

CARES Technical Approval Report TA1-A&B 5084



Issue 2

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Bartec Company Linxion DYN Couplers

Assessment of the
Linxion DYN Standard (LS)
and Positional (LCE)
Coupler Product
and Quality System
for Production



Product

Linxion DYN Standard (LS) and Positional (LCE) couplers for reinforcing steel

Product approval held by:

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1 Product Summary

Linxion DYN Standard (LS) and Positional (LCE) couplers in the size range 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 for DYN Standard (LS) coupler as shown in table 1 and Grade B500B only for Positional (LCE) coupler in table 2.

1.1 Scope of Application

Linxion DYN Standard (LS) and Positional (LCE) couplers in the size range 16mm - 40mm, have been evaluated for use as follows:

- a) Linxion DYN Standard (LS) coupler in CARES appendix TA1-A in tension and class D fatigue requirements using B500C reinforcement.
- b) Linxion DYN Standard (LS) coupler and DYN Positional (LCE) coupler in CARES appendix TA1-A in tension and class D fatigue requirements using B500B reinforcement.
- c) Linxion DYN Standard (LS) coupler for static and BS8110 applications in CARES Appendix TA1-B using B500C reinforcement.
- d) Linxion DYN Standard (LS) coupler and DYN Positional (LCE) coupler in CARES appendix TA1- B 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 Linxion DYN Standard (LS) and Positional (LCE) couplers are satisfactory for use within the limits stated in paragraph 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
June 2022



2 Technical Specification

2.1 General

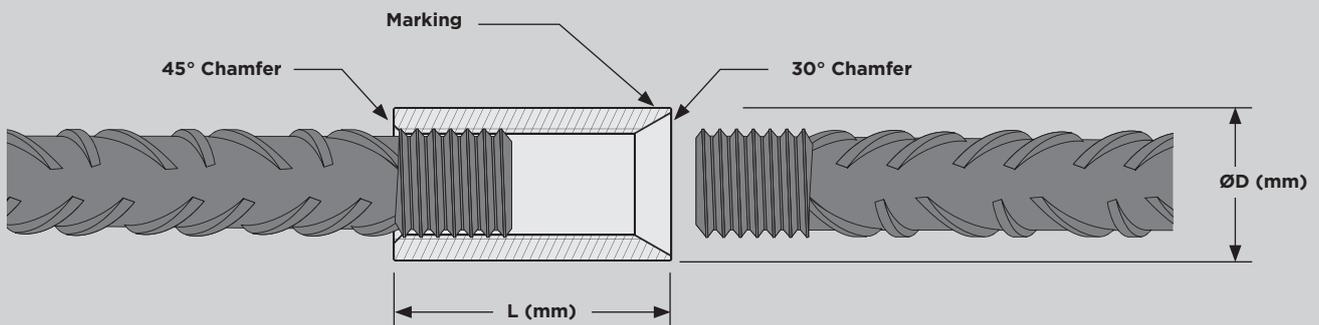
The function of Linxion DYN Standard (LS) and Positional (LCE) couplers is to connect deformed steel reinforcing bars complying with BS4449 Grade B500B and B500C for DYN Standard (LS) couplers and Grade B500B only for Positional (LCE) couplers, as appropriate and thereby create structural continuity of the reinforcing system (see tables 1 and 2).

2.2 Linxion DYN Standard (LS) Coupler

Linxion DYN Standard (LS) parallel thread couplers are an internally threaded steel sleeve. The standard coupler is suitable for applications where one of the bars to be spliced can be rotated.

The threaded bar ends are either protected by the coupler or an external plastic sheath. The internal thread of the coupler is protected by an internal plastic end cap. For certain applications (such as deep concrete pours), the coupler end caps may not prevent the ingress of concrete fines. For these applications, further protection may be required.

