

CARES Technical Approval Report TA1-B&C 5031

Issue 3



HY-TEN
REINFORCEMENT

Hy-Ten
HT(S) Welded Couplers

Assessment of the
Hy-Ten HT(S) Welded
Coupler Product and
Quality System for
Production



5031



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."

The specified cover for fire resistance and durability should be provided to the coupler sleeve.

1.3 Conclusion

It is the opinion of CARES that Hy-Ten HT(S) Welded Couplers are satisfactory for use within the limits stated in paragraph 1.1 clause a) and b) respectively when applied and used in accordance with the manufacturer's instructions and the requirements of this certificate.

B. Bowsher
Chief Executive Officer

October 2012



2 Technical Specification

2.1 General

The function of HT(S) Welded Couplers is to connect deformed steel reinforcing bars complying with BS 4449 Grade B500B and B500C for TA1-B application and B500C for TA1-C applications and thereby create structural continuity of the reinforcing system.

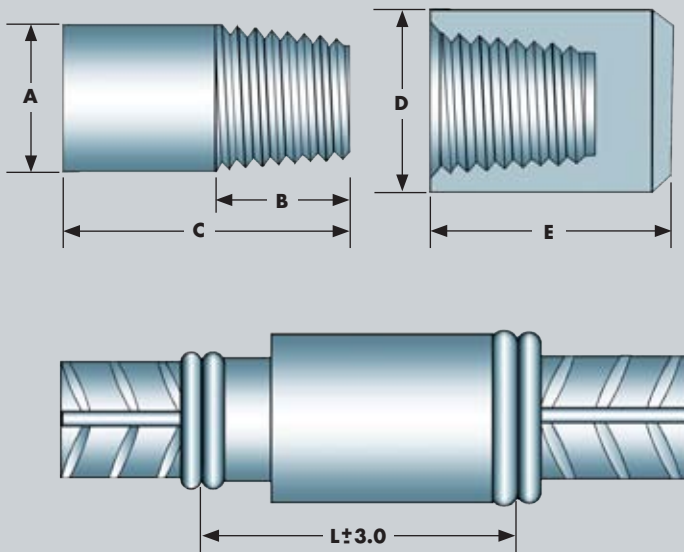
2.2 HT(S) Welded and Transitional Welded Couplers

The HT(S) Welded Coupler is a system providing a mechanical connection of deformed Grade B500B and B500C as defined high yield carbon steel bars for the reinforcement of concrete, complying with the tensile properties of BS4449.

HT(S) transitional couplers enables re-bar of varying diameters, to be effectively and rapidly coupled.

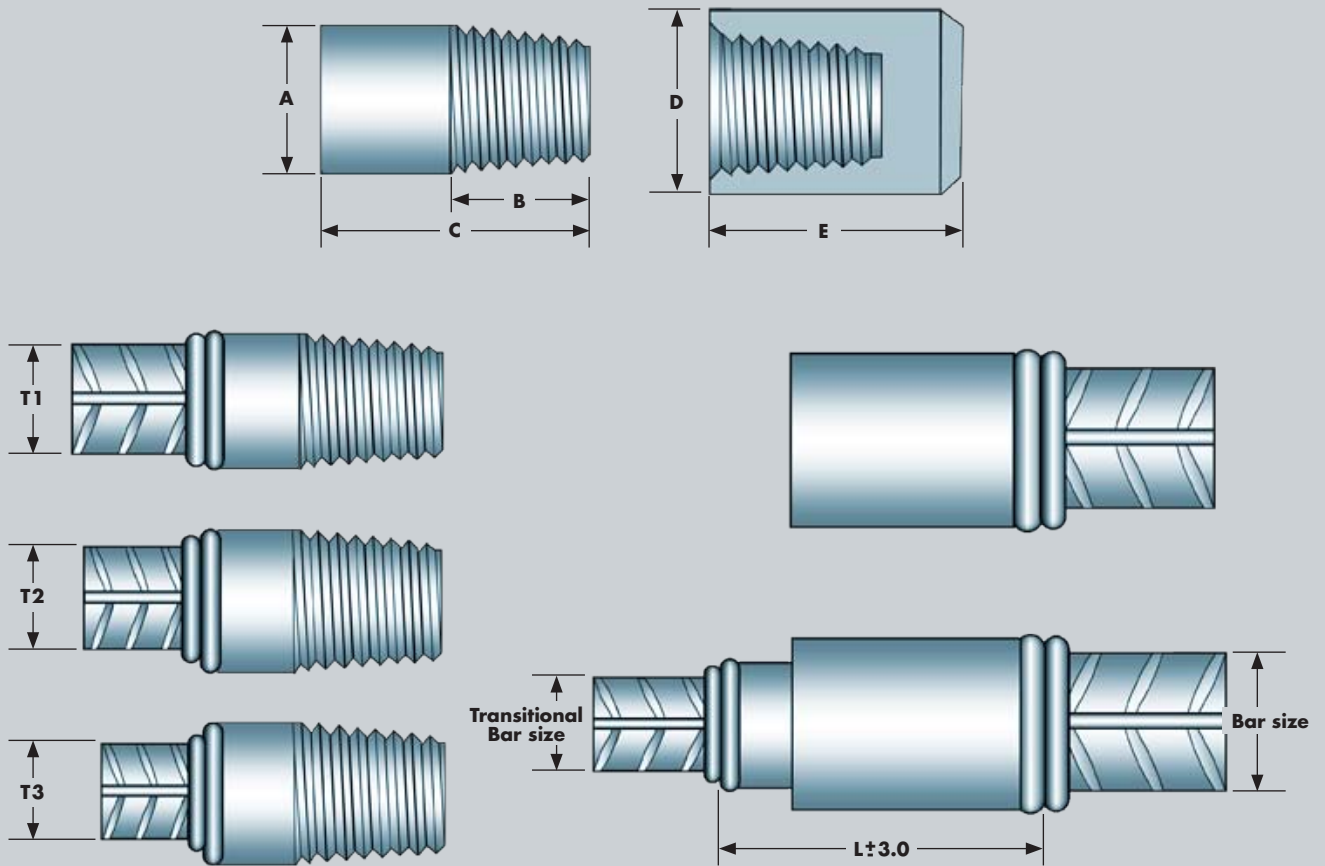
The table shown on page 4 refers to the diameters which can be transitionally coupled, the system is CARES approved for transitional joints from 50mm to 16mm in standard, S type.

