

CARES Technical Approval Report TA1-A&B 5049



Issue 7



Armaturis Firsty® Standard and Positional Couplers

Assessment of the
Armaturis Firsty®
Standard and Positional
Couplers Product
and Quality System
for Production



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TECHNICAL
APPROVAL
5049

0002

Validate with the
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Product

Armaturis Firsty® Standard and Positional Couplers for reinforcing steel

Product approval held by:

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1 Product Summary

Armaturis Firsty® Standard and Positional Couplers in the size range 12mm - 40mm are for the mechanical connection of deformed high yield carbon steel bars for the reinforcement of concrete complying with the requirements of BS4449 Grade B500B and B500C as defined in tables 1 and 2.

1.1 Scope of Application

- i) Armaturis Firsty® Standard and Positional Couplers in the size range 12mm - 40mm have been evaluated for use as follows:

TA1-B: Eurocode 2 and BS 8110 for static applications in tension-compression with BS4449 Grade B500B and B500C reinforcement as defined in tables 1 and 2.

- ii) Armaturis Firsty® Standard and Positional Couplers in the size range 12mm - 20mm have been evaluated for use as follows:

Armaturis Firsty® Standard and Positional Couplers in CARES Appendix TA1-A in tension and class D fatigue requirements using B500B reinforcement.

1.2 Design Considerations

BS 8110 Clause 3.12.8.9 Laps and Joints states "Connections transferring stress may be lapped, welded or joined with mechanical devices. They should be placed, if possible, away from points of high stress and should preferably be staggered". However, BS 8110 Clause 3.12.8.16.2 Bars in tension states "The only acceptable form of full-strength butt joint for a bar in tension comprises a mechanical coupler" satisfying specified slip and tensile strength criteria.



Eurocode 2, Clause 8.7 Laps and mechanical couplers 8.7.1 General (1)P “Forces are transmitted from one bar to another by:

- lapping of bars, with or without bends or hooks;
- welding;
- mechanical devices assuring load transfer in tension-compression or in compression only.”

Clause 8.8 Additional rules for large diameter bars goes on to state that “Splitting forces are higher and dowel action is greater with the use of large diameter bars. Such bars should be anchored with mechanical devices.”

The specified cover for fire resistance and durability should be provided to the coupler sleeve. All couplers have been designed with controlled mechanical properties to be compatible with reinforcing bars complying with reinforcement of the relevant Grade in accordance with BS4449.

1.3 Conclusion

It is the opinion of CARES that Armaturis Firsty® Standard and Positional Couplers in the size range 12mm - 40mm are satisfactory for use within the limits stated in paragraph 1.1 when applied and used in accordance with the manufacturer’s instructions and the requirements of this certificate.

Lee Brankley

L. Brankley
 Chief Executive Officer
 September 2022

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2 Technical Specification

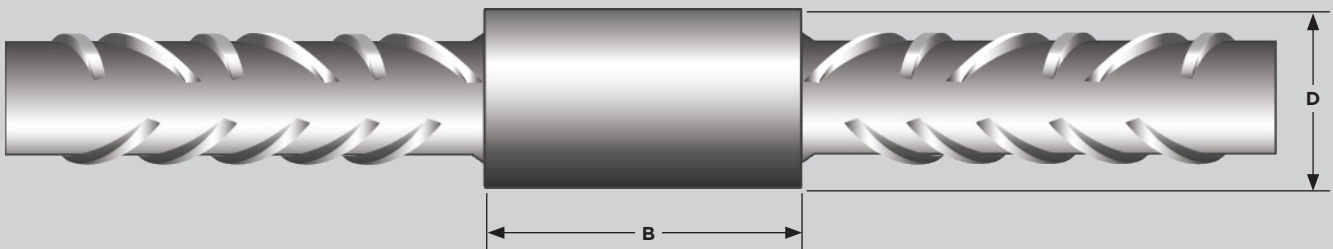
2.1 General

The function of Armaturis Firsty® Standard and Positional Couplers is to connect deformed steel reinforcing bars complying with BS4449 Grade B500B and B500C as defined in tables 1 and 2 and thereby create structural continuity of the reinforcing system.

