

CARES Technical Approval Report TA1-B 5060

Issue 2



HY-TEN
REINFORCEMENT

HY-TEN
HT.B Mechanical Coupler

Assessment of the
HY-TEN HT.B
Mechanical Coupler
Product and Quality
System for Production



Product

HY-TEN HT.B
mechanical coupler
for reinforcing steel

Product approval held by:

HY-TEN Limited,
Bridle Road,
Bootle,
Merseyside
L30 4UG
United Kingdom

1 Product Summary

HY-TEN HT.B mechanical couplers in the size range 12mm - 32mm 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 & B500C as shown in table 1.

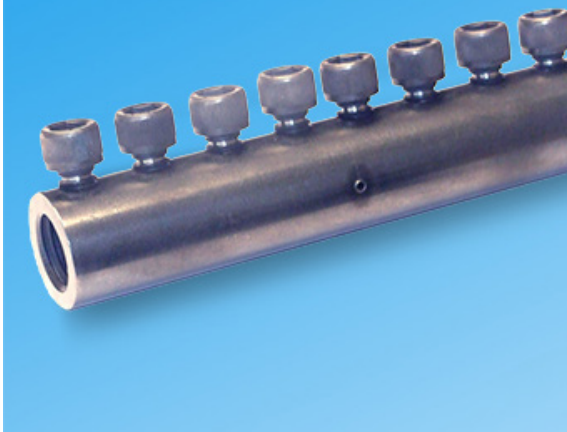
1.1 Scope of Application

HY-TEN HT.B mechanical couplers in the size range 12mm - 32mm have been evaluated for use as follows:

- a) 12mm to 32mm HY-TEN HT.B mechanical couplers for static Eurocode 2, EN1992 and BS 8110 applications in tension only in accordance with CARES Appendix TA1-B, using BS4449 Grade B500B and Grade B500C reinforcement only.

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 BS4449 Grade B500B and Grade B500C.

1.3 Conclusion

It is the opinion of CARES that HY-TEN HT.B mechanical 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.

L. Brankley
Chief Executive Officer

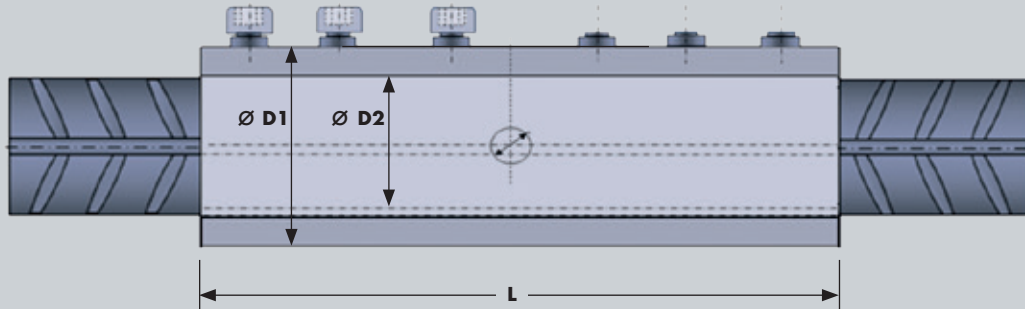
January 2020



2 Technical Specification

The function of HY-TEN HT.B coupler is to connect deformed steel reinforcing bars complying with BS4449 grades B500B and B500C as appropriate and thereby create structural continuity of the reinforcing system.

HY-TEN HT.B Coupler



Rebar Designation (mm)	Coupler Ref	Length L (mm)	Outside Diameter D1 (mm)	Inside Diameter D2 (mm)	Weight (kg)	Socket Size (mm)	Average Torque all Bolts (Nm)	Number of Bolts	TA1-B B500B and B500C
12	HT.B12	140	28	14	0.54	16/8	101	6	✓
16	HT.B16	160	32	19	0.75	18/10	114	6	✓
20	HT.B20	190	40	24	1.3	18/10	141	8	✓
25	HT.B25	250	48	29	2.5	24/14	345	8	✓
32	HT.B32	330	65	39	6.6	30/17	796	10	✓

Table 1

3 Product Performance and Characteristics

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

CARES APPENDIX TA1-B

- Permanent deformation is less than 0.10mm after loading to $0.65f_y$ in tension for grade B500B and B500C reinforcement
- 99% characteristic tensile strength is greater than 540 MPa for Grade B500B material and 575 MPa for grade B500C reinforcement.

