

CARES Technical Approval Report TA1-B 5053

Issue 4

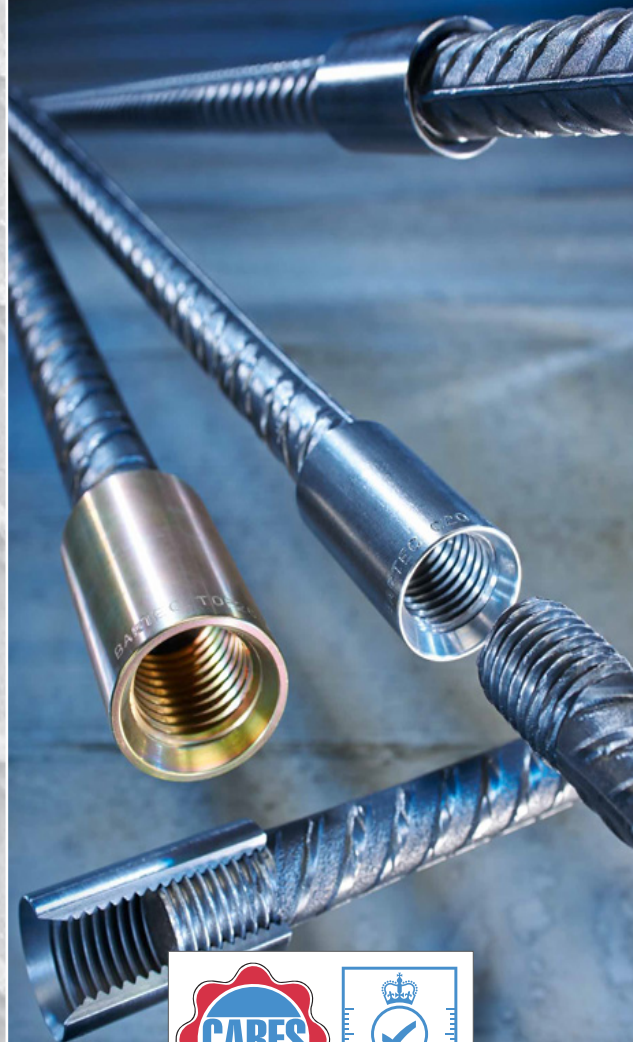


Company



Bartec Company Linxion Parallel Threaded Couplers

Assessment of the
Linxion Standard Type C
and PI Parallel
Threaded Coupler
Product and Quality
System for Production



**TECHNICAL
APPROVAL**
5053



0002

Product

Linxion Standard
Type C and PI parallel
threaded couplers
for reinforcing steel

Product approval held by:

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1 Product Summary

Linxion Standard Type C parallel threaded couplers in the size range 12mm - 40mm and Type PI 16mm - 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

Linxion Standard Type C parallel threaded couplers in the size range 12mm - 40mm have been evaluated for use as follows:

- a) TA1-B: Eurocode 2 and BS 8110 for static applications in tension only with BS4449 Grade B500B reinforcement.

Linxion Standard Type PI parallel threaded couplers in the size range 16mm - 40mm have been evaluated for use as follows:

- b) TA1 -B: Eurocode 2 for static applications in tension only with BS4449 Grade B500C 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 Linxion Standard Type C and PI parallel threaded couplers 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