2.2 Firsty® Standard Coupler

The Firsty® Standard Couplers are for joining deformed Grade B500B and B500C steel reinforcing bars complying with BS4449, where one of the bars to be coupled can be rotated.

Firsty® Standard Coupler









	Ø12	Ø16	Ø20	Ø25	Ø32	Ø40
B500C tension-compression	✓	✓	✓	✓	✓	✓
B500B tension only	✓	✓	✓	✓	✓	✓
B500B class D fatigue	✓	✓	✓	✗	✗	✗
B=coupler length (mm)	36.00	44.50	52.85	65.65	77.50	96.50
D=overall diameter (mm)	19.50	26.50	32.50	40.50	50.50	60.50
Description	CFI12	CFI16	CFI20	CFI25	CFI32	CFI40
Colour codes*						

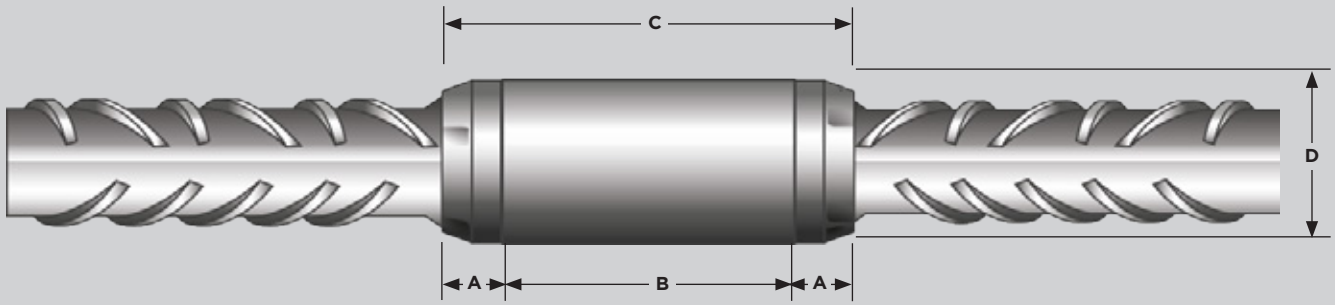
Table 1

* used on thread protection, coupler plugs and positional notch formers.

2.3 Firsty® Positional Coupler

The Firsty® Positional Couplers are for joining deformed Grade B500B and B500C steel reinforcing bars complying with BS4449, where the continuation bar cannot be rotated.

Firsty® Positional Coupler









	Ø12	Ø16	Ø20	Ø25	Ø32	Ø40
TA1-B B500B and B500C tension-compression	✓	✓	✓	✓	✓	✓
B500B class D fatigue	✓	✓	✓	✗	✗	✗
A=locknut width (mm)	10.00	11.50	14.00	17.50	21.00	26.50
B=coupler length (mm)	36.00	44.50	52.85	65.65	77.50	96.50
C=total length (mm)	56.00	67.50	80.85	100.65	119.50	149.50
D=overall diameter (mm)	19.50	26.50	32.50	40.50	50.50	60.50
Locknut reference	FRL12	FRL16	FRL20	FRL25	FRL32	FRL40
Coupler reference	CFI12	CFI16	CFI20	CFI25	CFI32	CFI40
Colour codes*						

Table 2

* used on thread protection, coupler plugs and positional notch formers.

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3 Product Performance and Characteristics

Full destructive tests have been carried out to demonstrate compliance with the performance requirements defined in CARES Appendix TA1-A and TA1-B when used with reinforcing steel BS4449 Grade B500B and B500C as appropriate detailed in tables 1 and 2:

CARES APPENDIX TA1-A strength requirements

- Permanent deformation is less than 0.10mm after loading to $0.65f_y$ in tension with BS4449 grade B500B reinforcement.
- 99% characteristic tensile strength is greater than 540MPa with Grade B500B or 575MPa with B500C.
- D class fatigue requirements.

CARES APPENDIX TA1-B strength requirements

- Permanent deformation is less than 0.10mm after loading to $0.65f_y$ in tension-compression as defined in table 1 and 2 with BS4449 grade B500B and B500C reinforcement.
- 99% characteristic tensile strength is greater than 540 MPa with grade B500B reinforcement and 575 MPa with grade B500C reinforcement.

