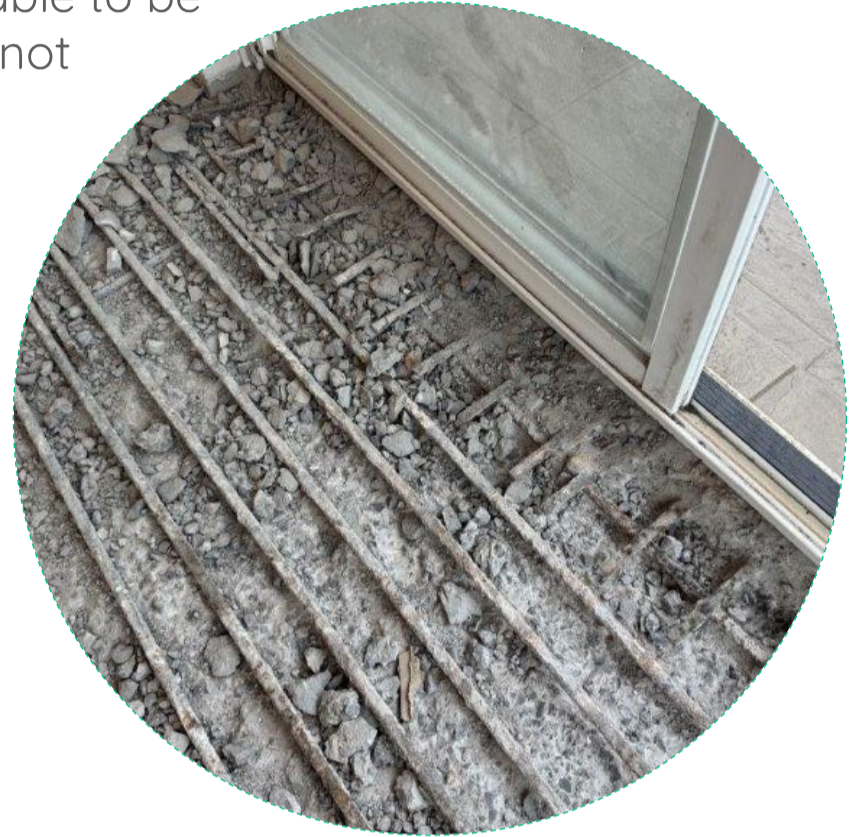
Details of the available FORTIS Bolt Couplers shown below:

Item Code	Bar Size	External Diameter (mm)	Length (mm)	Bolt QTY	Socket Size (mm)	Nominal Torque (Nm)	Unit Weight (kg)
FBC12	N12	33	127	6	14	205	0.7
FBC16	N16	37	159	6	14	205	1.1
FBC20	N20	44	191	8	14	205	1.8
FBC24	N24	54	311	10	16	475	4.0
FBC28	N28	60	311	10	16	475	5.0
FBC32	N32	65	396	10	22	680	7.5
FBC36	N36	72	430	12	22	750	9.6
FBC40	N40	80	440	12	22	790	12.8

Scope of Application

FORTIS Bolt Couplers provide a cost-effective method of joining rebar on site, particularly when one bar is already in place or when bars are unable to be rotated on site. Common applications include, but are not limited to:

- Extending reinforcement beyond available stock lengths
- Joining prefabricated rebar cages
- Column and wall continuity between construction stages
- Pile-to-pile cap connections
- Bridge deck and infrastructure construction
- Closure pours and staged construction
- Precast concrete construction
- Retrofit and strengthening works
- Repair and modification to existing structures

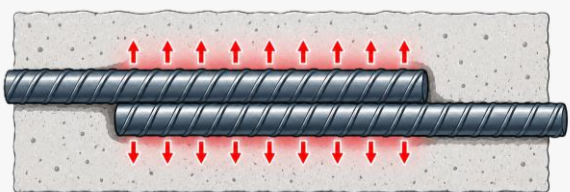


Splice Load Transfer

All types of rebar splice systems perform the same fundamental function—transferring force from one reinforcing bar into another. However, the mechanism by which this occurs varies considerably. The three primary load transfer mechanisms available for rebar splicing are reviewed below.

Bond-Based Transfer

Used in lap splices, force is transferred through bond stresses developed between the reinforcing bar and surrounding concrete.