December 2019



2 Technical Specification

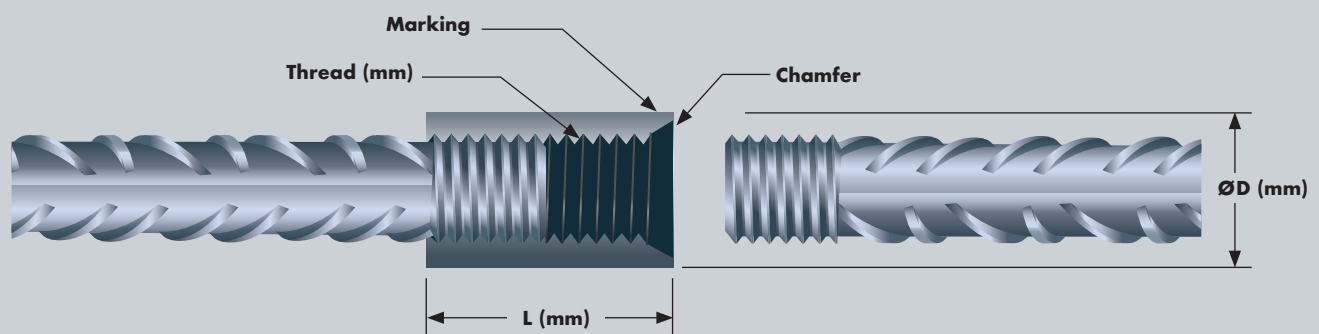
2.1 General

The function of Linxion Standard Type C and PI parallel threaded couplers is to connect deformed steel reinforcing bars complying with BS 4449 Grade B500B and B500C as appropriate (see tables 1 and 2) and thereby create structural continuity of the reinforcing system.

2.2 Linxion Standard Type C Couplers

Linxion Standard Type C Coupler was designed by Bartec Company for use where one of the bars to be spliced can be rotated. It comprises a steel sleeve with an internal parallel thread. This process was protected by the company Bartec with a patent for 20 years (1988-2008). The rebar is cold-upset and then a matching external parallel thread is applied.

Linxion Standard Type C Coupler



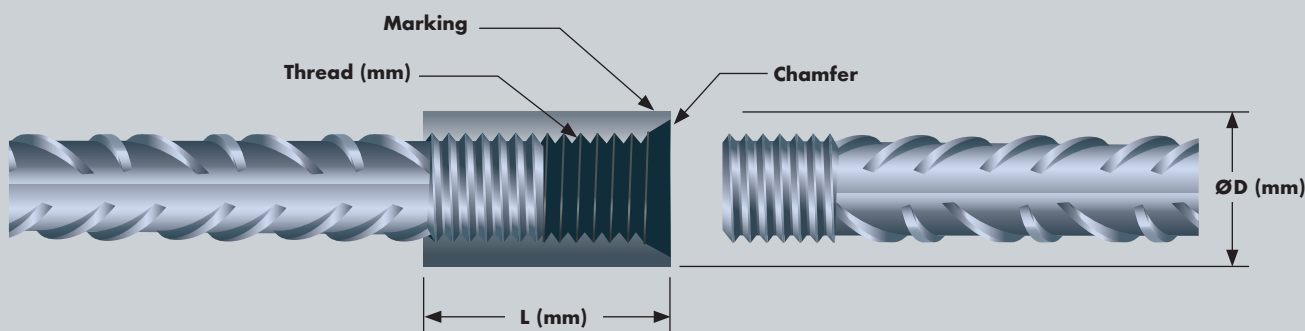
Ref	Size (mm)	External ØD (mm)	Length L (mm)	Thread (mm)	Weight (kg)	Marking	Sealing cap colour	TA1B B500B tension only
C12	12	20	33	M14 x 2	0.05	BTLX C12 XXX X	Yellow	✓
C16	16	25	46	M20 x 2.5	0.08	BTLX C16 XXX X	Blue	✓
C20*	20	30	55	M24 x 3	0.14	BTLX PI 20 XXX X	Red	✓
C26	25	38	68	M30 x 3.5	0.28	BTLX C26 XXX X	Orange	✓
C32	32	47	81	M36 x 4	0.52	BTLX C32 XXX X	Violet	✓
C40	40	59	100	M45 x 4.5	1.00	BTLX C40 XXX X	Pink	✓

Table 1 *Note that coupler C20 is the same coupler as the PI 20 coupler, hence it will adopt this marking

2.3 Linxion Standard Type PI Couplers

Linxion Standards Type PI Coupler was designed by Bartec Company for use where one of the bars to be spliced can be rotated. It comprises a steel sleeve with an internal parallel thread. This process is protect by the company Bartec with a patent. The rebar is cold-upset and then a matching external special parallel thread is applied.