3.1 Rebar Threading

Threading is achieved following cold upsetting of the rebar ends to increase the nominal diameter.

Threading by rolling maintains the steel fibres (figure 1).

- specific geometry design
- specific patented machinery
- strict inspections
- specialised workshops

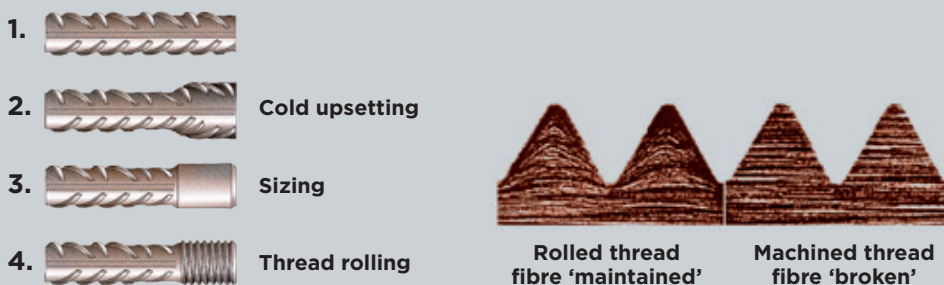
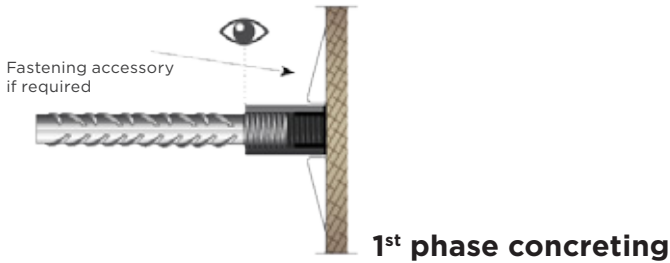


Figure 1

4 Installation

4.1 Firsty® Standard Coupler Assembly

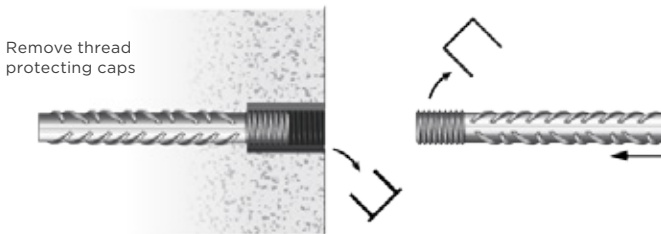
1 1st phase installation



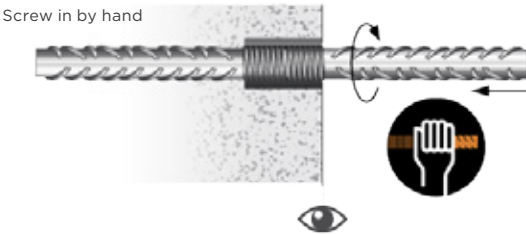
Inspection

- The coupler is tightly screwed on the bar.
- The plug is correctly inserted inside the coupler.

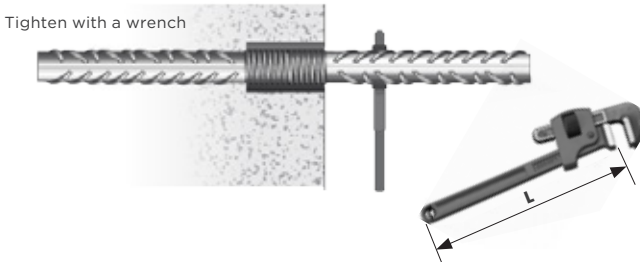
2 Put 2nd phase rebar in position



3 Screw on 2nd phase rebar



4 Secure the connection



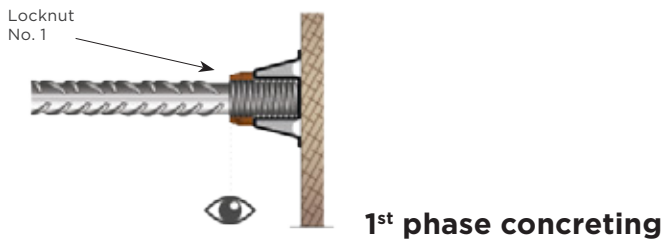
- For dia. 25mm and above: $L \geq 800\text{mm}$.

