

CARES Technical Approval Report TA1-A, B&C 5039



Issue 7



Armaturis Herisson® Plus Standard and Positional Couplers

Assessment of the
Armaturis Herisson®
Plus Standard and
Positional Coupler
Product and Quality
System for Production



Product

Armaturis Herisson® Plus Standard and Positional Couplers for reinforcing steel

Product approval held by:

Armaturis
340 Av. des Olivarello
13300 Salon de Provence
Tel: +33 (0)4 90 44 36 10
Fax: +33 (0)4 90 44 36 11
www.armaturis.com

1 Product Summary

Armaturis Herisson® Plus 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 table 1.

1.1 Scope of Application

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

- a) TA1-A: Eurocode 2 and BS 8110 for static applications in tension with Grade B500B reinforcement and Class D fatigue requirements as defined in table 1.
- b) TA1-B: Eurocode 2 and BS 8110 for static applications in tension only with grade B500B and tension and compression with Grade B500C reinforcement as defined in table 1.
- c) TA1-C: Sellafield Type A couplers in tension and compression with Grade B500C reinforcement as defined in table 1.

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 Herisson® Plus 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.

L. Brankley
 Chief Executive Officer
 May 2023

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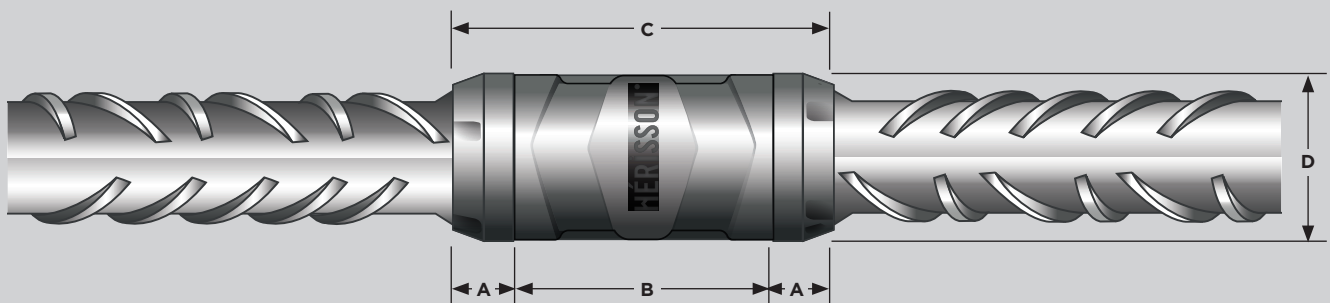
2 Technical Specification

2.1 General

The function of Armaturis Herisson® Plus Standard and Positional Couplers is to connect deformed steel reinforcing bars complying with BS 4449 Grade B500B or B500C as defined in table 1 as appropriate and thereby create structural continuity of the reinforcing system. The standard and positional couplers utilise the same components but differ in their installation methods (see section 4). The standard installation method is used when the continuation bar can be rotated and the positional installation method when it cannot.

2.2 Herisson® Plus Standard and Positional Coupler

Herisson® Plus Standard and Positional Coupler



	Ø12	Ø16	Ø20	Ø25	Ø32	Ø40
TA1-A and TA1-B B500B tension only	✓	✓	✓	✓	✓	✓
TA1-A B500B Class D fatigue	✓	✓	✓	✓	✓	✓
TA1-B B500C tension and compression	✓	✓	✓	✓	✓	✓
TA1-C B500C tension and compression	✓	✓	✓	✓	✓	✓
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)	23.10	27.90	33.70	42.30	51.00	63.40
Locknut reference	FRL12	FRL16	FRL20	FRL25	FRL32	FRL40
Coupler reference	CHP12	CHP16	CHP20	CHP25	CHP32	CHP40
Colour codes*	■	■	■	■	■	■

Table 1

* Against the colour codes.

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, TA1-B and TA1-C when used with reinforcing steel BS4449 Grade B500B or B500C as defined in table 1 as appropriate:

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 or B500C reinforcement.
- 99% characteristic tensile strength is greater than 575 MPa with grade B500C reinforcement or 540MPa with B500B reinforcement.
- Class D fatigue requirements.

CARES APPENDIX TA1-B strength requirements

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

CARES APPENDIX TA1-C strength requirements

- Permanent deformation is less than 0.1mm after loading to $0.65f_y$ in tension for grade B500C reinforcement.
- Tensile strength $\geq 1.15, \leq 1.35 \times$ Actual yield strength ($f_{y,act}$) for B500C reinforcing steel including:
- low cycle fatigue: 100 cycles @ 5%-90% f_y
- and cold soak at -7°C for 24 hours
- and a bar break mode of failure

3.1 Coupler Fabrication

Herisson® plus couplers are the only couplers fabricated by forging, a technique that maintains the steel fibres, which ensures improved coupler resistance in the event of severe stress.

