

CARES Technical Approval Report TA1-F 5091



Issue 2



Dextra



DEXTRA Bartec/Fortec BF and BV Parallel Thread Couplers

Assessment of the
DEXTRA Bartec/Fortec
BF and BV Parallel Thread
Coupler Product and
Quality System for Production



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Product

DEXTRA Bartec/Fortec BF and BV Parallel thread couplers for reinforcing steel

Product approval held by:

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1 Product Summary

DEXTRA Bartec/Fortec BF parallel thread couplers in the size range 12mm - 20mm and DEXTRA Bartec/Fortec BV parallel thread 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 / SS560 Grade B500B.

By agreement, this Technical Approval is not valid in the United Kingdom, as it acknowledges that the UK Standards Committee rejected ISO15835:2018 during the public comment phase of its introduction.

The introduction of the TA1-F appendix by CARES is to facilitate a Technical Approval scheme incorporating a testing method for couplers in geographical areas where no national approval schemes currently exist.

1.1 Scope of Application

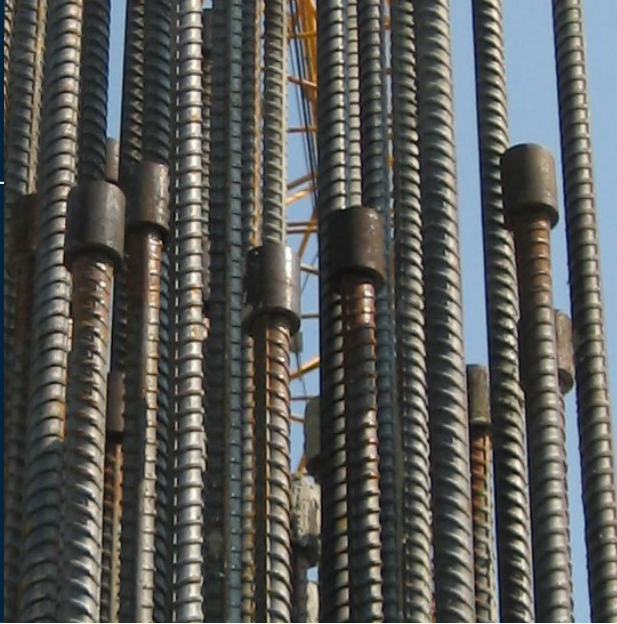
DEXTRA Bartec/Fortec BF parallel thread couplers in the size range 12mm - 20mm and DEXTRA Bartec/Fortec BV parallel thread couplers in the size range 12mm - 40mm have been evaluated for use as follows:

- a) TA1-F: Eurocode 2 for static applications in tension only with BS4449 and SS560 Grade B500B reinforcement.
- b) ISO15835-1:2018 Steels for the reinforcement of concrete - Reinforcement couplers for mechanical splices of bars - requirements Type B coupler under predominantly static loads in tension only using BS4449 and SS560 Grade B500B reinforcement.

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 table 1 have been designed with controlled mechanical properties to be compatible with reinforcing bars complying with BS4449 and SS560 Grade B500B.

1.3 Conclusion

It is the opinion of CARES that DEXTRA Bartec/Fortec BF parallel thread couplers in the size range 12mm - 20mm and DEXTRA Bartec/Fortec BV 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.

L. Brankley
 Chief Executive Officer
 February 2024

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2 Technical Specification

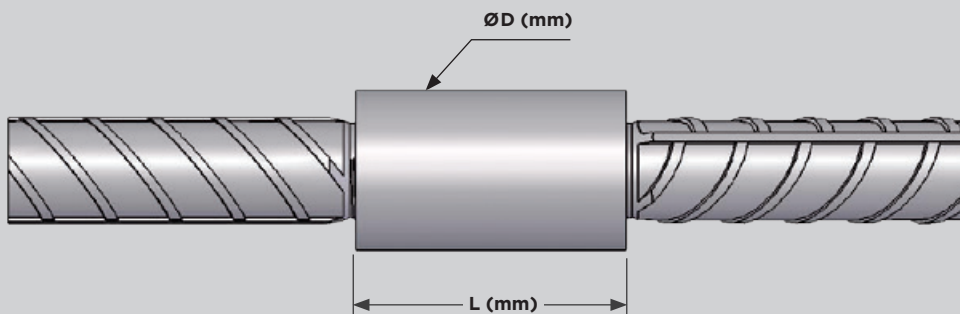
2.1 General

The function of the DEXTRA Bartec/Fortec BF and BV parallel thread couplers is to connect deformed steel reinforcing bars complying with BS4449 and SS560 Grade B500B, as appropriate, and thereby create structural continuity of the reinforcing system.