At this stage of assembly the Firsty® rebar coupler guarantees the safety of the liaison.



4.2 Firsty® Positional Coupler Assembly

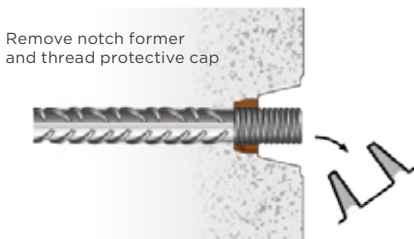
1 1st phase installation



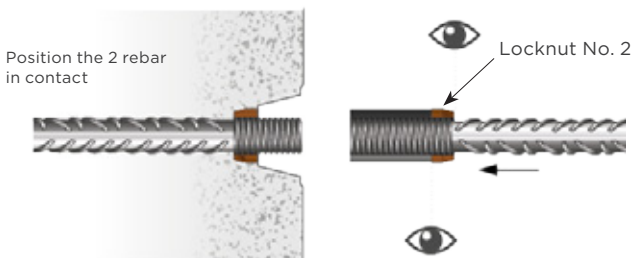
Inspection

- Locknut No. 1 is tightly screwed on the rebar.
- Thread protective cap and notch former are positioned correctly.

2 Remove notch former

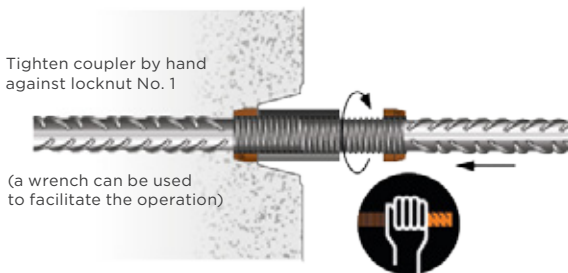


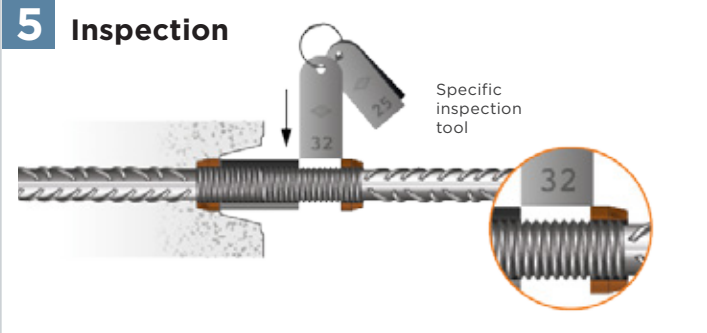
3 2nd phase installation



- Locknut No. 2 is tightly screwed on the rebar.
- The coupler is completely screwed against locknut No. 2.

4 Assembly by rotating the coupler

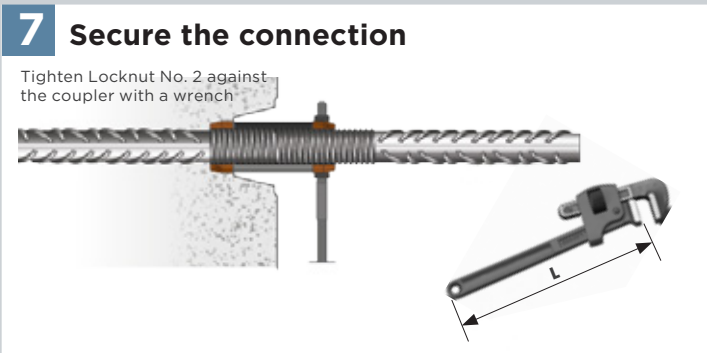




Inspection

The specific inspection tool must not enter between the coupler and locknut No. 2.

The specific checking tool makes it easy to check the splice assembly and therefore its safety.



For dia. 25mm and above: $L \geq 0.80m$.

