

# CARES Technical Approval Report TA1-C 5080

Issue 2



Dextra



**Dextra  
Unitec Couplers**

Assessment of the  
Dextra Unitec  
Coupler Product  
and Quality System  
for Production



# Product

## Dextra Unitec Couplers for reinforcing steel

### Product approval held by:

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## 1 Product Summary

Dextra Unitec 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 B500C as detailed in table 1.

### 1.1 Scope of Application

Dextra Unitec Couplers in the size range 16mm - 40mm have been evaluated for use as follows:

- Static tension and compression applications in accordance with CARES TA1-C, Sellafield Specification for couplers for Type B mechanical splices using grade B500C reinforcement.
- BS8110 for static use in tension and compression.

### 1.2 Design Considerations

BS8110 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, BS8110 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 UK CARES that Dextra Unitec Couplers in the size range 16mm - 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  
July 2021



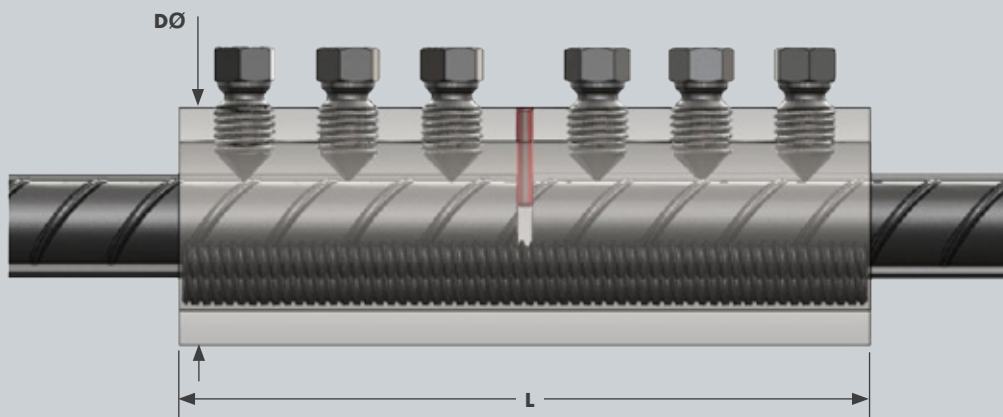
## 2 Technical Specification

The function of Dextra Unitec Couplers is to connect deformed steel reinforcing bars complying with BS 4449 grade B500C and thereby create structural continuity of the reinforcing system.

### 2.1 Unitec Couplers

Unitec couplers are designed for concrete-embedded bars, repair and retrofit works, and bent bars. Preparation of the reinforcing bar end is not needed. The Unitec coupler can be installed on site with a standard wrench. (Larger sizes need a power tool). Proper installation has been achieved once the bolt heads have sheared off.

#### Unitec Coupler



Size mm	Art No	D (mm)	L (mm)	Shear bolts Size	Quantity	Weight (kg)	Sellafield Coupler Class	Tension/Compression Slip
16	FPUS0500002	48	140	M12	6	1.6	B	B500C
20	FPUS0700002	58.5	180	M16	6	2.8	B	B500C
25	FPUS0800002	62	240	M16	8	3.8	B	B500C
32	FPUS1000002	82.5	280	M20	8	8.5	B	B500C
40	FPUS1200002	95.2	425	M20	12	15.4	B	B500C

Table 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-C when used with reinforcing bars to BS4449 grade B500C.

#### CARES APPENDIX TA1-C

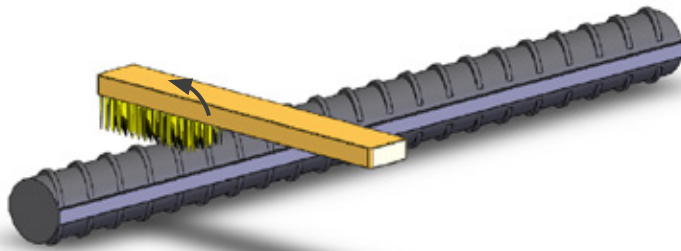
- Permanent deformation is less than 0.10mm after loading at  $0.65f_y$  in tension - compression (see table 1 for details)
- Tensile strength is greater than  $1.15 \times R_{e,act}$  and less than  $1.35 \times R_{e,act}$  and greater than the load required to produce 2% strain in the reference bar
- Cyclic loading at 100 cycles between 5% and 90%  $f_y$
- Reduced temperature performance at  $-7^\circ\text{C}$
- Class B failure occurring inside the splice length





## 4 Installation

1



The reinforcing bar shall be free of any excessive dirt, concrete slurry, rust, etc. that may affect product performance.