DEXTRA Bartec/Fortec BF and BV 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 cut 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 BF and BV Couplers

The Bartec/Fortec BF and BV couplers are 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)	Model	Art No	D (mm)	L (mm)	Thread (mm)	Weight (kg)	Plastic protection colour	Reinforcement Grade
12	BF12	FPBF1214201	20	28	M14 x 2.0	0.04	Yellow	B500B
16	BF16	FPBF1620255	26	44	M20 x 2.5	0.09	Lavender	B500B
20	BF20	FPBF2024305	31	52	M24 x 3.0	0.16	Orange	B500B

Table 1 Bartec BF coupler

Size (mm)	Model	Art No	D (mm)	L (mm)	Thread (mm)	Weight (kg)	Plastic protection colour	Reinforcement Grade
12	BV12	FPBV1214200	20	28	M14 x 2.0	0.04	Yellow	B500B
16	BV16	FPBV1620251	26	38	M20 x 2.5	0.08	Lavender	B500B
20	BV20	FPBV2024301	31	45	M24 x 3.0	0.14	Orange	B500B
25	BV25	FPBV2530351	39	56	M30 x 3.5	0.28	Clear	B500B
32	BVC32	FPBV3236401	48	67	M36 x 4.0	0.52	Light Blue	B500B
40	BVC40	FPBV4045451	60	85	M45 x 4.5	1.03	Blue	B500B

Table 2 Bartec BV coupler

3 Product Performance and Characteristics

Full destructive tests have been carried out to demonstrate compliance with the performance requirements defined in CARES Appendix TA1-F coupler when used with reinforcing steel BS4449 and SS560 grade B500B as appropriate as detailed in tables 1.

CARES APPENDIX TA1-F strength requirements

- Permanent deformation is less than 0.10mm after loading to 60% of the specified characteristic yield strength value of the reinforcing bar in tension with BS4449 / SS560 grade B500B reinforcement, tested in accordance with option 2 of ISO15835-1 clause 5.4.1.
- The relaxed slip requirements for couplers longer than 100mm and calculation of slip as a median as defined in ISO 15835-1:2018 clause 5.4.2 is not be permitted for couplers approved under this TA1-F schedule

ISO15835-1:2018 requirements for slip and tensile strength

Tests verify compliance with Clauses 5.3 and 5.4 of ISO15835-1:2018 for the following for an ISO15835 category “B” coupler as defined in table 2:

- a) slip under static forces; and
- b) tensile strength and ductility under static forces.



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 using a suitable wrench.



