CARES Technical Approval Report TA1-A&B 5092

Issue 1

Dextra

BARTEC R FORTEC R

DEXTRA
Bartec/Fortec
R Parallel Thread Couplers

Assessment of the DEXTRA Bartec/Fortec R Parallel Thread Standard and Positional Coupler Product and Quality System for Production

CARES TECHNICAL APPROVAL 5092

UKAS PRODUCT CERTIFICATION 0002

Validate with the CARES Cloud App

Product

DEXTRA Bartec/Fortec R Parallel thread couplers for reinforcing steel

Product approval held by:

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1 Product Summary

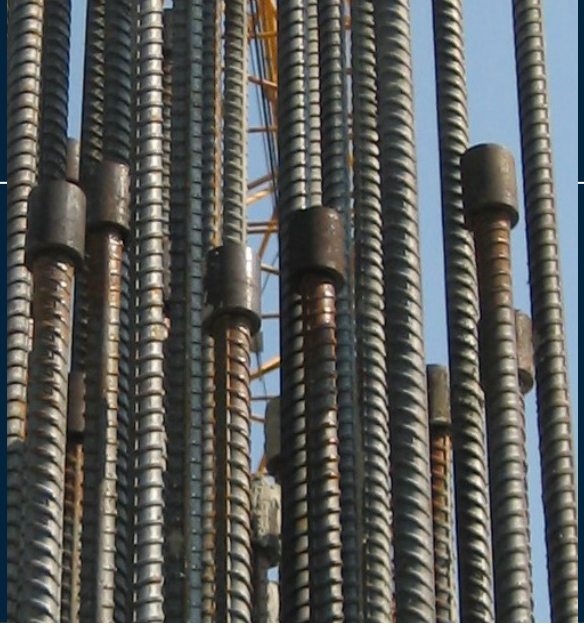
DEXTRA Bartec/Fortec R parallel thread standard and positional couplers in the size range 12mm - 40mm are for the mechanical connection of deformed high-yield carbon steel bars for the reinforcement of concrete complying with the requirements of BS4449 Grades B500B and B500C.

1.1 Scope of Application

DEXTRA Bartec/Fortec R parallel thread standard and positional couplers in the size range 12mm - 40mm have been evaluated for use as follows:

a) In accordance with CARES Appendix TA1-A and BS 8597 tested in tension with BS4449 grades B500B and B500C reinforcement as detailed in table 1.

b) In accordance with CARES Appendix TA1-B and BS8597 tested in tension with BS4449 grades B500B and B500C reinforcement as detailed in table 1.



1.2 Design Considerations

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 as detailed in tables 1 and 2 have been designed with controlled mechanical properties to be compatible with reinforcing bars complying with BS4449 Grades B500B and B500C.

1.3 Conclusion

It is the opinion of CARES that DEXTRA Bartec/Fortec R parallel thread 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
March 2024

2 Technical Specification

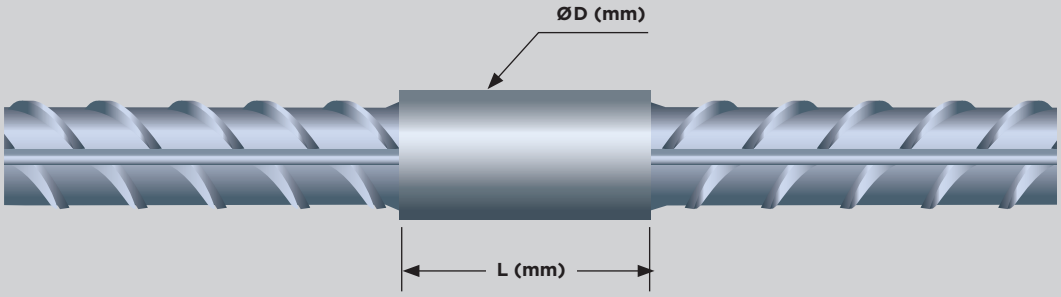
2.1 General

The function of the DEXTRA Bartec/Fortec R parallel thread couplers is to connect deformed steel reinforcing bars complying with BS4449 Grades B500B and B500C, as appropriate, and thereby create structural continuity of the reinforcing system.

