

CARES Technical Approval Report TA1-B&C 5071



Issue 2



Dextra

DEXTRA Headed Bar

Assessment of the
Dextra PC Headed Bar
(9A and 9D) Product
and Quality System
for Production



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 TECHNICAL APPROVAL 5071	 0002	 Validate with the CARES Cloud App
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Product

Dextra PC Headed Bars (9A and 9D) for the anchorage of steel reinforcing bars

Product approval held by:

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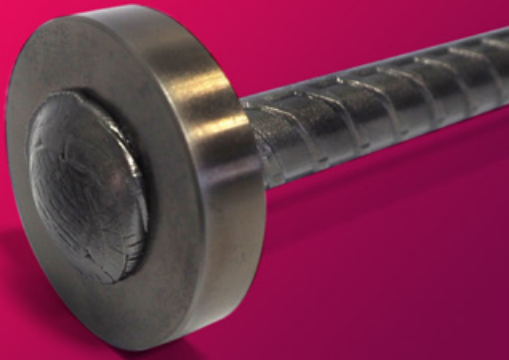
1 Product Summary

Dextra PC Headed Bars (9A and 9D) in the size range 10mm - 20mm are for the anchorage of steel reinforcing bars complying with the requirements of BS4449 grade B500C.

1.1 Scope of Application

Dextra PC Headed Bars (9A and 9D) in the size range 10mm to 20mm have been evaluated for use as follows:

- a) TA1-B: Eurocode 2 and BS 8110 for static applications in tension only with BS4449 Grade B500C reinforcement.
- b) BS8597:2015 for mechanical splices in reinforced concrete structures under predominantly static loads in tension only using BS4449 Grade B500C reinforcement.
- c) Static tension applications in accordance with Type A Sellafield Ltd Specification for Couplers and Anchors and CARES TA1-C using B500C reinforcement only.



1.2 Design Considerations

Eurocode 2, Clause 8.4 Anchorage of longitudinal reinforcement requires:

8.4.1 General (1)P Reinforcing bars, wires or welded mesh fabrics shall be so anchored that the bond forces are safely transmitted to the concrete avoiding longitudinal cracking or spalling. Transverse reinforcement shall be provided if necessary.

8.4.1 (5) (5) Where mechanical devices are used the test requirements should be in accordance with the relevant product standard or a European Technical Approval.

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 Dextra PC Headed Bars (9A and 9D) in the size range 10mm - 20mm size range 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



2 Technical Specification

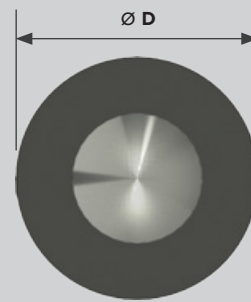
2.1 General

The function of Dextra PC Headed Bars (9A and 9D range) is to provide an alternative to bends, hooks and loops for the anchorage of steel reinforcing bars complying with BS4449 grade B500C. The difference of these two models is that the (9A) Headed Bar has chamfer side on the plate which allows only one side of the plate to be assembled, whilst the (9D) Headed Bar provides chamfers on both sides of plate which allows assembly with rebars without checking the side of the plate during assembly.

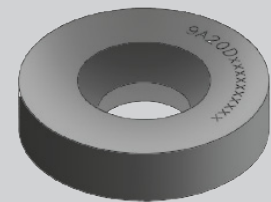
2.2 Dextra PC Headed Bar Range (9A)

The Dextra PC Headed Bar (9A) comprises a circular plate fixed to the end of the reinforcing bar by forging. They are designed to exceed the full tensile strength of the rebar and can therefore be used without any rebar bond contribution. The diameter of the plate is such that its gross surface is at least ten times the specified cross-section area of the reinforcing bar. Its net bearing area is therefore at least nine times the specified cross-section area of the reinforcing bar.