HT(S) Welded Coupler



Coupler Ref	Bar Dia	A	B	C	D	E	L	TA1-B/ B500B	TA1-C/TA1-B B500C
HT(S)12	12	13	13	35	18	32	50	✓	✗
HT(S)16	16	16	17	42	22	36	50	✓	✓
HT(S)20	20	19	20	45	25	40	50	✓	✓
HT(S)25	25	25	25	55	34	50	65	✓	✓
HT(S)32	32	32	32	63	42	63	80	✓	✓
HT(S)40	40	40	40	70	53	70	90	✓	✓
HT(S)50	50	50	50	85	65	85	105	✓	✗

HT(S) Transitional Welded Couplers



Coupler Ref	Bar Dia	Transitional Bar Dia			A	B	C	D	E	L	TA1-B/ B500B	TA1-B/ B500C
		T1	T2	T3								
HT(S)16	16	12	-	-	16	17	42	22	36	50	✓	✗
HT(S)20	20	16	12	-	19	20	45	25	40	50	✓	✓
HT(S)25	25	20	16	12	25	25	55	34	50	65	✓	✓
HT(S)32	32	25	20	16	32	32	63	42	63	80	✓	✓
HT(S)40	40	32	25	20	40	40	70	53	70	90	✓	✓
HT(S)50	50	40	32	25	50	50	85	65	85	105	✓	✗

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3 Product Performance and Characteristics

3.1 Material Properties

Full destructive tests have been carried out to demonstrate compliance with the performance requirements defined in CARES Appendix TA1-B and TA1-C when used with reinforcing bars to BS4449 Grade B500B and B500C respectively:

CARES APPENDIX TA1-B strength requirements

- Permanent deformation is less than 0.10mm after loading to $0.65f_{yk}$ in tension or compression with grade B500B reinforcement.
- 99% characteristic tensile strength is greater than 540 MPa with grade B500B reinforcement.

CARES APPENDIX TA1-C tensile strength requirements for Type A Couplers

- Permanent deformation is less than 0.10mm after loading to $0.65f_{yk}$ in tension for grade B500C reinforcement.
- Tensile strength $\geq 1.15, \leq 1.35 \times$ Actual yield strength ($f_{y,act}$) for B500C reinforcing steel including:
 - low cycle fatigue: 100 cycles @ 5%-90% f_{yk}
 - and cold soak at -7°C for 24 hours
 - and a bar break mode of failure

4 Installation

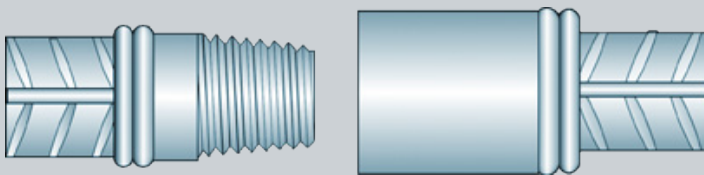
The HT(S) coupler is always delivered to site welded to the appropriate re-bar. The formation of the joint is achieved by screwing the two sections together, ie male and female elements.

The joint should always be tightened by the use of a wrench, until there is no further movement available between the two sections.

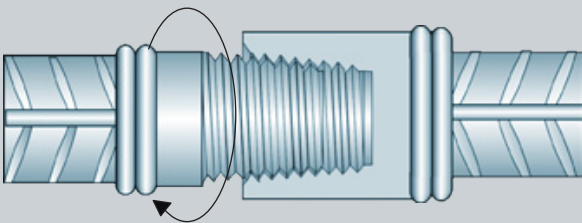


HT(S) Coupler Machine

Coupler Installation



1 The two sections of the joint are brought together



2 The joint is then screwed together using a wrench



3 Finished joint tightened with a wrench until no further movement between sections

5 Safety Considerations

The friction welding of the couplers is done at the Hy-Ten factory in Liverpool. The couplers are delivered to the factory, packaged in 20kg boxes. A full risk assessment has been undertaken by Hy-Ten for this manufacturing process.