DEXTRA Bartec/Fortec R parallel thread couplers offer a full strength connection. Each end of the bar to be joined is cut square and enlarged using a cold forging process. A parallel metric thread is then rolled onto the enlarged bar end. The thread form is such that the cross sectional area of the bar ends is not reduced, thus ensuring the strength of the connection matches or exceeds that of the parent bars.

2.2 Bartec/Fortec R Standard Coupler

The Bartec/Fortec R standard coupler is designed for use where one of the bars to be spliced can be rotated. It comprises a steel sleeve with an internal parallel thread, the rebar is upset and then a matching external parallel thread is applied.

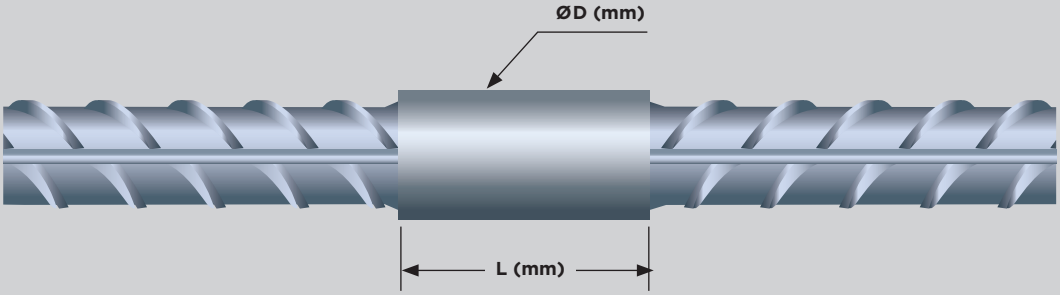


Size (mm)	Art No	D (mm)	L (mm)	Thread (mm)	Weight (kg)	Plastic protection colour	Tensile slip	Fatigue Class D
12	FPBF1214201	20	28	M14 x 2.0	0.04	Yellow	B500B/B500C	B500B/B500C
16	FPBF1620255	26	44	M20 x 2.5	0.09	Lavender	B500B/B500C	B500B/B500C
20	FPBF2024305	31	52	M24 x 3.0	0.16	Orange	B500B/B500C	B500B/B500C
25	FPBF2530355	39	66	M30 x 3.5	0.31	Clear	B500B/B500C	B500B/B500C
32	FPBF3236405	48	78	M36 x 4.0	0.60	Light Blue	B500B/B500C	B500B/B500C
40	FPBF4045355	60	97	M45 x 3.5	1.13	Blue	B500B/B500C	B500B/B500C

Table 1 Bartec R parallel thread couplers

2.3 Bartec/Fortec R Positional Coupler

The Bartec/Fortec R positional coupler is designed for use when both bars would be a burden to rotate, for example because of their size or length, the Bartec/Fortec splice system simply extends the thread onto the ribs of the bar, thereby enabling the coupler to be fully screwed onto it.
It is then unscrewed from one bar and back onto the second bar to accomplish the connection.



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 Appendix TA1-B when used with reinforcing steel BS4449 grade B500B or B500C as appropriate as detailed in table 1.

CARES APPENDIX TA1-A and TA1-B strength requirements

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

4 Installation

4.1 Process

The bars to be spliced are prepared in three step steps. They are cut straight and cold-upset using the DEXTRA cutting machine, DEXTRA forging machine, and then finally threaded using the DEXTRA threading machine.

The machines must be operated by suitably trained staff in accordance with DEXTRA operating instructions.

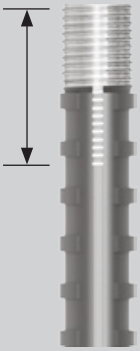
The parts are screwed together and tightened as detailed in the following section.

Step 1 - Cutting

The end of the reinforcing bar is sawn square.