3.2 Rebar Threading

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

Threading by rolling maintains the steel fibres (figure1).

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

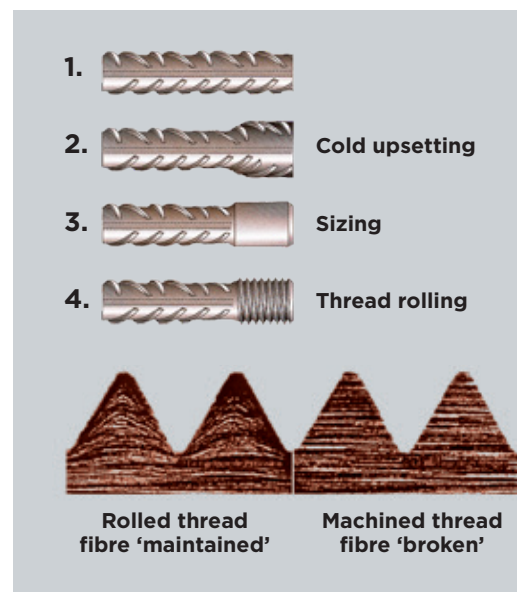


Figure 1

Mechanical continuity

Herisson® Plus technical choices, thread rolling following cold upsetting of rebar, coupler forged in high-tensile steel, locknuts to compensate for any play in threads contribute to the level of resistance (figure 2).

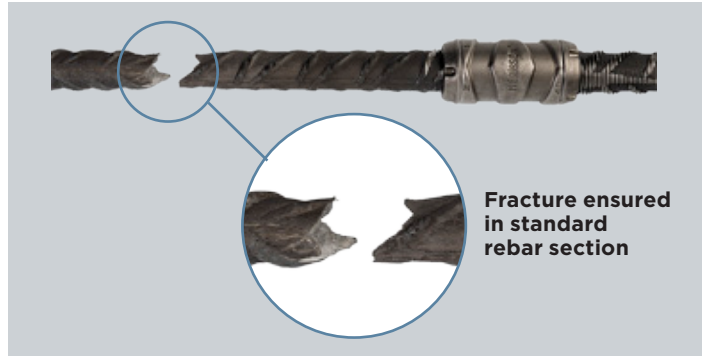


Figure 2

Continuity in shape

Shape transition from the bar to the coupler must be progressive. In order to avoid stress concentration in the concrete, right angles must be avoided. Thanks to their specifically designed locknuts, this is perfectly achieved by the Herisson® Plus rebar mechanical splices.

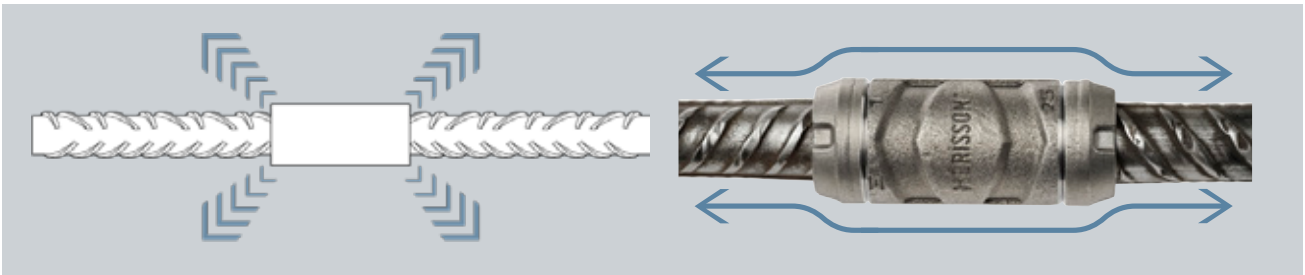
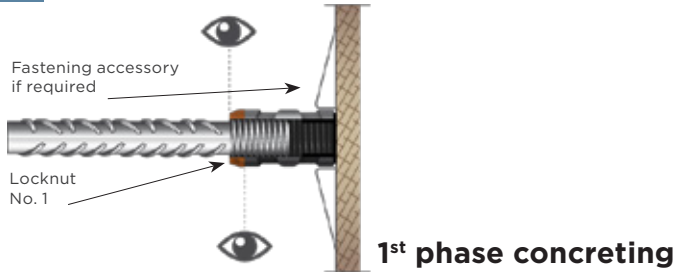