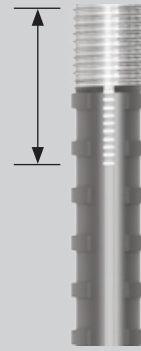
Step 1 - Cutting

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

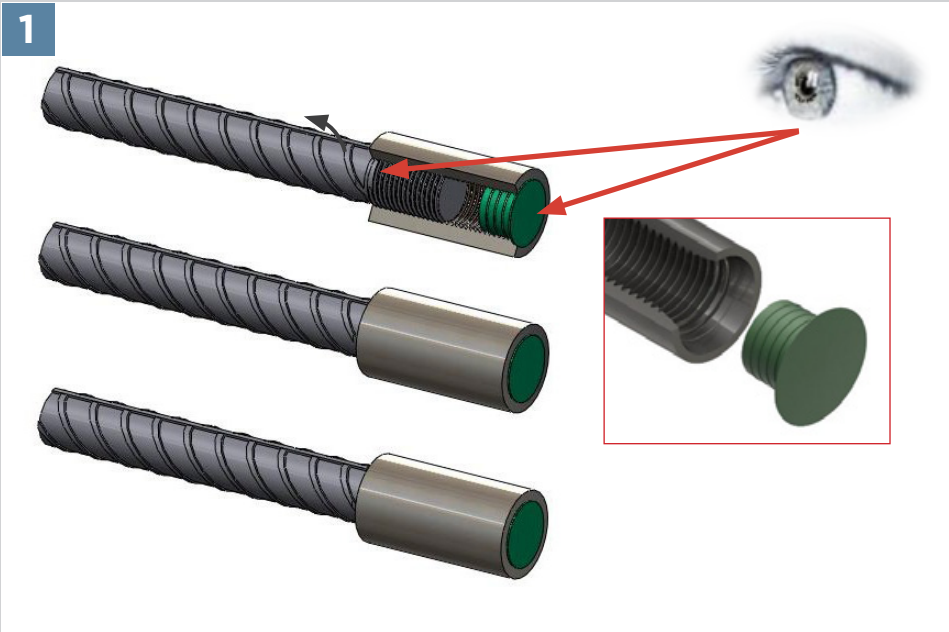


DEXTRA Forging Machine






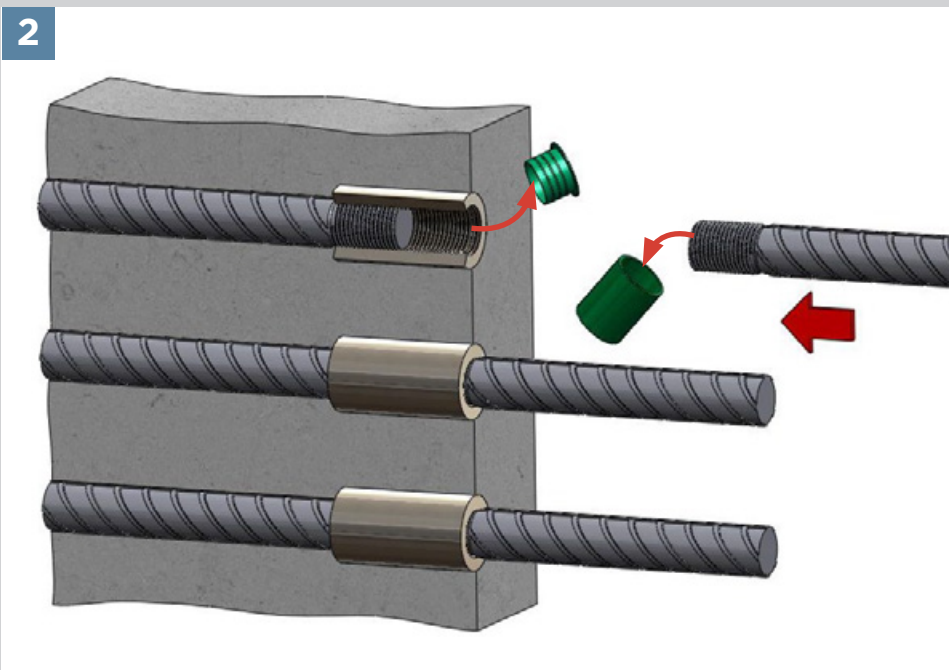
DEXTRA Threading Machine

4.2 Bartec/Fortec BF and BV Coupler Installation Sequences



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.

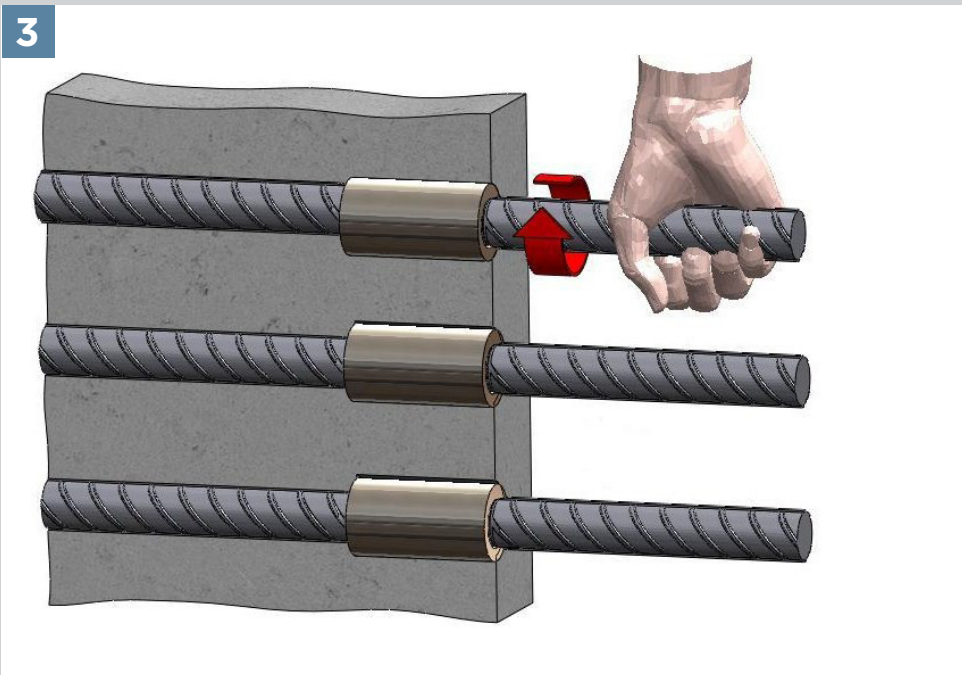


1st phase concreting.