Linxion DYN Standard (LS) Coupler



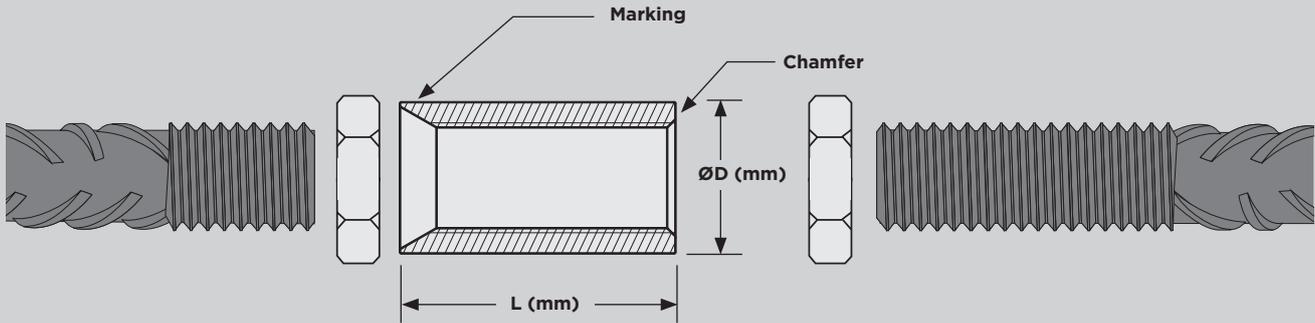
Ref	Thread (mm)	External ØD (mm)	Length L (mm)	Weight (kg)	Marking	Sealing cap colour	TA1A B500B and B500C tension and fatigue class D	TA1B B500B and B500C tension only
DYN16	M20 x 2.75	30	46	0.16	BTLX DYN 16 XXXX	Blue	✓	✓
DYN20	M24 x 2.75	37	55	0.20	BTLX DYN 20 XXXX	Red	✓	✓
DYN26	M30 x 3.0	42	68	0.41	BTLX DYN 26 XXXX	Orange	✓	✓
DYN32	M36 x 3.0	51	81	0.69	BTLX DYN 32 XXXX	Violet	✓	✓
DYN40	M45 x 4.0	64	100	1.34	BTLX DYN 40 XXXX	Pink	✓	✓

Table 1

2.3 Linxion DYN Positional (LCE) Coupler

Linxion DYN Positional (LCE) parallel thread couplers are an internally threaded steel sleeve. The positional coupler is suitable for applications where the bars to be spliced cannot be rotated.

Linxion DYN Positional (LCE) Coupler



Ref	Thread (mm)	External ØD (mm)	Length L (mm)	Weight (kg)	Marking	Sealing cap colour	TA1A B500B tension and fatigue class D	TA1B B500B tension only
DYN16	M20 x 2.75	30	46	0.16	BTLX DYN 16 XXXX	Blue	✓	✓
DYN20	M24 x 2.75	37	55	0.20	BTLX DYN 20 XXXX	Red	✓	✓
DYN26	M30 x 3.0	42	68	0.41	BTLX DYN 26 XXXX	Orange	✓	✓
DYN32	M36 x 3.0	51	81	0.69	BTLX DYN 32 XXXX	Violet	✓	✓
DYN40	M45 x 4.0	64	100	1.34	BTLX DYN 40 XXXX	Pink	✓	✓

Table 2

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2.4 Linxion DYN Standard (LS) and Positional (LCE) 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 DYN
3. The diameter of the rebar to be used
4. Batch number, consisting of 3 or 4 alphanumeric characters.

Example:

BTLX - DYN16 - M1A (LS or LCE coupler type for reinforcement diameter 16mm, batch number M1A)

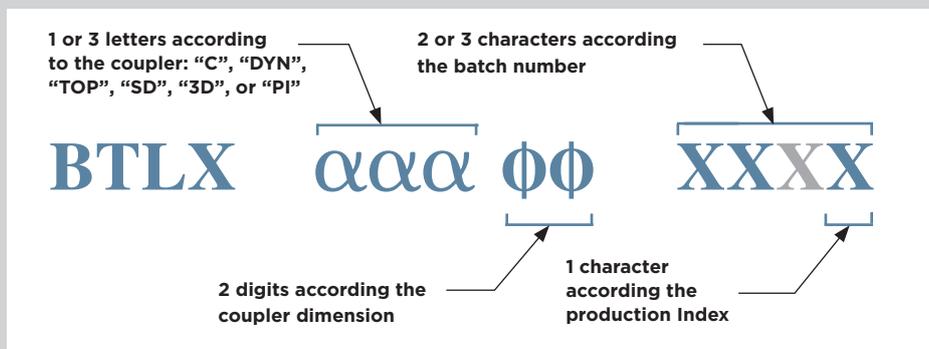


Figure 1

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 bars to BS4449 Grade B500B and B500C as defined in tables 1 - 2 as appropriate.

CARES APPENDIX TA1-A 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 570MPa with B500C reinforcement.
- D Class Fatigue requirements.