Figure 3

4 Installation

4.1 Herisson® Plus Couplers Standard Assembly

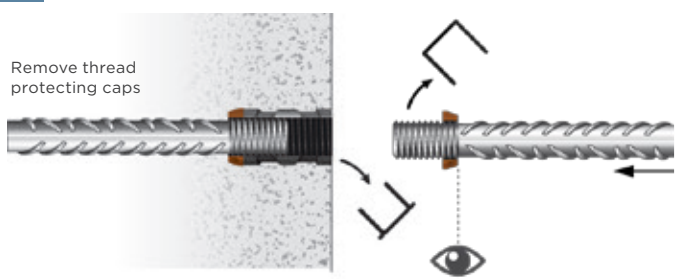
1 1st phase installation



Inspection

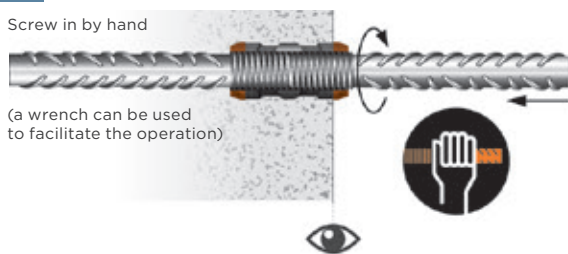
- The locknut No. 1 is tightly screwed on the rebar.
- The coupler is completely screwed against the locknut No. 1.
- The cap is correctly in place on the coupler.

2 Put 2nd phase rebar in position



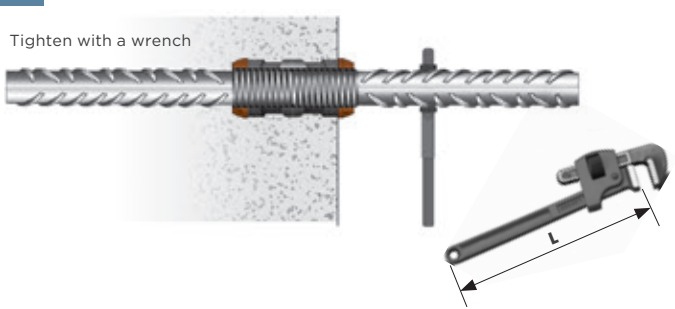
- The locknut No. 2 is tightly screwed on the 2nd rebar.

3 Screw on 2nd phase rebar



- Upon completion of screwing, the locknut No. 2 is completely screwed against the coupler.

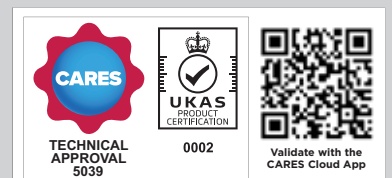
4 Secure the connection



- For dia. 25 and greater: $L \geq 0.80$ m.

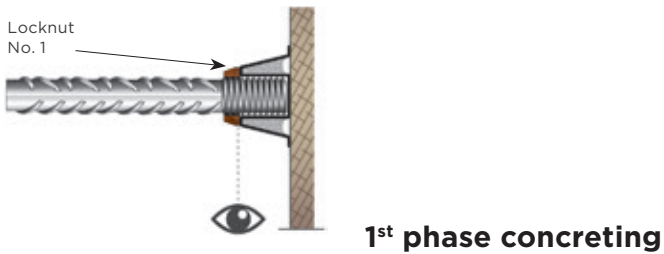
At this stage of assembly the Herisson® Plus rebar coupler guarantees the safety of the splice.

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4.2 Herisson® Plus Couplers Positional Assembly