Step 2 - Cold Forging

The sawn end of the reinforcing bar is then enlarged by a patented cold forging process. The core diameter of the bar is increased to a pre-determined size.



Step 3 - Threading

Finally, the enlarged end of the rebar is threaded to the required length.

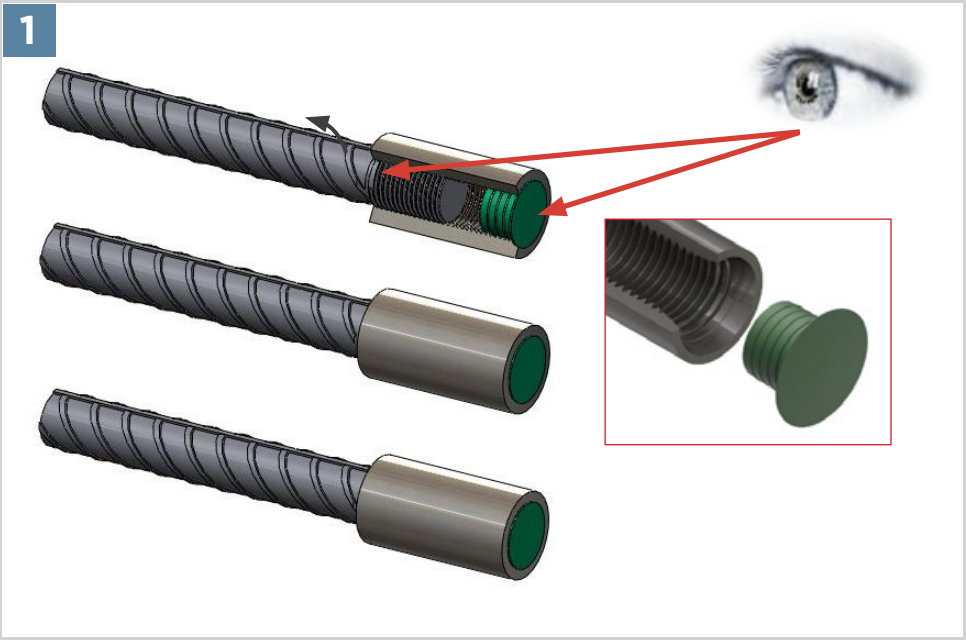
DEXTRA Cutting Machine

DEXTRA Forging Machine

DEXTRA Threading Machine

4.2 Bartec/Fortec R Standard Coupler Installation Sequences

1



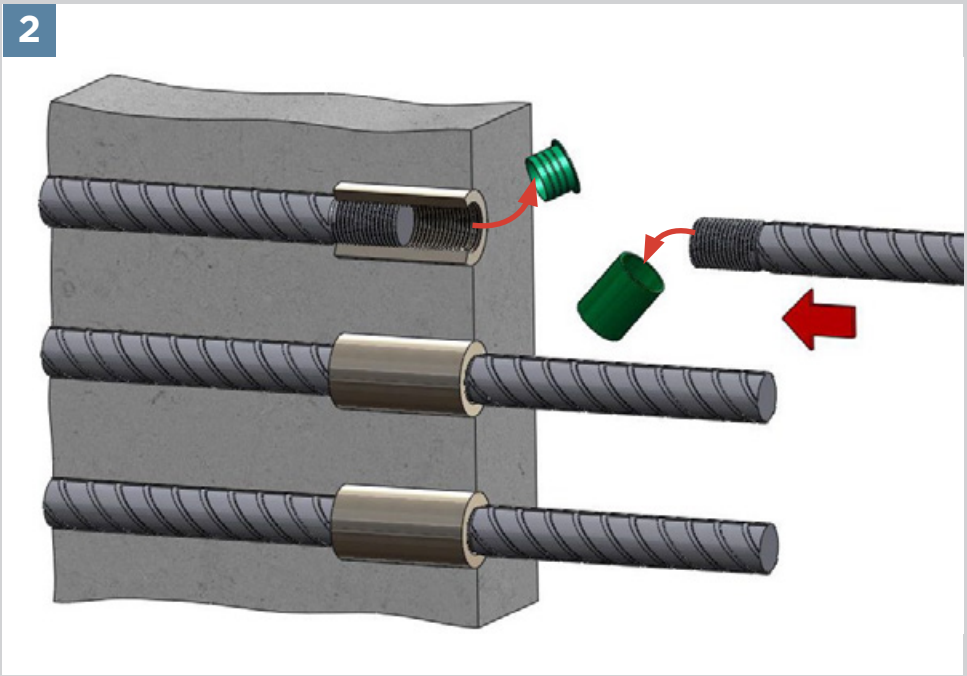
Prepare the 1st stage bar.