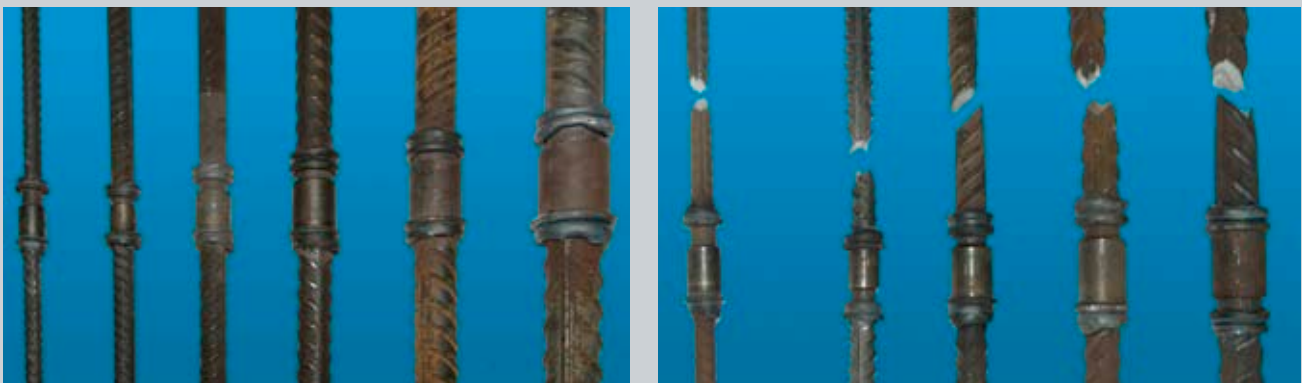
On site, the usual safety precautions should be followed when handling re-bar and the use of gloves and other relevant PPE is always advised.

6 Product Testing and Evaluation

HT(S) Welded Couplers have been tested to satisfy the requirements of CARES Appendix TA1-B for Couplers with reinforcing bars to BS4449 Grade B500B and Appendix TA1-C for couplers with reinforcing bars to BS4449 Grade B500C. The testing comprised the following elements:

- Tensile Strength
- Permanent Deformation
- Low cycle fatigue (TA1-C)
- Cold Soak (TA1-C)

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

HT(S) Welded 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

Eurocodes

BS8110 was withdrawn in April 2010 after its coexistence period with Eurocode 2 ended. Although not yet formally endorsed by the Secretary of State it is anticipated that under building regulations Eurocode 2 when used in conjunction with the national annex will be accepted in lieu of BS8110.

8.1 The Building Regulations (England and Wales)

Structure, Approved Document A

HT(S) Welded Couplers, when used in BS8110 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, to support regulation 7

This technical approval gives assurance that the HT(S) Welded Couplers comply with the material requirements of BS8110.

8.2 The Building Regulations (Northern Ireland)

Part B, Materials and Workmanship

This technical approval gives assurance that HT(S) Welded Couplers comply with the material requirements of BS8110 by virtue of regulation *B3, Deemed to satisfy provisions regarding the fitness of materials and workmanship.*

8.3 The Building Standards (Scotland) Regulations

Part B, Fitness of Materials

This technical approval gives assurance that HT(S) Welded Couplers comply with the material requirements of BS8110 by virtue of *Clause B2.1.*

Part C, Structure

HT(S) Welded Couplers, when used in BS8110 based designs using the data contained within this technical approval, satisfy the requirements of *The Building Standards (Scotland) Regulations 1990, Part C, C2.1 clause b. construction,ii.*



9 References

- BS 4449: 2005: Steel for the reinforcement of concrete - Weldable reinforcing steel - Bar, coil and decoiled product - Specification.
- BS8110: Part 1: 1997 (Revised 2005): Structural Use of Concrete, Code of Practice for Design and Construction.
- BS EN ISO 9001: 2008: Quality management systems - Requirements.
- CARES Appendix TA1-B; Quality and Operations Schedule for the Technical Approval of Couplers for Reinforcing Steel For BS8110 and EN1992-1-1 Applications for Static Loading in Tension or Tension and Compression.
- BS EN 1992-1-1:2004 Eurocode 2 Design of concrete structures - General rules for buildings.
- TA1-C Quality and Operations Schedule for the Technical Approval of Tension Couplers and Reinforcement Anchors for Reinforcing Steel for Sellafield Ltd Standard Applications.
- Sellafield Ltd Technical Standard: A.0391_1: Mechanical Splices and Anchors to Reinforcement for Concrete.

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 and method of manufacture 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 Hy-Ten 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 5031. Confirmation that this technical approval is current can be obtained from UK CARES.





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