Position the continuation bars.


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

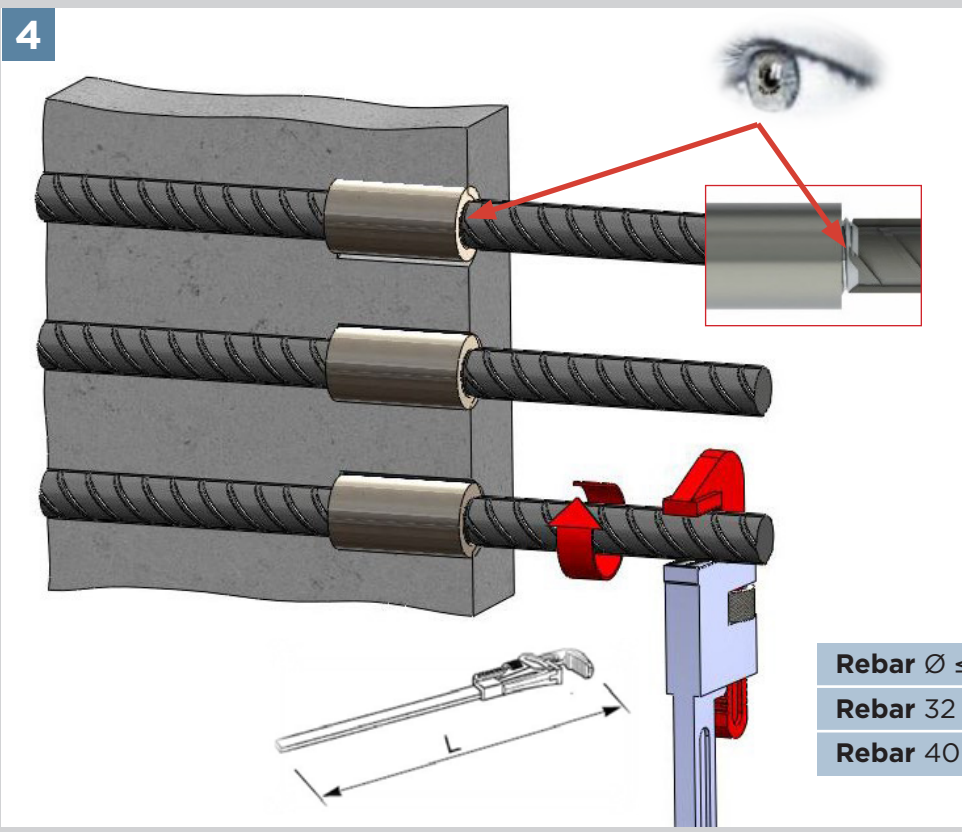
-  Check that both caps are of the same colour.



Join the bars.


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


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



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 $\varnothing \leq 32$:	$L \geq 60\text{cm (24")}$
Rebar $32 < \varnothing \leq 40$:	$L \geq 75\text{cm (30")}$
Rebar $40 < \varnothing \leq 50$:	$L \geq 100\text{cm (40")}$

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 BF and BV parallel thread couplers have been tested to satisfy the requirements of CARES Appendix TA1-F for Couplers with reinforcing bars to BS4449 / SS560 Grade B500B as appropriate.

The testing comprised the following elements:

- Tensile Strength
- Ductility
- Permanent deformation in tension

Tests verify compliance with Clauses 5.3 and 5.4 of ISO15835-1:2018 for tensile strength, ductility and slip under static forces.



7 Quality Assurance

DEXTRA Bartec/Fortec BF and BV 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

This technical approval gives assurance that the DEXTRA Bartec/Fortec BF and BV parallel thread couplers to reinforcing steel comply with the material requirements of EC2.

9 References

- BS4449: 2005 Steel bars for the reinforcement of and use in concrete - Requirements and test methods.
- SS560: 2016: 2016 Specification for steel for the reinforcement of concrete - Weldable reinforcing steel - Bar, coil and decoiled product.
- ISO15835-1:2018 Steels for the reinforcement of concrete - Reinforcement couplers for mechanical splices of bars - Part 1: Requirements
- 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-F: Quality and Operations Schedule for the Technical Approval of Couplers for high cycle fatigue and low cycle loading and static loading applications in tension

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 5091. Confirmation that this technical approval is current can be obtained from CARES.



Bartec/Fortec BF and BV Coupler Applications



Bartec/Fortec couplers in pile cages.



Bartec/Fortec couplers in diaphragm wall.



Bartec/Fortec couplers in columns.



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