2

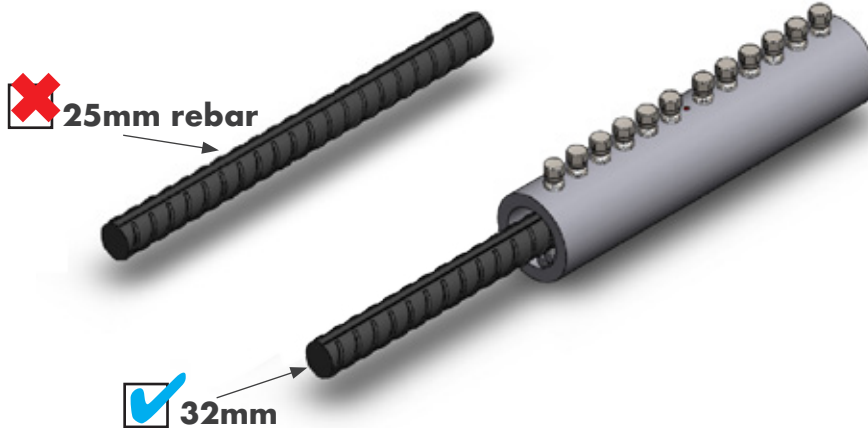


Rebar Size	16	20	25	32	40
Maximum shear cut diameter	18	24	27	37	46

Table 2

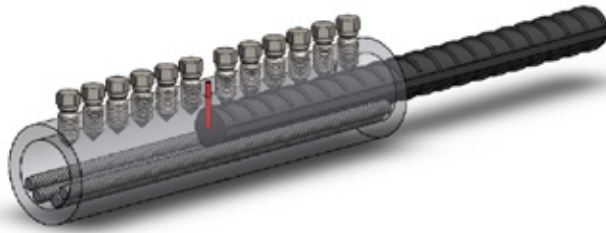
Maximum shear cut diameter shall not exceed the limit in table 2.

3



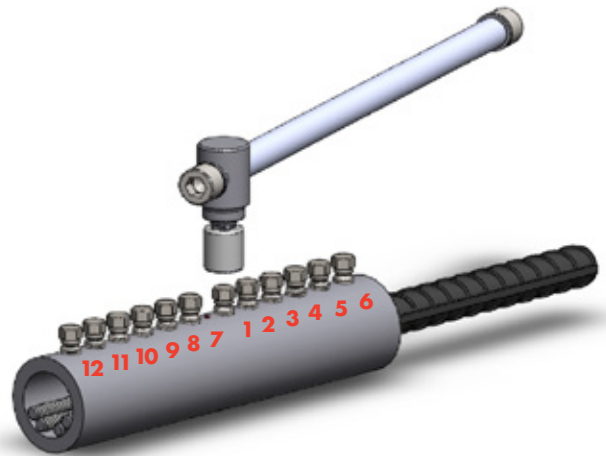
Ensure the Unitec coupler which can be found in the product datasheet is sized properly for the bars being spliced.

4



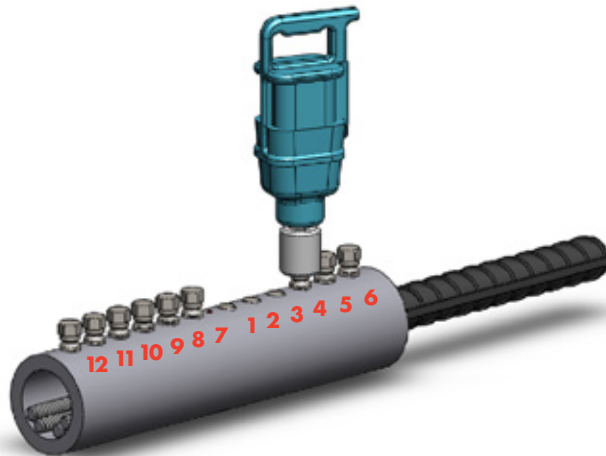
Insert the Unitec coupler over the end of the first bar until contact with the centre pin.

5



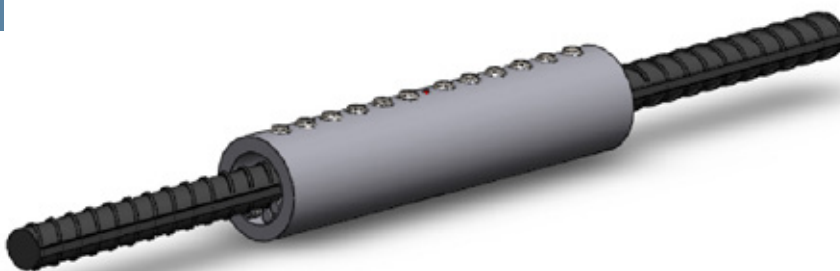
Hand tighten the bolts from centre to outside (1 to 12) with a wrench to pre-position the coupler.

6



Tighten the bolts, from centre to outside (1 to 12), with a hand wrench or power drive (pneumatic wrench) until the heads of the screws shear off.

7



Repeat the same sequence on the other side.



## 5 Safety Considerations

Couplers are supplied in wooden containers which have a maximum weight of 1000 kg and must be handled with appropriate lifting equipment. It is advisable to wear protective gloves during handling the containers, couplers and reinforcement; during coupler installation.

## 6 Product Testing and Evaluation

Dextra Unitec Couplers have been tested to satisfy the requirements of CARES Appendix TA1-C for Couplers with reinforcing bars to BS4449 grade B500C as detailed in table 1. The testing comprised the following elements:

- Tensile Strength.
- Permanent deformation in tension and compression as detailed in table 1.
- Cyclical loading.
- Strain.
- Mode of failure.
- Low temperature testing at -7°C was included.

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

## 7 Quality Assurance

Dextra Unitec Couplers are produced under an 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.



## 8 Building Regulations

### 8.1 The Building Regulations (England and Wales)

#### Structure, Approved Document A

Dextra Unitec 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 Dextra Unitec 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 Unitec 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 Unitec Couplers comply with the material requirements of EC2 by virtue of *Clause 0.8.*

#### Structure

Dextra Unitec 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-C: Quality and Operations Schedule for the Technical Approval of Tension Couplers for Reinforcing Steel for Sellafield Standard Applications.
- Sellafield ES\_0\_3100\_2 Mechanical Splices and Anchors - Manufacturing, installation and construction.

## 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 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 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 5080. Confirmation that this technical approval is current can be obtained from UK CARES.





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