

# CARES Technical Approval Report TA1-A&B 5082



Issue 2

**HY-TEN**  
REINFORCEMENT

## Hy-Ten HT Couplers Standard Type HT.FS and Positional Type HT.FP

Assessment of the  
HY-TEN HT.FS and  
HT.FP Coupler Product  
and Quality System  
for Production



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# Product

## HY-TEN HT.FS and HT.FP couplers for reinforcing steel

### Product approval held by:

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## 1 Product Summary

HY-TEN HT.FS couplers in size range 16mm - 40mm and HT.FP couplers in the size range 16mm - 32mm are for the mechanical connection of deformed high yield carbon steels bars for the reinforcement of concrete complying with the requirements of BS4449 Grades B500B and B500C.

HT Couplers are manufactured by way of an automatic friction forging process which fuses the CNC produced coupler component to the rebar.

### 1.1 Scope of Application

HY-TEN HT.FS couplers in size range 16mm - 40mm and HT.FP couplers in the size range 16mm - 32mm have been evaluated for use as follows:

- a) HT.FS and HT.FP couplers for static Eurocode 2, EN1992 applications in tension only in accordance with CARES Appendix TA1-B in tension only. Using BS4449 Grade B500B and B500C reinforcement only.
- b) HT.FS and HT.FP couplers for static Eurocode 2, EN1992 applications in tension only in accordance with CARES Appendix TA1-A Class D fatigue in tension only. Using BS4449 Grade B500B and 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.”

Additionally clause 8.8 Additional rules for large bars goes on to say “Splitting forces are higher and dowel actions are 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 Standard HT.FS and Positional HT.FP 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.

L. Brankley  
 Chief Executive Officer  
 October 2022

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## 2 Technical Specification

### 2.1 General

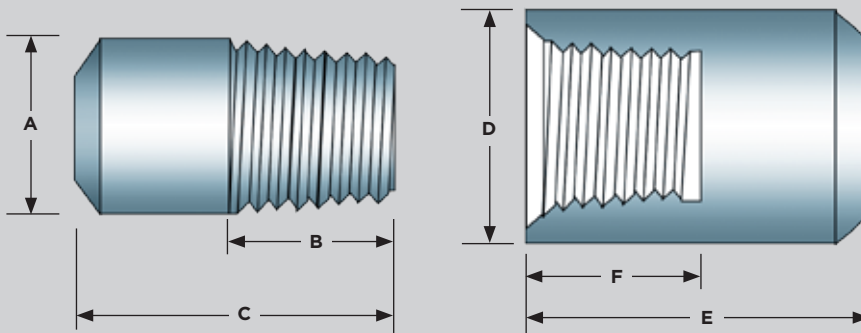
The function of HY-TEN HT.FS and HT.FP couplers is to connect deformed steel reinforcing bars complying with BS4449 grade B500B and B500C for TA1-A and TA1-B applications as defined in tables 1 and 2 and thereby create structural continuity of the reinforcing system. HT Couplers are manufactured by way of an automatic friction forging process which fuses the CNC produced coupler component to the rebar.

HY-TEN HT.FS and HT.FP, an in-situ rebar splice, requires no bar-end preparation, sawing or swaging. It can be used for new construction 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.

### 2.2 HY-TEN HT.FS standard coupler

HT couplers are a system providing a mechanical connection of deformed carbon steel bars for the reinforcement of concrete, complying with the tensile properties of BS4449, which allows for complete visual inspection. The dimensions are in Tables 1 and 2.

#### HY-TEN HT.FS standard couplers

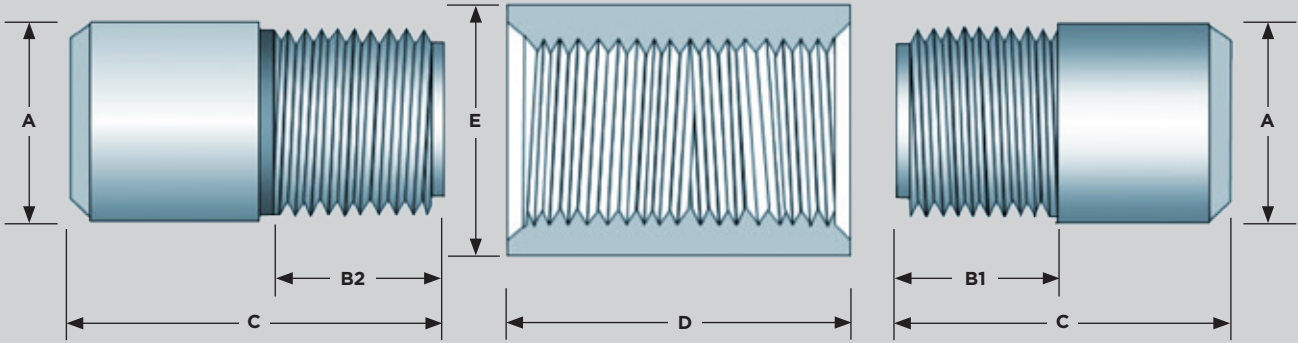


Coupler Ref	Bar Dia (mm)	Coupler Dimensions (mm)						Torque (N-m)	
		A	B	C	D	E	F	Min	Max
HT.FS.20	16	30	23	61	38	50	27	71	85
HT.FS.20	20	30	23	61	38	50	27	71	85
HT.FS.25	25	34	30	69	46	58	34	101	121
HT.FS.32	32	45	36	83	60	70	42	246	296
HT.FS.40	40	60	45	93	80	84	52	448	538