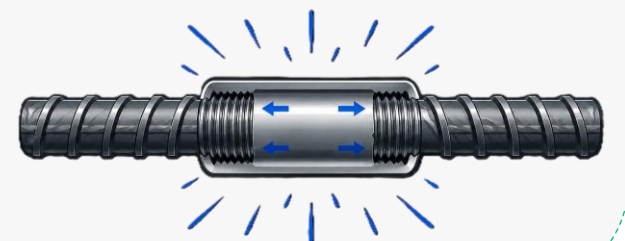
Metallurgical Transfer

Used in welded lap and friction-welded systems, force is transferred through a metallurgical bond created between the reinforcing bars.



Mechanical Transfer

Used in mechanical couplers, force is transferred directly through bearing, friction, interlock or thread engagement.



Understanding the force transfer mechanism is critical when selecting the most appropriate splice solution for a particular application.

Correct Splice Selection is Critical

The selection of a rebar splicing system for your project should consider structural, construction, economic and program factors. These considerations include, but are not limited to:

- **Design Requirements:** Tensile and yield strengths, uniform elongation and slip limits.
- **Member Size and Congestion:** Available space for rebar laps and/or installation tools.
- **Construction Method:** Cast-in-place, precast, formwork cycle times.
- **Bar Size and Grade:** Compatibility with your chosen splice system.
- **Concrete Quality and Cover:** These attributes influence bond and durability.
- **Project Criticality and Risk:** Importance of reliable, predictable performance.
- **Construction Program:** Is there sufficient time to implement your chosen system?

GENERAL GUIDANCE



Critical structural elements:

Prefer mechanical coupler splices



Congested reinforcement / limited lap length:

Prefer mechanical or threaded splices



Prefabrication / pour break / fast track:

Prefer mechanical or welded splices



Low stress / non-critical / ample space:

Lapped splice may be acceptable

Regardless of the type of rebar splice selected, always design, specify and install rebar splices in accordance with the applicable Australian Standards and manufacturer's installation guidelines. Relevant Australian Standards include, but are not limited to:

- **AS3600:2018** *Concrete Structures*
- **AS 5100.5:2017** *Bridge Design, Part 5: Concrete*
- **AS/NZS 4671:2019** *Steel for the Reinforcement of Concrete*
- **AS/NZS 1554.3:2014** *Structural Steel Welding, Part 3: Welding of Reinforcing Steel*
- *Road Authority Specifications relevant to your jurisdiction*

FORTIS Bolt Coupler Performance

FORTIS Bolt Couplers work by using torque-controlled lock-shear bolts to clamp and mechanically interlock two reinforcing bars inside an internally-threaded steel sleeve. Tensile forces are transferred from the first bar through the bolt indentations in the rebar and internal threads of the coupler sleeve into the coupler sleeve itself. The sleeve then transfers the load through the adjacent bolts and internal threads of the coupler sleeve into the second bar, creating a structural rebar splice without threading, welding, or bar rotation.

In line with Transport for New South Wales requirements, which nominate the most stringent specification for rebar splicing systems in Australia, beyond what is nominated in **AS 3600:2018 Concrete Structures**, **AS 5100.5:2017 Bridge Design, Part 5: Concrete** and any other Road Authority specification in Australia, the tensile strength of FORTIS Bolt Couplers exceeds 625MPa and 97.5% of the tensile strength of the parent rebar, along with achieving a slip performance of less than 0.1mm.



The mechanical properties of the spliced rebar, including tensile strength, yield strength and uniform elongation are compliant with the requirements of *AS/NZS 4671: 2019 - Table 7.2 (A)* for Strength Grade and Ductility Class 500N.