Check the threaded ends of the 1st stage bars are fully engaged inside the couplers.

Check the coupler cap is correctly fitted.

The chamfered side of the coupler must face the continuation bar.

2



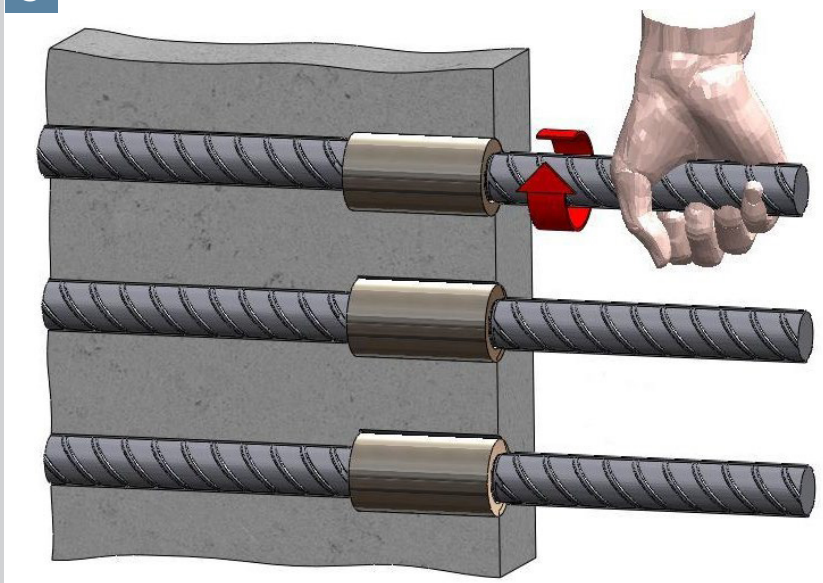
1st phase concreting.

Position the continuation bars.

After concreting remove the plastic caps from the couplers and the thread protection cap from the continuation bars.

Check that both caps are of the same colour.