Linxion Standard Type PI Coupler



Ref	Size (mm)	External Ø D (mm)	Length L (mm)	Weight (kg)	Marking	Sealing cap colour	TA1B B500C tension only
PI16	16	25	46	0.08	BTLX PI 16 XXX X	Blue	✓
PI20	20	30	55	0.14	BTLX PI 20 XXX X	Red	✓
PI26	25	40	68	0.31	BTLX PI 26 XXX X	Orange	✓
PI32	32	50	81	0.58	BTLX PI 32 XXX X	Violet	✓
PI40	40	62	100	1.20	BTLX PI 40 XXX X	Pink	✓

Table 2

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2.4 Linxion Standard Type C and PI Coupler Markings

Each BTLX coupler body is marked on its outer circumference with an identification imprint consisting of four pieces of information:

1. The letter "BTLX"
2. The type of coupler "C" or "PI"
3. The diameter of the rebar to be used
4. Batch number, consisting of 3 or 4 alphanumeric characters.

Example:

BTLX - C16 - M1A (C coupler type for reinforcement diameter 16mm, batch number M1A)

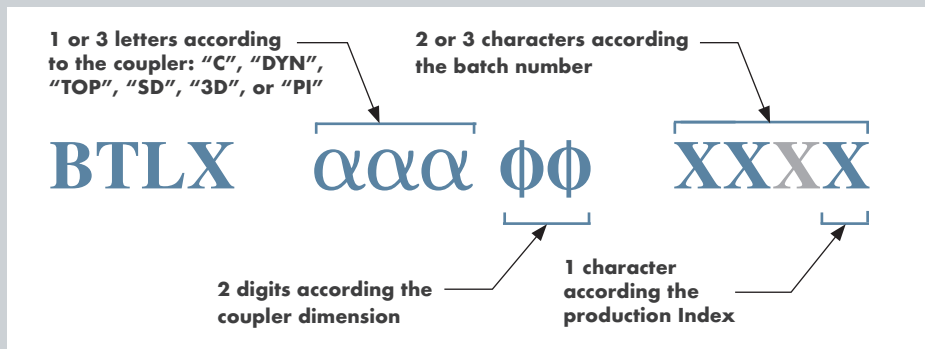


Figure 1

3 Product Performance and Characteristics

The performance requirements of CARES Appendix TA1-B in tension only when used with reinforcing steel of BS4449 Grade B500B for coupler C and B500C for coupler PI are:

CARES APPENDIX TA1-B strength requirements

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

4 Installation

4.1 Process

The bars to be spliced are cut straight and cold-upset using the Bartec Company Machines, and then finally threaded. The machines must be operated by suitable trained staff in accordance with Bartec Company operating instructions. The parts are screwed together and tightened using a suitable wrench.



Figure 2 - Mobile production line



Cold upsetting



Thread by cutting

Figure 3



4.2 Linxion Standard Type C and PI parallel threaded couplers installation



Place the 1st Phase Rebar

Screw the coupler to the end of the thread on the fixed bar and check the plastic cap is correctly fitted.

1



1st Phase Concreting

After concreting remove the plastic cap from the coupler.

2



Remove the plastic protection from the 2nd phase rebar.