Dextra PC Headed Bar (9A)



Single Chamfer Plate (PC Headed Bar 9A)



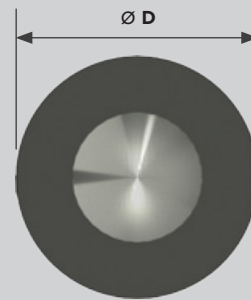
Bar size (mm)	Art No	Head size Ø D (mm)	Head thickness T (mm)	Bar cross section area (mm ²)	Head bearing surface area (mm ²)		Head bearing area to bar cross section ratio	
					net	gross	net	gross
10	FPHF1000001	34	9	78.5	829	908	>9	>10
12	FPHF1200001	40	11	113	1,144	1,257	>9	>10
16	FPHF1600001	52	16	201	1,923	2,124	>9	>10
20	FPHF2000001	65	20	314	3,004	3,318	>9	>10

Table 1

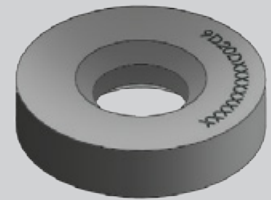
2.3 Dextra PC Headed Bar Range (9D)

The Dextra PC Headed Bar (9D) comprises a circular plate fixed to the end of the reinforcing bar by forging. They are designed to exceed the full tensile strength of the rebar and can therefore be used without any rebar bond contribution. Headed bar range (9D) provide more convenient assembly regardless of the side of plate. The diameter of the plate is such that its gross surface area is at least ten times the specified cross-section area of the reinforcing bar. Its net bearing area is therefore at least nine times the specified cross-section area of the reinforcing bar.

Dextra PC Headed Bar (9D)



Double Chamfer Plate (PC Headed Bar 9D)



Bar size (mm)	Art No	Head size Ø D (mm)	Head thickness T (mm)	Bar cross section area (mm ²)	Head bearing surface area (mm ²)		Head bearing area to bar cross section ratio	
					net	gross	net	gross
10	FPHF1000003	34	9	78.5	829	908	>9	>10
12	FPHF1200003	40	11	113	1,144	1,257	>9	>10
16	FPHF1600003	52	16	201	1,923	2,124	>9	>10
20	FPHF2000003	65	20	314	3,004	3,318	>9	>10

Table 2

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3 Product Performance and Characteristics

Full destructive tests have been carried out to demonstrate compliance with performance requirements defined in CARES Appendix TA1-B and TA1-C when used with reinforcing bars to BS4449 Grade B500C:

BS 8597:2015 requirements for slip and tensile strength

Tests verify compliance with Clause 5 of BS 8597:2015 for the following:

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

CARES APPENDIX TA1-B strength requirements

- Permanent elongation is less than 0.10mm after loading to $0.65f_y$ in tension.
- 99% characteristic tensile strength is greater than 575MPa with B500C reinforcing.

CARES APPENDIX TA1-C strength requirements

- Permanent deformation is less than 0.10mm at $0.65f_y$ in tension-compression (see table 1).
- 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 bars.
- Cyclic loading of 100 cycles between 5% and 90% f_y .
- Reduced temperature performance at -7°C .
- Bar break mode of failure (for Type A splices only).

4 Installation

Dextra PC Headed Bars (9A and 9D range) can be forged to one or both ends of the rebar. Heads at both ends can be used as shear studs, see figure 1.

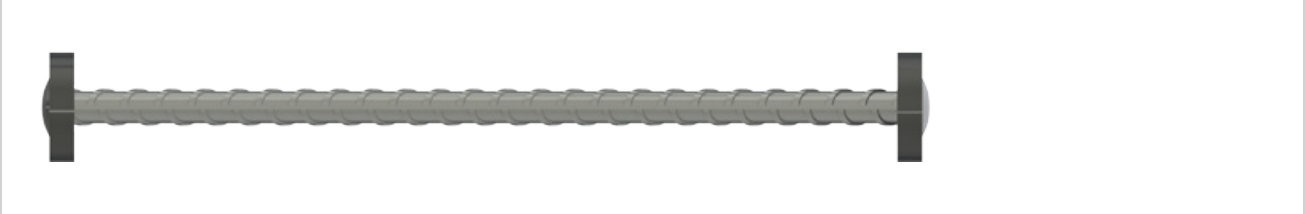
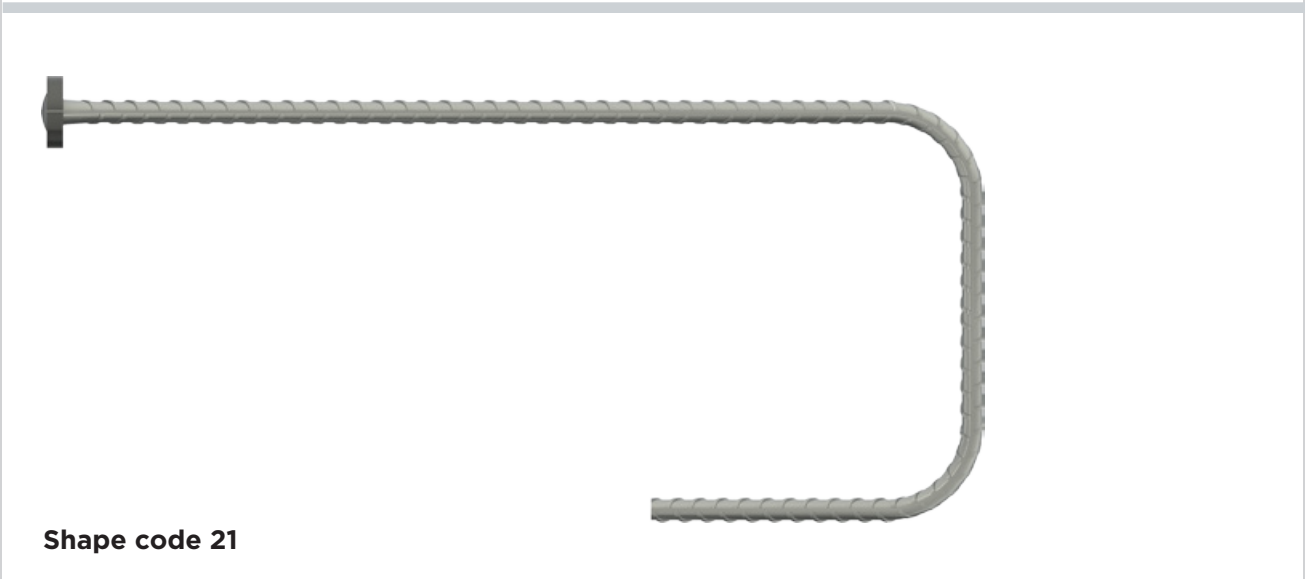