CARES APPENDIX TA1-B requirements

- Permanent deformation is less than 0.10mm after loading to $0.65f_y$ in tension with BS4449 grade B500B and B500C reinforcement (as defined in tables 1 and 2).
- 99% characteristic tensile strength is greater than 540MPa for B500B or 570MPa with B500C reinforcement.



4 Installation

4.1 Process

The bars to be spliced are cut straight and cold-upset using 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.

Step 1 : Band Saw Machine

The band saw is used to perform a straight cut necessary for the cold forging process.

Step 2 : Cold Forging Machine

The cold forging machine creates an upper resistant section on the part of the bar intended to be threaded. The cold forging automatic machine is developed by Bartec Company.

Step 3 : RB Machine

The first step of the RB machine consists of a peeling process.

The second step consists of a rolling process.

The RB automatic machine is developed by Bartec Company.



Cold upsetting



Thread by rolling

Figure 2

4.2 Linxion DYN Standard (LS) Coupler Sequences



1

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.



2

1st Phase Concreting

After concreting remove the plastic cap from the coupler.



3

Remove the plastic protection from the 2nd phase rebar.



4

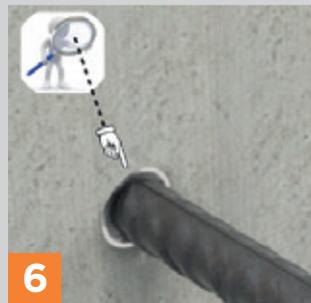
2nd Phase Rebar and Securing the Splice

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



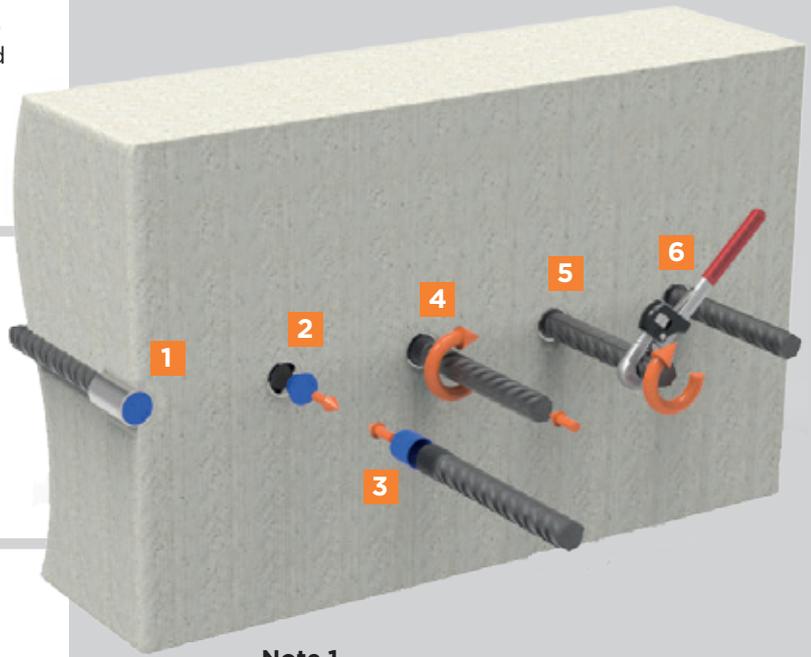
5

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



6

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



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.

4.3 Linxion DYN Positional (LCE) Coupler Sequence



Place the 1st Phase Rebar
Check no threaded portion of the rebar is visible outside the lock nut and the plastic plug is correctly fitted.



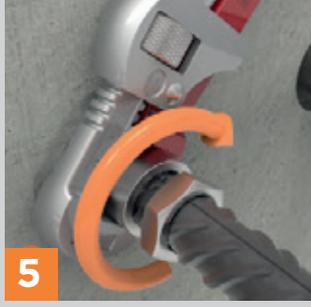
1st Phase Concreting
After concreting remove the plastic plug from the coupler.