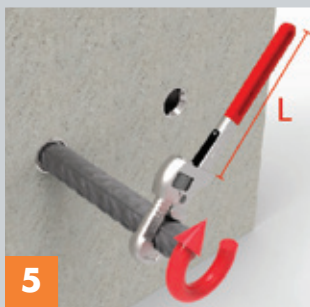
3



2nd Phase Rebar and Securing the Splice

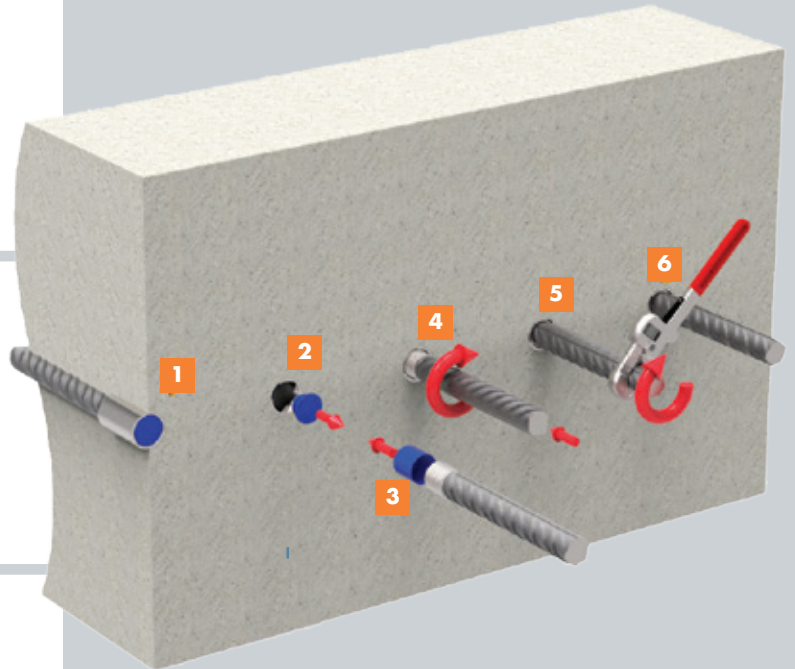
Rotate the 2nd phase rebar bar into the coupler up to the other threaded end of the fixed bar.

4



Tighten the joint using a wrench on the continuation bar.
25mm Ø rebar and above:
L = 800mm minimum.

5

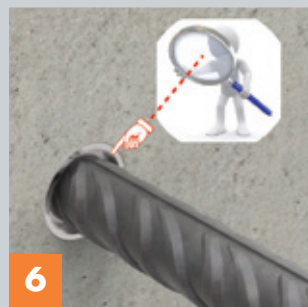


Note 1

Rebar splices reach their full resistance by hand-screwing at 80% of their total length of engagement.

Note 2

Step 5 now guarantees non slip across the rebar splices.



When installation is complete check no threaded portion of the rebar is visible outside the coupler.

6

5 Safety Considerations

Couplers are supplied in metal containers 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

Linxion Standard Type C and PI parallel threaded couplers have been subject to mechanical testing to demonstrate compliance with the requirements of CARES Appendix TA1-B with reinforcing bars to BS4449 Grade B500B for Standard Type C and B500C for PI. The testing comprised the following elements:

- Measurement of tensile strength
- Measurement of permanent deformation after loading to $0.65f_y$ in tension

7 Quality Assurance

Linxion Standard Type C and PI parallel threaded couplers are produced under an BS EN ISO 9001 quality management system certified by CARES at production locations agreed with 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 ongoing periodic mechanical testing to ensure continued compliance with the TA1-B requirements.



8 Building Regulations

8.1 The Building Regulations (England and Wales)

Structure, Approved Document A

Linxion Standard Type C and PI Parallel threaded 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 Linxion Standard Type C and PI parallel threaded couplers comply with the material requirements of EC2.

8.2 The Building Regulations (Northern Ireland)

Materials and Workmanship

This technical approval gives assurance that Linxion Standard Type C and PI parallel threaded 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 Linxion Standard Type C and PI parallel threaded couplers comply with the material requirements of EC2 by virtue of *Clause 0.8*.

Structure

Linxion Standard Type C and PI parallel threaded 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 (now withdrawn).
- 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-B; Quality and Operations Schedule for the Technical Approval of Couplers for Reinforcing Steel For BS8110 and EN 1992-1-1 Applications 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 Bartec Company 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 5053. Confirmation that this technical approval is current can be obtained from UK CARES.

Linxion Coupler Applications



Linxion couplers in diaphragm wall.



Linxion couplers in invert.



Linxion couplers in invert.

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