4 Installation

HY-TEN HT.B, an in-situ rebar splice, requires no bar-end preparation, sawing or swaging. It can be used for new construction, repair, or retrofit applications. This mechanical rebar splice is designed for use in reinforced concrete applications such as column splicing, bridge applications, piling, splicing to protruding dowels cast in concrete and beams.

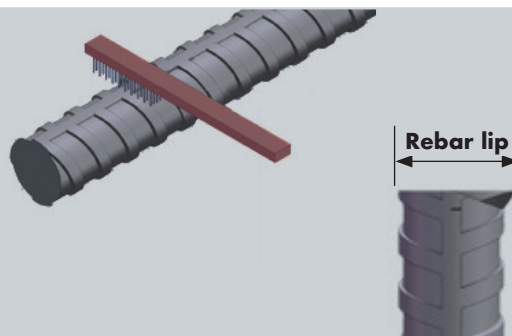
The couplers can be installed with a standard wrench, electric or pneumatic power tool. The bolt heads will shear off when proper installation tightness has been reached, which allows for complete visual inspection. The dimensions are in Table 1.



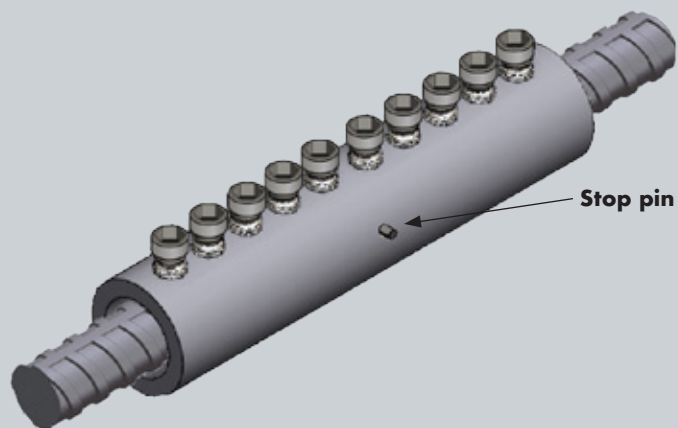
HY-TEN HT.B coupler installation

1. Ensure the HY-TEN HT.B coupler is installed correctly to achieve the full working capacity. The coupler should be complete with all the number of bolts and the screw in place inside the coupler. In order to have correct installation, all the bolts must be tightened until the heads shear off.

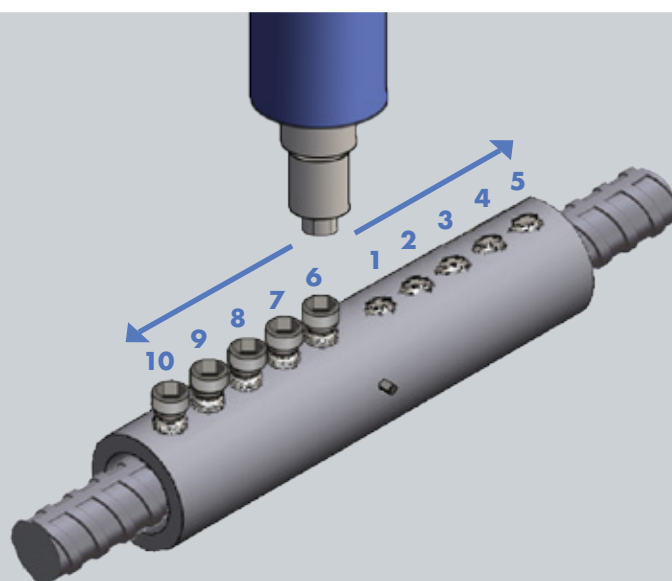
2. Ensure the rebar is free of any excessive dirt, concrete slurry, rust etc. which may affect product performance. Ensure maximum rebar lip does not exceed the inner diameter of coupler in table 1. Excessive shear lip interferes with rebar installation.