3

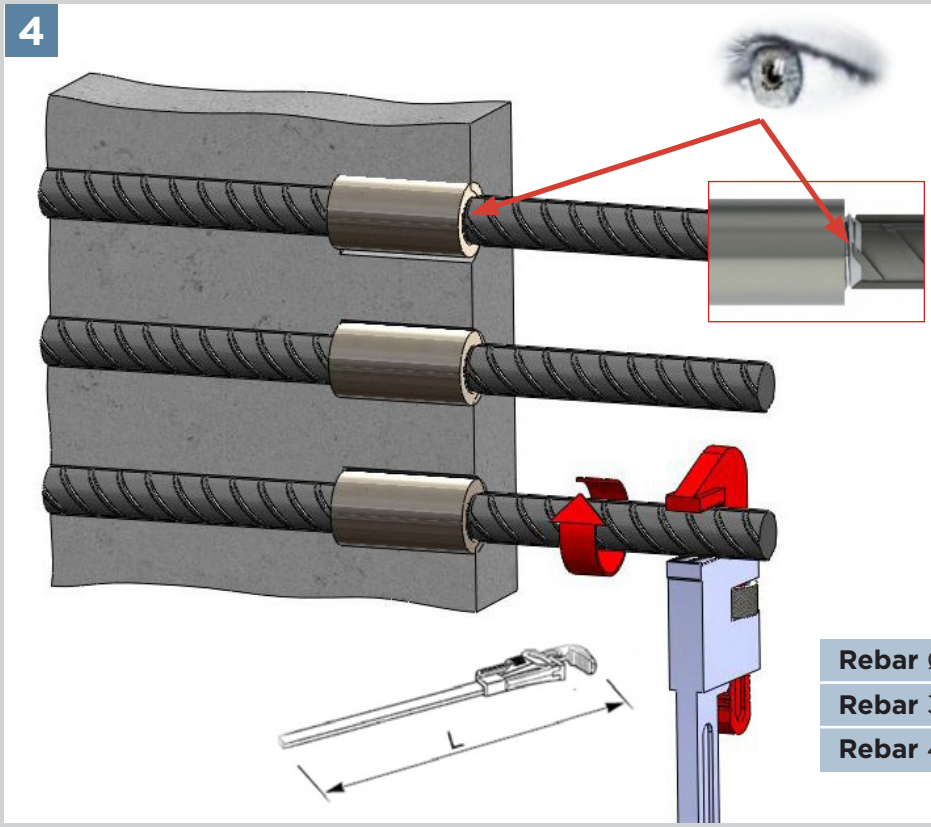


Join the bars.

Hand screw the continuation bar into the coupler. (A wrench may be used if it makes the operation easier).

Full engagement of the thread is sufficient to develop full tensile strength of the splice.

4



Lock the splices.

Use a stillson or pipe wrench on the continuation bar. No specific torque amount is required.

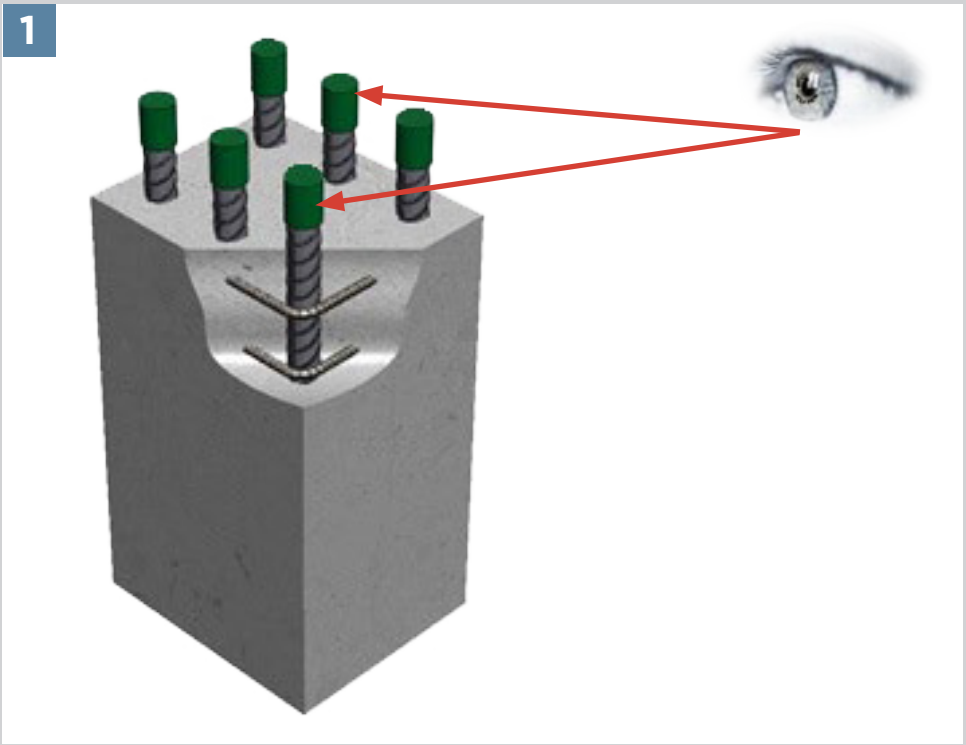
Locking the splice ensures that its permanent elongation meets the code requirement.

Check the rebar threaded length visible outside the coupler after full engagement and tightening should not exceed three pitches.