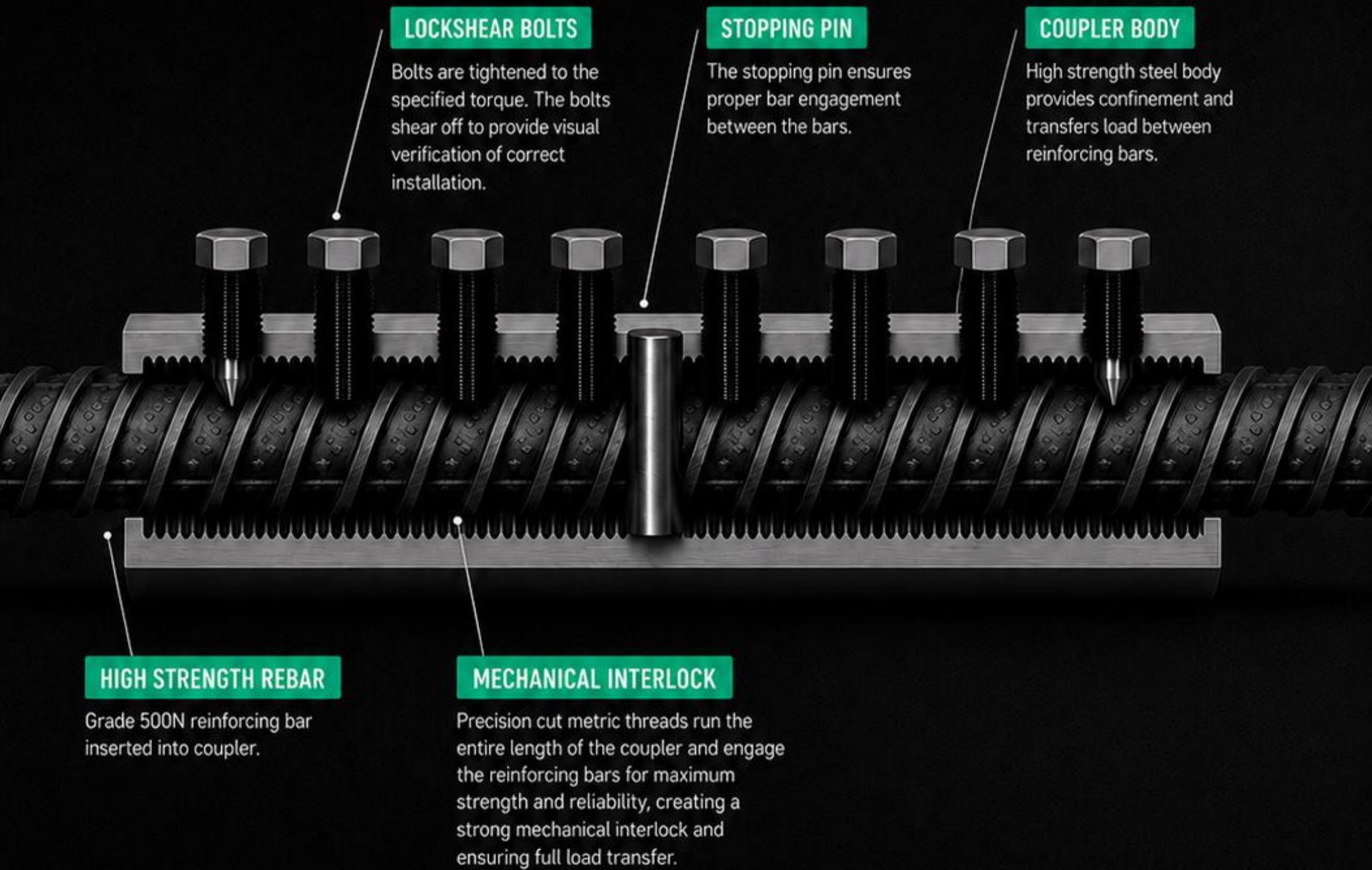
While on-site performance of the product is critical to a successful project, off-site supplier performance is just as critical. At STRYPE, we believe that great customer service is key to our success. Our team's industry-leading knowledge of both our products and their applications uniquely positions us to understand the on-site challenges that you are facing and work together in putting forward a simple solution to address these challenges. Let's keep it simple when solving these problems.

The graphic on the following page illustrates the fundamental elements of the FORTIS Bolt Coupler, the elements that ensure that the products will deliver the performance, durability and reliability required on-site.

FORTIS BOLT COUPLER

CROSS SECTION

The FORTIS Bolt Coupler develops full bar strength through mechanical interlock and bearing.



LOCKSHEAR BOLTS

Bolts are tightened to the specified torque. The bolts shear off to provide visual verification of correct installation.

STOPPING PIN

The stopping pin ensures proper bar engagement between the bars.

COUPLER BODY

High strength steel body provides confinement and transfers load between reinforcing bars.

HIGH STRENGTH REBAR

Grade 500N reinforcing bar inserted into coupler.

MECHANICAL INTERLOCK

Precision cut metric threads run the entire length of the coupler and engage the reinforcing bars for maximum strength and reliability, creating a strong mechanical interlock and ensuring full load transfer.