Figure 1

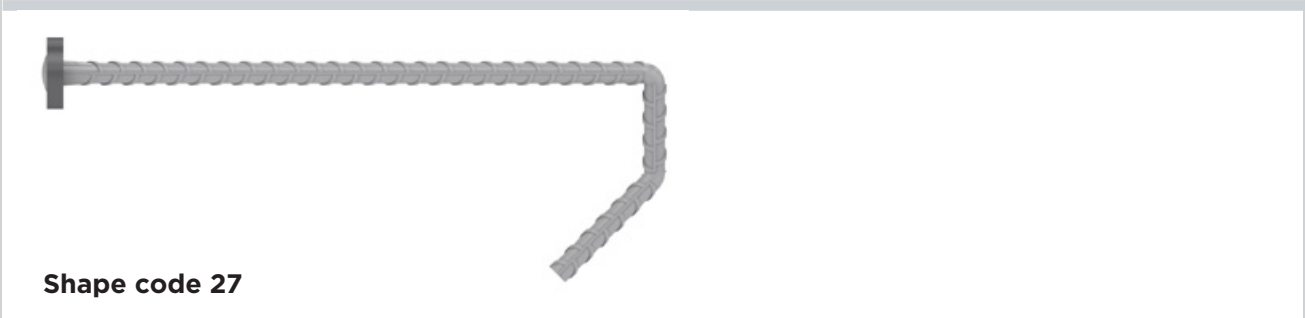
Alternatively, with a head at one end, the rebar can be bent to a standard shape, see figure 2, as per BS 8666 for example:



Shape code 13



Shape code 21



Shape code 27

Figure 2

Installation can be done with the head either up or down, see figure 3:

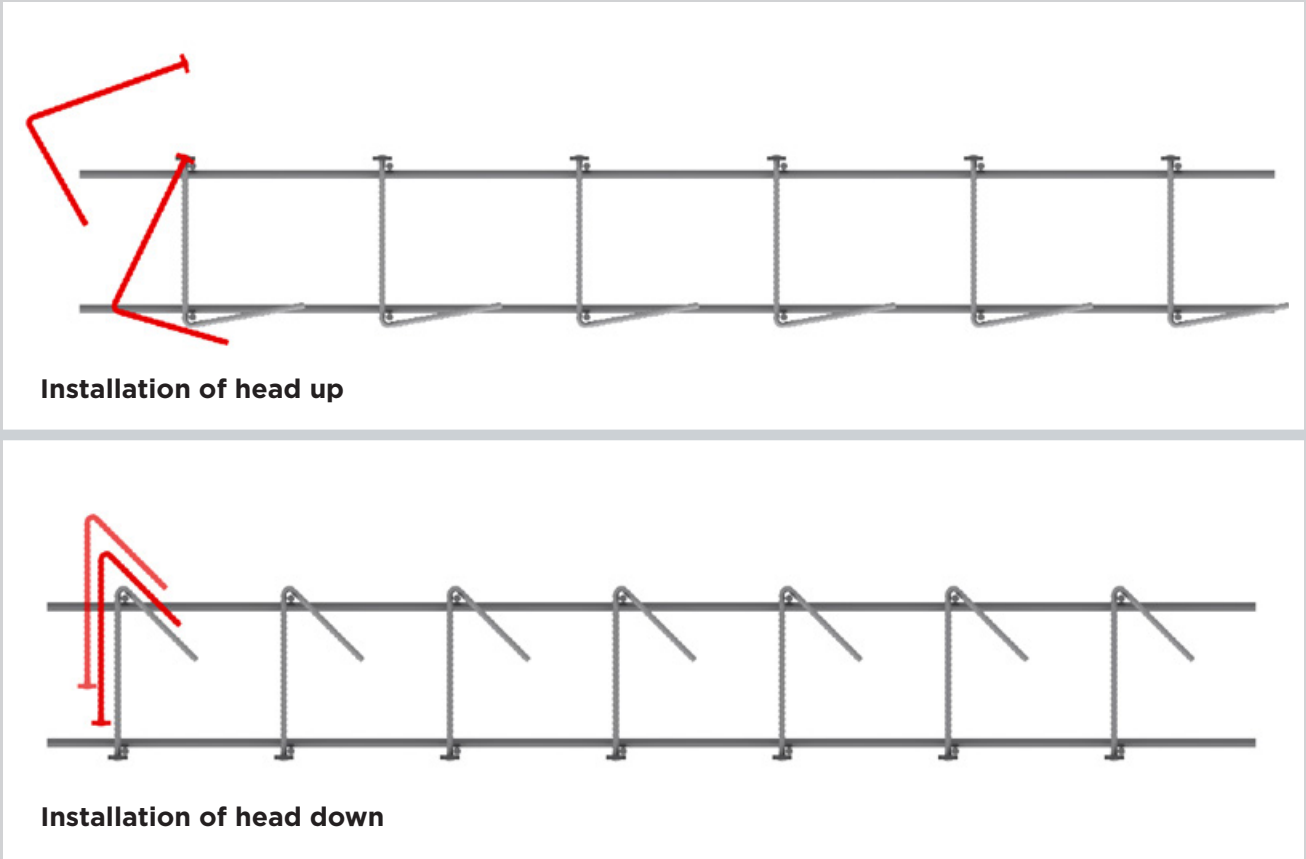


Figure 3

5 Safety Considerations

Plates are supplied in wooden containers which have a maximum weight of 500 kg and must be handled with appropriate lifting equipment. It is advisable to wear protective gloves during handling the containers, plates and reinforcement; during the forging process and during site installation.

6 Product Testing and Evaluation

Dextra PC Headed Bars (9A and 9D range) have been tested to satisfy the requirements of CARES Appendix TA1-B, TA1-C and the Sellafield Specification for Headed Bars with reinforcing bars to BS4449 Grade B500C. The testing comprised the following elements:

- Tensile Strength*
- Permanent Deformation*
- Cyclic Loading
- Strain
- Mode of failure*
- Low temperature testing at -7°C was included

*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

Dextra PC Headed Bars (9A and 9D range) are produced under an EN ISO 9001 quality management system certified by CARES at locations agreed with CARES.

The quality management system scheme monitors the production of the Headed Bars 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 Building Regulations

8.1 The Building Regulations (England and Wales)

Structure, Approved Document A

Dextra PC Headed Bars (9A and 9D range), 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 PC Headed Bars (9A and 9D range) comply with the material requirements of EC2.

8.2 The Building Regulations (Northern Ireland)

Materials and Workmanship

This technical approval gives assurance that Dextra PC Headed Bars (9A and 9D range) 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 PC Headed Bars (9A and 9D range) comply with the material requirements of EC2 by virtue of *Clause 0.8*.

Structure

Dextra PC Headed Bars (9A and 9D range), 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.
- BS8110: Part 1: 1997: Structural Use of Concrete , Code of Practice for Design & Construction.
- BS 8597:2015 Steels for the reinforcement of concrete - Reinforcement couplers - Requirements and test methods.
- 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 Static Loading in Tension or Tension and Compression.
- 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_3110_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 5071. Confirmation that this technical approval is current can be obtained from CARES.



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