Rebar Ø ≤ 32:	L ≥ 60cm (24”)
Rebar 32 < Ø ≤ 40:	L ≥ 75cm (30”)
Rebar 40 < Ø ≤ 50:	L ≥ 100cm (40”)

4.3 Bartec/Fortec R Positional Coupler Installation Sequences

1

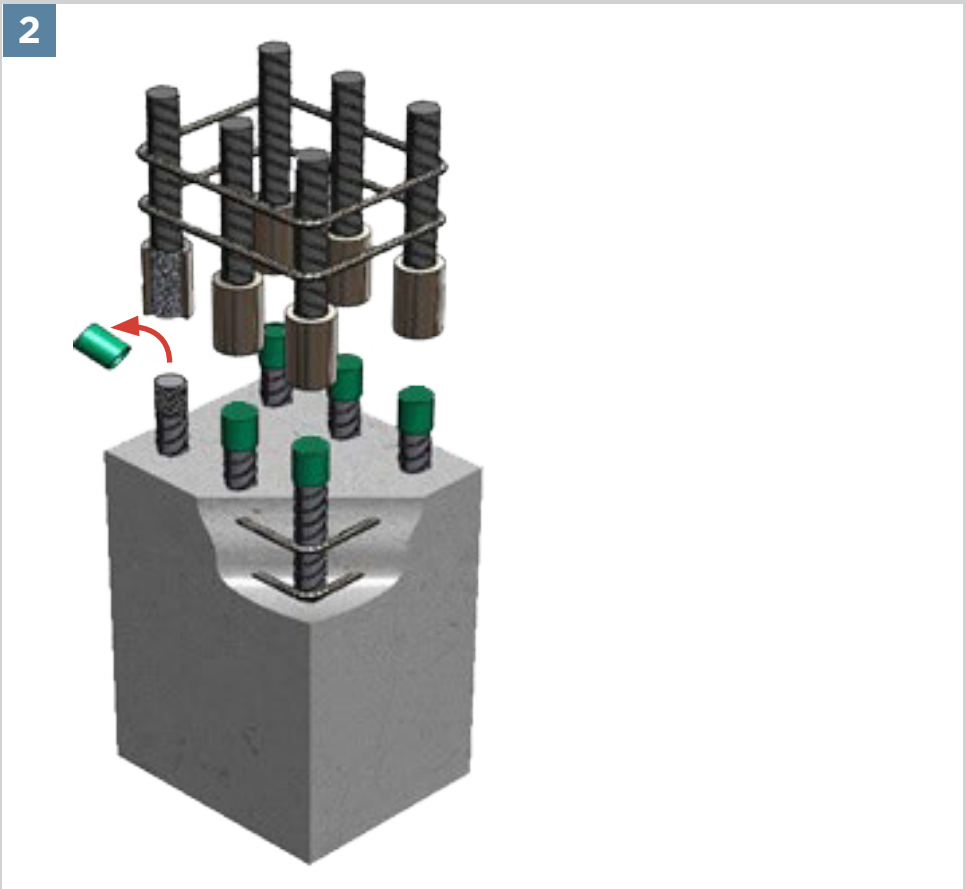


Prepare the 1st stage bar.

Check that the thread protection caps are fully engaged onto all 1st stage bars.

Check that the coupler caps are correctly fitted.

2



1st phase concreting.