FORTIS BOLT COUPLERS ARE IDEAL FOR:



NEW
CONSTRUCTION



INFRASTRUCTURE
PROJECTS



RETROFIT &
STRENGTHENING



PILE CAPS



CONGESTED
REINFORCEMENT



Rebar Splicing Fundamentals

There are various methods for splicing rebar, with each approach offering its own advantages and suitability for different installation applications. When it comes to rebar splicing, no one system will be ideal for every possible installation and so it is important to understand that different approaches are available so the most appropriate rebar splice type may be selected for the given application. Six common methods of rebar splicing are reviewed below. The only splicing system offered by STRYPE is the FORTIS Bolt Coupler.

Traditional Lapped

The lap splice is the oldest and most widely used form of rebar splice. Two bars are placed alongside one another over a specified lap length and force is transferred indirectly through bond stresses between the steel and surrounding concrete. The bars themselves never directly transfer load to one another.



Welded Lap

Two bars are placed alongside one another (over a shorter length than with a lapped splice) and are welded together to develop the full strength of the bars. This is often used in prefabrication yards, however is permitted on site when completed by qualified welders to code requirements.



Threaded

Bars are joined together using a threaded coupler providing a mechanical connection through direct tension in the threads. The ends of the bars can either be equipped with a parallel male thread or a tapered male thread, with matching female threaded couplers used to connect the bars. This splice requires proprietary off-site bar end preparation.



Swaged Coupler

This is similar to the threaded splice, however this system relies on the coupler being hydraulically deformed onto reinforcing bars. The sleeve plastically deforms around the bar profile, creating a mechanical interlock. These systems consist of a male threaded coupler on one bar and a female threaded coupler on the other bar. This splice requires proprietary off-site bar end preparation.



Friction Welded Coupler

This is similar to the threaded splice, however this system relies on the couplers being attached to the bars by friction welding (a factory-controlled process in which one component rotates at high-speed while being pressed against another). The generated heat produces a solid-state metallurgical bond. These systems consist of a male threaded coupler on one bar and a female threaded coupler on the other bar. This splice requires proprietary off-site bar end preparation.



FORTIS Bolt Coupler

FORTIS Bolt Couplers use torque-controlled lock-shear bolts to clamp and mechanically interlock two reinforcing bars inside an internally-threaded steel sleeve. Tensile forces are transferred from the bars through the bolt indentations in the rebar and internal threads of the coupler sleeve into the coupler sleeve itself. This system is ideal for applications where it is not practical to have the ends of the rebar prepared off-site or when final bar geometries are not known until bars are cast on site. This splice requires no off-site bar end preparation, nor advance scheduling.



SPLICE TYPE	OFF-SITE BAR-END PREPARATION	ADVANCE REBAR SCHEDULING	RETROFIT / REMEDIAL APPLICATIONS	PRE-BENT REBAR COMPATIBILITY	PREFABRICATED CAGE COMPATIBILITY	TYPICAL SPLICE LENGTH
TRADITIONAL LAPPED	NO	NO	POOR	EXCELLENT	EXCELLENT	LONG
WELDED LAP	NO	NO	EXCELLENT	GOOD	GOOD	MEDIUM
THREADED	YES	YES	POOR	SPECIAL COUPLERS REQUIRED	SPECIAL COUPLERS REQUIRED	SHORT
SWAGED COUPLER	YES	YES	POOR	SPECIAL COUPLERS REQUIRED	SPECIAL COUPLERS REQUIRED	MEDIUM
FRICITION WELDED COUPLER	YES	YES	POOR	SPECIAL COUPLERS REQUIRED	SPECIAL COUPLERS REQUIRED	SHORT
FORTIS BOLT COUPLER	NO	NO	EXCELLENT	EXCELLENT	EXCELLENT	MEDIUM

Overview of Rebar Splicing Methods

The table below provides an impartial review of the six common rebar splicing methods used within Australia. The benefits and limitations are outlined, ensuring you are well-equipped to select the appropriate rebar splicing system for your project.