At this stage of assembly the Firstly® rebar coupler guarantees the Safety of the splice.

5 Safety Considerations

Couplers are supplied in containers that have a maximum weight of 25 kg handlifted or in wooden containers that have a maximum weight of 300 kg which must be handled with appropriate lifting equipment. It is advisable to wear protective gloves when handling containers, couplers, threaded bars and during coupler installation.

6 Product Testing and Evaluation

Armaturis Firsty® Standard and Positional Couplers have been tested to satisfy the requirements of CARES Appendix TA1-A and TA1-B for Couplers with reinforcing bars to BS4449 Grade B500B and B500C. The testing comprised the following elements:

- Tensile Strength
- Permanent deformation in tension-compression as defined in table 1 and 2
- Compression
- Resistance to Fatigue

7 Quality Assurance

Armaturis Firsty® Standard and Positional Couplers are produced under EN ISO 9001 quality management system certified by CARES. The quality management system scheme monitors the production of the couplers and ensures that materials and geometry remain within the limits of this technical approval.

The products are also subject to a programme of periodic testing.

8 Building Regulations

8.1 The Building Regulations (England and Wales)

Structure, Approved Document A

Firsty® Standard and Positional Couplers, when used in EC2 based designs using the data contained within this technical approval, satisfy the relevant requirements of The Building Regulations (England and Wales), Approved Document A.

Materials and Workmanship, Approved Document

This technical approval gives assurance that the Firsty® Standard and Positional Couplers comply with the material requirements of EC2.

8.2 The Building Regulations (Northern Ireland)

Materials and Workmanship

This technical approval gives assurance that Firsty® Standard and Positional Couplers comply with the material requirements of EC2 by virtue of regulation 23, *Deemed to satisfy provisions regarding the fitness of materials and workmanship*.

8.3 The Building Standards (Scotland)

Fitness of Materials

This technical approval gives assurance that Firsty® Standard and Positional Couplers comply with the material requirements of EC2 by virtue of *Clause 0.8*.

Structure

Firsty® Standard and Positional Couplers, when used in EC2 based designs using the data contained within this technical approval, satisfy the requirements of *The Building Standards (Scotland) clause 1*.



9 References

- BS 4449: 2005: Steel for the reinforcement of concrete - Weldable reinforcing steel - Bar, coil and decoiled product - Specification.
- BS8110: Part 1: 1997: Structural Use of Concrete, Code of Practice for Design and Construction.
- BS EN 1992-1-1:2004 Eurocode 2 Design of concrete structures - General rules for buildings.
- BS EN ISO 9001: Quality management systems - Requirements.
- CARES Appendix TA1-A; Quality and Operations Schedule for the Technical Approval of Couplers for Reinforcing Steel for use in Structures and Structural elements Designed in accordance with the Fatigue Requirements of Structural Eurocodes.
- CARES Appendix TA1-B; TA1-B Quality and Operations Schedule for the Technical Approval of Couplers for Reinforcing Steel and Reinforcement Anchors for Static Loading in Tension or Tension and Compression.

10 Conditions

1. The quality of the materials and method of manufacture have been examined by CARES and found to be satisfactory. This technical approval will remain valid providing that:
 - a. The product design and specification are unchanged.
 - b. The materials, method of manufacture and location are unchanged.
 - c. The manufacturer complies with CARES regulations for technical approvals.
 - d. The manufacturer holds a valid CARES Certificate of Product Assessment.
 - e. The product is installed and used as described in this report.
2. CARES make no representation as to the presence or absence of patent rights subsisting in the product and/or the legal right of Armaturis to market the product.
3. Any references to standards, codes or legislation are those which are in force at the date of this certificate.
4. Any recommendations relating to the safe use of this product are the minimum standards required when the product is used. These requirements do not purport to satisfy the requirements of the Health and Safety at Work act 1974 or any other relevant safety legislation.
5. CARES does not accept any responsibility for any loss or injury arising as a direct or indirect result of the use of this product.
6. This Technical Approval Report should be read in conjunction with CARES Certificate of Product Assessment No 5049. Confirmation that this technical approval is current can be obtained from CARES.





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