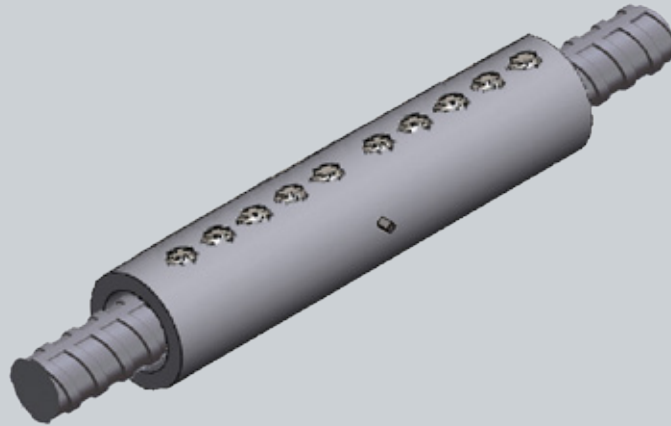
3. Place rebar into HY-TEN HT.B coupler until contact is made with the centre stop pin. Rebar must be flush against centre stop pin. Tighten the lock shear bolts partly using the appropriate tool. Insert another rebar into the coupler until contact is made with the centre stop pin. Tighten the remaining lock shear bolts. Checking the alignment and make any necessary adjustments.



4. Tighten the bolts until the bolts shear off using either a standard ratchet wrench, electric or pneumatic power tool. Do not use impact power tools. Starting from the centre of the coupler and working to the outside (1 to 10), towards the end of the coupler.

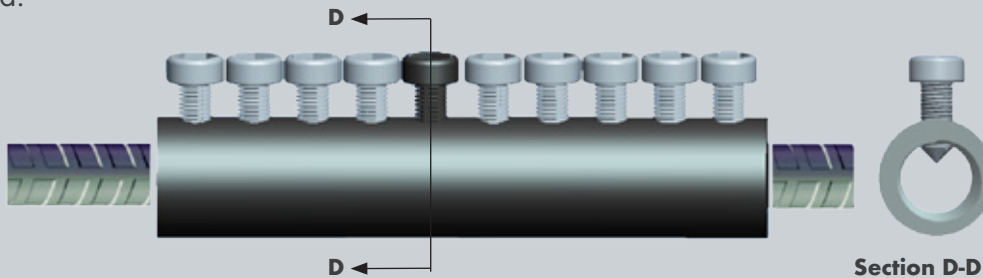


5. The installation will be completed after all bolts are sheared off.



6. If bolt heads does not shear off, the torque value should be verified between the appropriate torque range to meet the requirement in table 2.

The head can be cut off after maximum torque value has been applied, if a minimum cover limit is requested.



Rebar Designation (mm)	Coupler Ref	Coupler Length (mm)	Outside Diameter (mm)	Inside Diameter (mm)	Minimum Torque (Nm)	Average Torque (Nm)	Maximum Torque (Nm)	Number of Bolts
12	HT.B12	140	28	14	86	101	117	6
16	HT.B16	160	32	19	97	114	131	6
20	HT.B20	190	40	24	120	141	162	8
25	HT.B25	250	48	29	294	345	397	8
32	HT.B32	330	65	39	676	796	915	10

Table 2



5 Safety Considerations

HY-TEN HT.B couplers shall be installed and used only as indicated in HY-TEN product instruction sheets and training materials. Instruction sheets are available from your customer service representative.

HY-TEN HT.B couplers may only be used for the purpose for which they were designed.

- All HY-TEN instructions must be followed to ensure proper and safe installation and performance.
- Improper installation, misapplication or other failure to completely follow HY-TEN's instructions and warnings may cause product malfunction, property damage.
- The customer is responsible for:
Conformance to all governing codes.
The integrity of structures to which the products are attached including their capability of safely accepting the loads imposed, as evaluated by a qualified engineer.
- Using appropriate industry standard hardware as noted above.
- All governing codes and regulations and those required by the job site must be observed. Always use appropriate safety equipment such as eye protection, hard hat, and gloves as appropriate to the application.

6 Product Testing and Evaluation

HY-TEN HT.B mechanical couplers have been tested to satisfy the requirements of CARES Appendix TA1-B for Couplers with reinforcing bars to BS4449 Grade B500B and B500C as shown in table 1. The testing comprised the following elements

- Tensile Strength
- Permanent Deformation

7 Quality Assurance

HY-TEN HT.B 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.

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

HY-TEN HT.B 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 HY-TEN HT.B 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 HY-TEN HT.B 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 HY-TEN HT.B mechanical couplers comply with the material requirements of EC2 by virtue of *Clause 0.8*.

Structure

HY-TEN HT.B 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

- BS4449: 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.

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 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 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 5060. Confirmation that this technical approval is current can be obtained from UK CARES.





Electronic Copy www.ukcares.com



UK CARES

Pembroke House
21 Pembroke Road
Sevenoaks
Kent TN13 1XR

Phone: +44(0)1732 450000
E-mail: general@ukcares.com
URL: www.ukcares.com

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