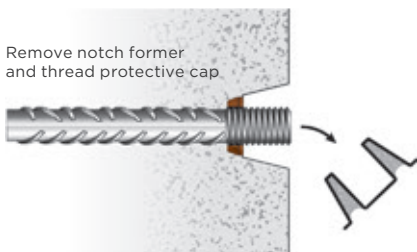
1 1st phase installation



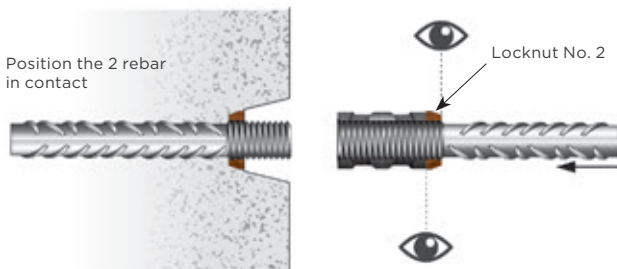
Inspection

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

2 Remove notch former

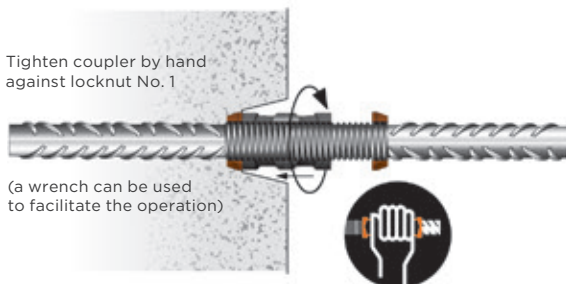


3 2nd phase installation

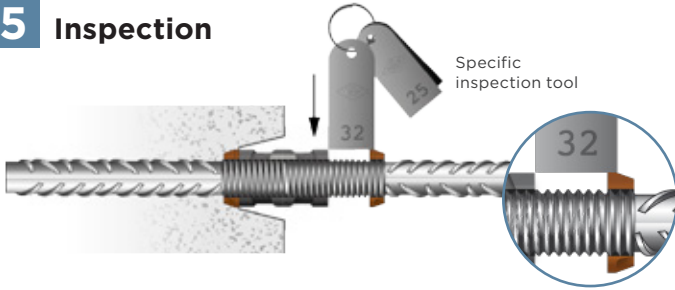


- Locknut No. 2 is tightly screwed on the rebar.
- The coupler is completely screwed against locknut No. 2.

4 Assembly by rotating the coupler



5 Inspection

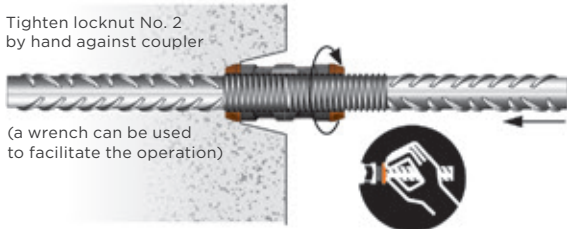


Inspection

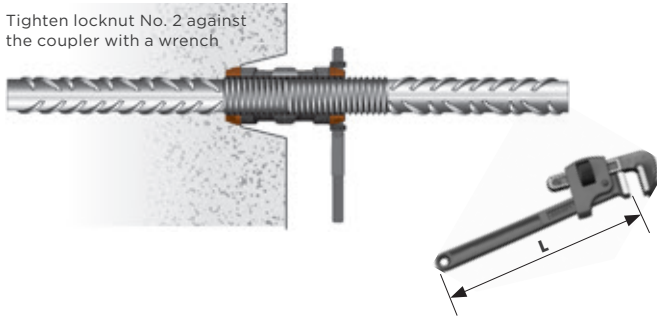
X The specific checking tool must not enter between the coupler and locknut No. 2.

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

6 Tighten locknut No. 2



7 Secure the connection



X For dia. 25 and greater: $L \geq 0.80$ m.

At this stage of assembly the Herisson® Plus 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 Herisson® Plus Standard and Positional Couplers have been tested to satisfy the requirements of CARES Appendix TA1-A, TA1-B and TA1-C for Couplers with reinforcing bars to BS4449 Grade B500B or B500C as defined in table 1. The testing comprised the following elements:

- Tensile Strength
- Permanent deformation in tension
- Low cycle fatigue
- Compression
- Cold soak
- Effective strain
- Class D fatigue

7 Quality Assurance

Armaturis Herisson® Plus 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

Herisson® Plus 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 Herisson® Plus 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 Herisson® Plus 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 Herisson® Plus Standard and Positional Couplers comply with the material requirements of EC2 by virtue of *Clause 0.8.*

Structure

Herisson® Plus 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: 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.
- CARES Appendix TA1-C: Quality and Operations Schedule for the Technical Approval of Tension or Tension- compression Couplers for Reinforcing Steel and Reinforcement Anchors based on Sellafield Engineering Standard.
- Sellafield Engineering Standard ES_0_3110_2: Mechanical Splices to Reinforcement for Concrete Part 2 - Manufacturing, Installation and Construction Requirements.

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 5039. Confirmation that this technical approval is current can be obtained from CARES.





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CARES

Pembroke House
21 Pembroke Road
Sevenoaks
Kent TN13 1XR

Phone: +44(0)1732 450000
E-mail: general@carescertification.com
www.carescertification.com



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