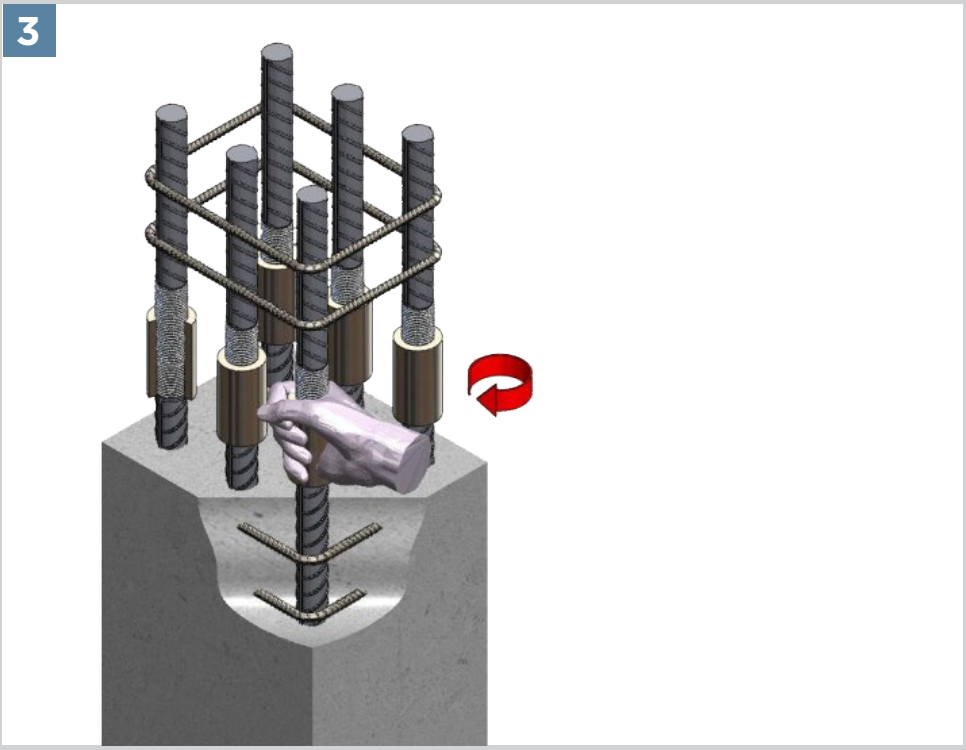
Position the continuation bars.

Remove the thread protections from all first stage bars and bring the continuation bars in butt-to-butt contact.

Control that the couplers are fully engaged on the 1st stage bars.

For ease of installation, check that the chamfer of the coupler engaged on the continuation bar is facing the 1st stage bar.