Table 1

## 2.2 HY-TEN HT.FP positional coupler

### HY-TEN HT.FP positional coupler



Coupler Ref	Bar Dia (mm)	Coupler Dimensions (mm)						Torque (N-m)	
		A	B1	B2	C	D	E	Min	Max
HT.FP.20	16	30	17	20	43	33	40	71	85
HT.FP.20	20	30	17	20	43	33	40	71	85
HT.FP.25	25	36	24	27	55	47	50	101	121
HT.FP.32	32	44	29	32	60	55	65	246	296

Table 2

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### 3 Product Performance and Characteristics

Full destructive tests has 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:

#### CARES APPENDIX TA1-A strength requirements

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

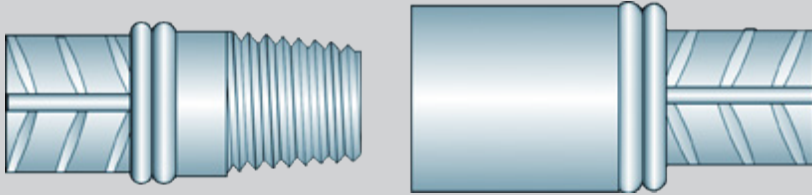
#### CARES APPENDIX TA1-B strength requirements

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

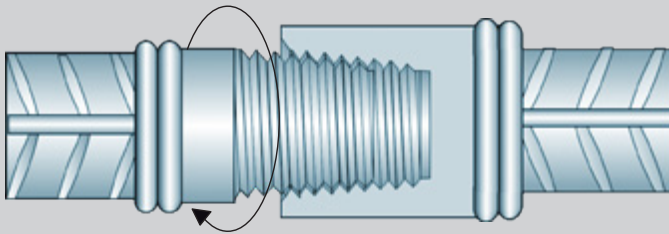
## 4 Installation

### 4.1 HY-TEN HT.FS standard coupler

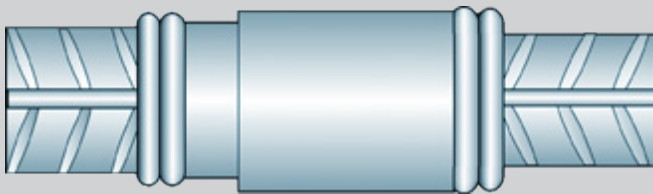
#### Installation instructions



**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 torque wrench until no further movement and torque requirements of table 1 are met.

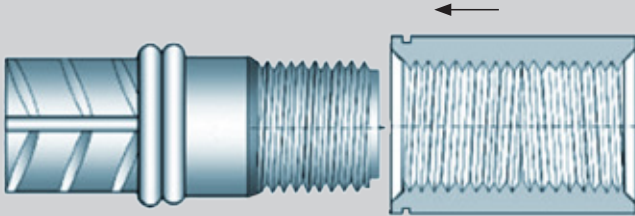
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## 4.2 HY-TEN HT.FP positional coupler

Positional coupler type: HT.FP with left and right screw for un-rotatable but moveable rebar.

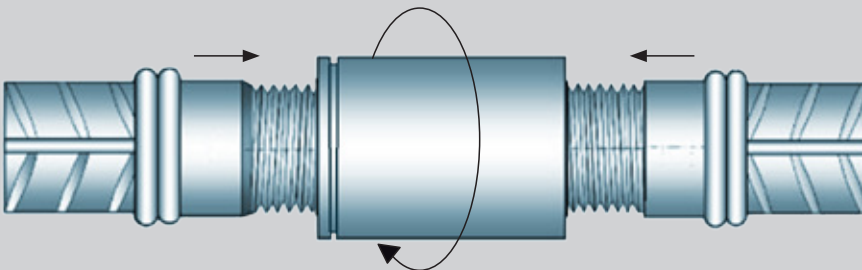
### Installation instructions



- 1 The end of the female coupler with a machined score line should be first introduced to the longer threaded male coupler, which is identified by a wider machined collar.



- 2 The second shorter threaded male coupler should then be introduced to the "inscored" end of the female coupler.



- 3 Both sections are then screwed together by turning the female coupler. The finished joint tightened with a torque wrench until no further movement and torque requirements of table 2 are met. For correct installation and maximum thread cover both ends should meet in the middle of the female coupler.



- 4 The finished correct installation is achieved when no threads are showing and only part of the machined bevel on the large threaded coupler is visible.



## 5 Safety Considerations

HY-TEN HT.FS and HT.FP 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.FS and HT.FP 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.
- 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.FS and HT.FP 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. The testing comprised the following elements

- Tensile Strength
- Permanent Deformation
- Resistance to fatigue
- Low cycle fatigue
- High cycle 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

HY-TEN HT.FS and HT.FP 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

HY-TEN HT.FS and HT.FP 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.FS and HT.FP 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.FS and HT.FP 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.FS and HT.FP couplers comply with the material requirements of EC2 by virtue of *Clause 0.8*.

#### Structure

HY-TEN HT.FS and HT.FP 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.
- 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-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.
- CARES Appendix TA1-B; Quality and Operations Schedule for the Technical Approval of Couplers for Reinforcing Steel and Reinforcement Anchors 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 5082. Confirmation that this technical approval is current can be obtained from CARES.



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