SPLICE TYPE	TRADITIONAL LAPPED	WELDED LAP	THREADED
MECHANISM OF LOAD TRANSFER	Bond between reinforcing bar and surrounding concrete over the lap length. Forces are transferred from one bar to the concrete and then into the adjacent bar.	Direct metallurgical bond between overlapping bars through weld material. Load is transferred through the weld and overlapping reinforcement.	Mechanical transfer through precision-cut or rolled threads into the coupler sleeve.
TYPICAL APPLICATIONS	<ul style="list-style-type: none"> •General cast-in-place construction •Slabs, walls, footings, lightly reinforced elements •Applications where sufficient lap length and cover are available 	<ul style="list-style-type: none"> •Prefabrication •Pile cages, column starter bars •Retrofit works •Situations where reduced lap lengths are desired 	<ul style="list-style-type: none"> •Critical structural elements •High-rise construction •Infrastructure applications •Precast construction •High-volume fabrication facilities •Columns, walls and heavily reinforced members
ADVANTAGES	<ul style="list-style-type: none"> •Simple and familiar method •No special equipment required •Low material cost •No off-site bar end preparation •No advance rebar scheduling •Easy inspection 	<ul style="list-style-type: none"> •Shorter than conventional laps •Can reduce reinforcement congestion •No proprietary couplers required •Advance rebar scheduling not required •Suitable for prefabrication 	<ul style="list-style-type: none"> •Develops full bar strength •Compact splice length •Minimal reinforcement congestion •Suitable for prefabrication •Skilled labour not required for site installation
LIMITATIONS	<ul style="list-style-type: none"> •Requires long splice lengths •Causes reinforcement congestion •Increased steel consumption •Performance dependent on concrete quality and confinement •Not ideal for heavily reinforced areas 	<ul style="list-style-type: none"> •Requires qualified welders and QA/QC •Welding can affect bar properties if not controlled •Site welding can be weather dependent •Inspection and testing may be required 	<ul style="list-style-type: none"> •Requires off-site bar-end preparation (threading) •Advance rebar scheduling required •Higher material cost •Requires careful thread protection during handling •Bar rotation or special couplers may be required •Special couplers required when used with bent rebar or cages

SPLICE TYPE	FRICTION WELDED COUPLER	SWAGED COUPLER	FORTIS BOLT COUPLER
MECHANISM OF LOAD TRANSFER	<p>Solid-state metallurgical bond created by rotational friction and pressure between bar ends and couplers. Load is transferred directly through the welded connection into the coupler, then through the precision-cut or rolled threads of the couplers themselves.</p>	<p>Mechanical interlock created by plastically deforming the coupler onto the reinforcing bar. Load is transferred through friction, then through the precision-cut or rolled threads of the two couplers.</p>	<p>Mechanical bearing and interlock created by lock-shear bolts that embed into the bar ribs. Load is transferred through the coupler body and bolts without bar-end preparation</p>
TYPICAL APPLICATIONS	<ul style="list-style-type: none"> •Critical structural elements •High-rise construction •Infrastructure applications •Precast construction •High-volume fabrication facilities •Columns, walls and heavily reinforced members 	<ul style="list-style-type: none"> •Critical structural elements •High-rise construction •Infrastructure applications •Precast construction •High-volume fabrication facilities •Columns, walls and heavily reinforced members 	<ul style="list-style-type: none"> •Existing construction •Retrofit and strengthening works •Pile extensions •Precast connections •Congested reinforcement zones •Applications where bar rotation is not possible •Prefabricated cage compatible
ADVANTAGES	<ul style="list-style-type: none"> •Develops full bar strength •Compact splice length •Minimal reinforcement congestion •Suitable for prefabrication •Typically higher quality threads than threaded splices •Skilled labour not required for site installation 	<ul style="list-style-type: none"> •Develops full bar strength •Compact splice length •Minimal reinforcement congestion •Suitable for prefabrication •Typically higher quality threads than threaded splices •Skilled labour not required for site installation 	<ul style="list-style-type: none"> •Develops full bar strength •No off-site bar-end preparation •No advance rebar scheduling •No proprietary equipment needed •Ideal for retrofit applications •Can join bent, fixed or inaccessible bars •Performance is independent of concrete quality
LIMITATIONS	<ul style="list-style-type: none"> •Requires off-site bar-end preparation (threading) •Advance rebar scheduling required •Higher material cost •Requires careful thread protection during handling •Bar rotation or special couplers may be required •Special couplers required when used with bent rebar or cages 	<ul style="list-style-type: none"> •Requires off-site bar-end preparation (threading) •Advance rebar scheduling required •Higher material cost •Requires careful thread protection during handling •Bar rotation or special couplers may be required •Special couplers required when used with bent rebar or cages 	<ul style="list-style-type: none"> •Higher material cost than laps •Requires correct installation procedure •Installation access required around coupler •Special tooling required for larger bar diameters

STRYPE

SIMPLIFY. SOLVE.



www.STRYPE.com.au

sales@STRYPE.com.au

+61 493 440 658

ABN: 73 688 732 229

PO Box 5142, Mordialloc VIC 3195