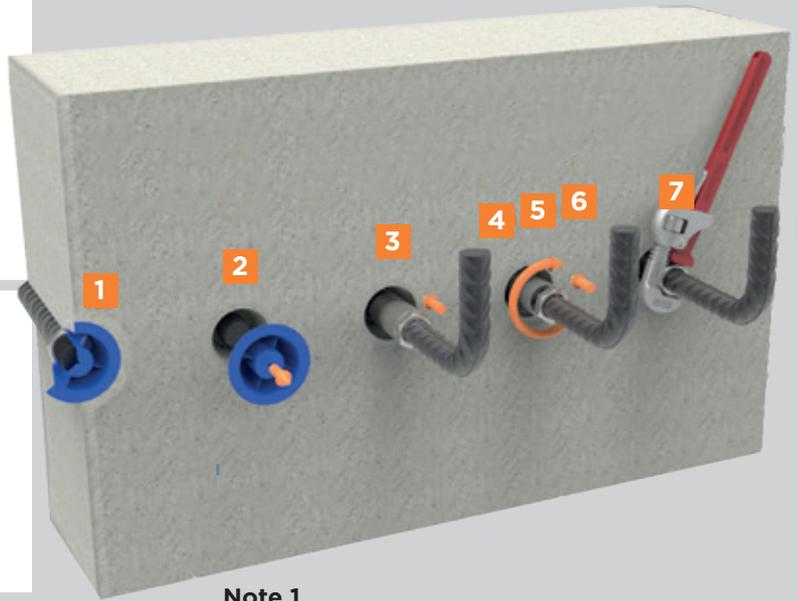
Install 2nd Phase Rebar
Screw the lock nut on to the 2nd phase rebar checking the coupler and lock nut are in contact.



Screw the coupler by hand onto the 1st phase rebar. A wrench may be used to ease operation.



Fix the Coupler and Secure the Splice
Use a wrench to tighten the coupler.

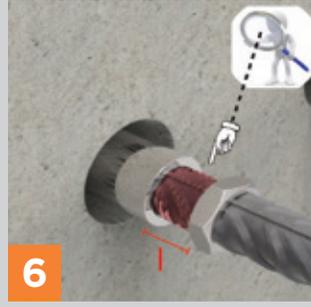


Note 1

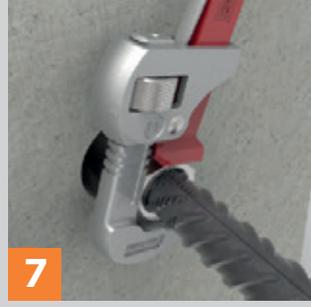
Rebar splices reach their full resistance by hand-screwing at 80% of their total length of engagement.

Note 2

Step 5 now guarantees non slip across the rebar splices.



Check the distance "l" between the coupler and lock nut (still engaged at the bottom of the long thread) it has to fall between the limits indicated in table 3 below.



Set the rebar in the correct position and use a wrench to tighten the lock nut.



25mm Ø rebar and above:
L = 800mm minimum.

Rebar Diameter (mm)	Ø16	Ø20	Ø26	Ø32	Ø40
l min (mm)	22	27	33	39	48
l max (mm)	28	33	40	48	58

Table 3

5 Safety Considerations

Linxion DYN Standard (LS) and Positional (LCE) couplers are generally supplied in robust cardboard cartons. Containers weighing up to 25kg may be handled manually with care. Heavier cases require the use of mechanical handling equipment. Protective gloves should be worn when installing the couplers.

6 Product Testing and Evaluation

Linxion DYN Standard (LS) and Positional (LCE) parallel threaded mechanical 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 for DYN Standard (LS) couplers and Grade B500B only for Positional (LCE) couplers. The testing comprised the following elements:

- Tensile Strength
- Permanent Deformation
- Resistance to fatigue

The products are subject to a programme of periodic testing to ensure that they remain within the performance limits of this technical approval.

7 Quality Assurance

Linxion DYN Standard (LS) and Positional (LCE) parallel threaded mechanical couplers are produced under an ISO9001 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.



8 Building Regulations

8.1 The Building Regulations (England and Wales)

Structure, Approved Document A

Linxion DYN Standard (LS) and Positional (LCE) parallel threaded mechanical 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 DYN Standard (LS) and Positional (LCE) parallel threaded mechanical 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 DYN Standard (LS) and Positional (LCE) parallel threaded mechanical 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 DYN Standard (LS) and Positional (LCE) parallel threaded mechanical couplers comply with the material requirements of EC2 by virtue of *Clause 0.8*.

Structure

Linxion DYN Standard (LS) and Positional (LCE) parallel threaded mechanical 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-B; Quality and Operations Schedule for the Technical Approval of Couplers for Reinforcing Steel and Reinforcement Anchors For BS8110 and EN1992-1-1 Applications for Static Loading in Tension or Tension and Compression.
- 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.



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 provided 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 etc 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 5084. Confirmation that this technical approval is current can be obtained from CARES.

Linxion Coupler Applications



Linxion couplers in diaphragm wall.



Linxion couplers in invert.



Linxion couplers in invert.



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