3

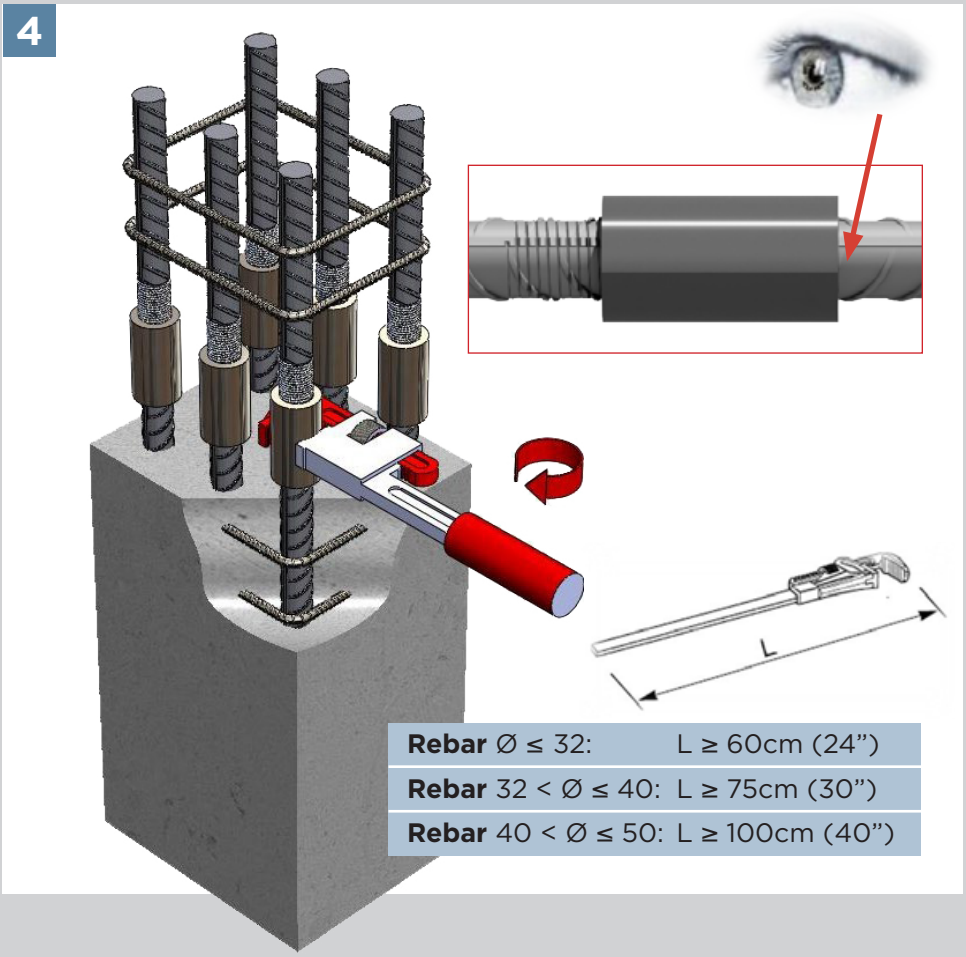


Join the bars.

Hand screw the coupler out of the continuation bar and onto the first stage bar. (A wrench may be used if it makes the operation easier).

Full engagement of the thread is sufficient to develop full tensile strength of the splice.

4



Rebar Ø ≤ 32:	L ≥ 60cm (24")
Rebar 32 < Ø ≤ 40:	L ≥ 75cm (30")
Rebar 40 < Ø ≤ 50:	L ≥ 100cm (40")

Lock the splices.

Use a Stillson or pipe wrench on the continuation bar. No specific torque amount is required.

Locking the splice ensures that its permanent elongation meets the code requirement.

No pitch should be visible after proper engagement. (For Type A thread only, not applicable for the Type B thread that is extended on the ribs).

5 Safety Considerations

Couplers are supplied in robust cardboard cartons weighting up to 25kg, which may be handled manually with care. Heavier cases require the use of mechanical handling equipment. It is advisable to wear suitable protective gloves during handling the containers, couplers and implementation, as well as during the cutting, upsetting and threading process.

6 Product Testing and Evaluation

DEXTRA Bartec/Fortec R parallel thread couplers have been tested to satisfy the requirements of CARES Appendix TA1-A and TA1-B for Couplers with reinforcing bars to BS4449 Grades B500B and B500C as appropriate.
The testing comprised the following elements:

- Tensile Strength
- Ductility
- Permanent deformation in tension
- Hich cycle fatigue (Class D)

7 Quality Assurance

DEXTRA Bartec/Fortec R parallel thread couplers for reinforcing steel are produced under a BS EN ISO9001 quality management system certified by CARES at locations agreed with CARES.

The quality management system scheme monitors the production of the Standard Couplers and ensures that materials and geometry remain within the limits of this technical approval.

The products are subject to a programme of periodic testing to ensure continued compliance.

8 Materials and Workmanship

8.1 The Building Regulations (England and Wales)

Structure, Approved Document A

DEXTRA Bartec/Fortec R parallel thread 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 DEXTRA Bartec/Fortec R parallel thread 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 DEXTRA Bartec/Fortec R parallel thread 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 DEXTRA Bartec/Fortec R parallel thread standard and positional couplers comply with the material requirements of EC2 by virtue of *Clause 0.8*.

Structure

DEXTRA Bartec/Fortec R parallel thread 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

- BS4449: 2005 Steel bars for the reinforcement of and use in concrete - Requirements and test methods.
- BS 8597 :2015: Steels for the reinforcement of concrete - Reinforcement couplers.
- 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.

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 DEXTRA 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 5092. Confirmation that this technical approval is current can be obtained from CARES.

Bartec/Fortec R Coupler Applications

Bartec/Fortec R couplers in pile cages.

Bartec/Fortec R couplers in diaphragm wall.

Bartec/Fortec R couplers in columns.

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Independent Product Assessments for the Construction Industry

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