

CARES Technical Approval Report TA1-A 5051



Issue 7



Dextra



PARALLEL THREAD COUPLERS

DEXTRA GRIPTEC Extruded Coupler

Assessment of the
Dextra GRIPTEC
Extruded Coupler
and Quality System
for Production



TECHNICAL
APPROVAL
5051



0002



Validate with the
CARES Cloud App

Product

Dextra GRIPTEC extruded coupler for reinforcing steel

Product approval held by:

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1 Product Summary

DEXTRA Griptec standard, positional and caging couplers as detailed in tables 1 to 3 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 and B500C.

1.1 Scope of Application

DEXTRA Griptec couplers have been evaluated for use as follows:

Griptec standard, positional and caging couplers requirements in accordance with CARES Appendix TA1-A and BS 8597, as detailed in tables 1 to 3.

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 as detailed in tables 1 to 3 have been designed with controlled mechanical properties to be compatible with reinforcing bars complying with BS4449 Grade B500B and B500C.

1.3 Conclusion

It is the opinion of CARES that DEXTRA Griptec standard, positional and caging 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
October 2022



2 Technical Specification

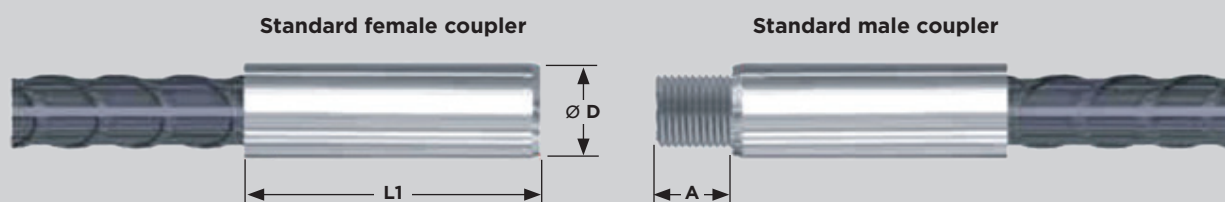
2.1 General

DEXTRA Griptec standard, positional and caging couplers as detailed in tables 1 to 3 are for joining grade B500B and B500C reinforcing bars. The couplers comprise two ends, extruded onto the reinforcing steel and joined by a parallel thread connection. The Dextra GRIPTEC extrusion machine automatically conducts systematic performance testing of every joint.

2.2 GRIPTEC Standard Range

The Griptec standard coupler is designed for use where one of the bars to be spliced can be rotated. It comprises two steel sleeves that are swaged onto the bar ends and have matching male and female parallel ISO threads which allow the two bars to be joined.

Standard Coupler



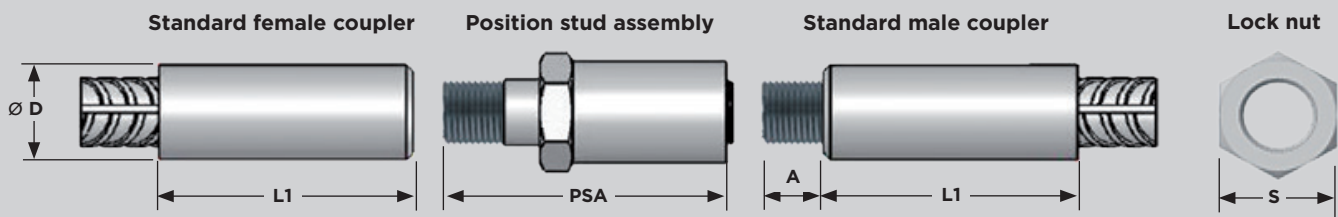
Size (mm)	Art No	D (mm)	L1 (mm)	A (mm)	Weight (kg)	Plastic protection colour	Tensile Slip	Fatigue Class D	Compression Slip
12	AG12	19 to 20	66 to 72	12	0.2	Yellow	B500B/B500C	B500B/B500C	B500B/B500C
16	AG16	25 to 26	99 to 103	16	0.5	White	B500B/B500C	B500B/B500C	B500B/B500C
20	AG20N	29.5 to 32	107 to 110	20	1.1	Grey	B500B/B500C	B500B/B500C	B500B/B500C
25	AG25	37 to 39	112 to 125	22	1.2	Red	B500B/B500C	B500B/B500C	B500B/B500C
32	AG32N	47 to 49	137 to 143	28	2.1	Brown	B500B/B500C	B500B/B500C	B500B/B500C
40	AG40N	61 to 63	167 to 170	34	5.6	Green	B500B/B500C	B500B/B500C	B500B/B500C

Table 1

2.3 GRIPTEC Positional Range

The GRIPTEC positional coupler is designed for use where neither of the bars to be coupled can be rotated. The positional coupler comprises five components: the same male and female sleeves as in the standard coupler, plus a position stud (that screws itself into the female sleeve), a position nut (that screws itself onto the male sleeve), and a lock nut.

Positional Coupler



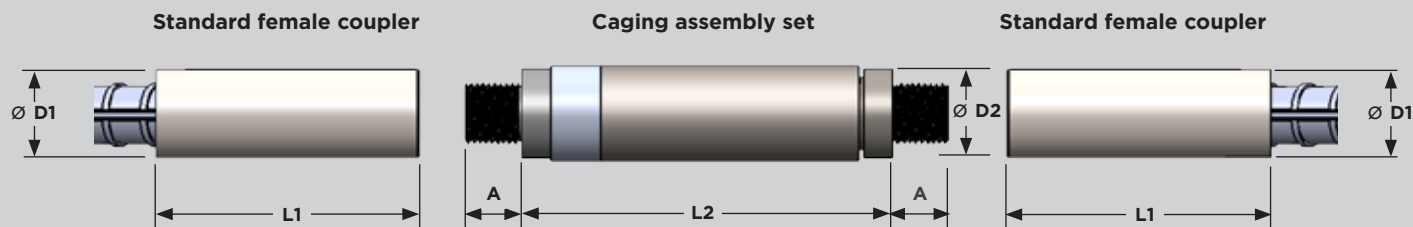
Size (mm)	Art No	D (mm)	PSA (mm)	S (mm) (Approx)	L1 (mm)	A (mm)	Weight (kg)	Plastic protection colour	Tensile Slip	Fatigue Class D	Compression Slip
12	AGP12	19 to 20	60	22	66 to 72	12	0.3	Yellow	B500B/B500C	B500B/B500C	B500B/B500C
16	AGP16	25 to 26	77	27	99 to 103	16	0.7	White	B500B/B500C	B500B/B500C	B500B/B500C
20	AGP20	29.5 to 32	94	32	107 to 110	20	1.5	Grey	B500B/B500C	B500B/B500C	B500B/B500C
25	AGP25	37 to 39	107	41	112 to 125	22	2.0	Red	B500B/B500C	B500B/B500C	B500B/B500C
32	AGP32	47 to 49	133	50	137 to 143	28	4.0	Brown	B500B/B500C	B500B/B500C	B500B/B500C
40	AGP40	61 to 63	161	65	167 to 170	34	8.8	Green	B500B/B500C	B500B/B500C	B500B/B500C
50	AGP50	71 to 73	212	80	220 to 225	47	16.9	Grey	B500B/B500C	B500B/B500C	---

Table 2

2.4 GRIPTEC Caging Range

The GRIPTEC caging “GCA” coupler range is designed for use when the two bars are not well aligned (as it happens often in the manufacturing of reinforcement cages). This splice uses two standard GRIPTEC female couplers that are connected by a GRIPTEC “Caging assembly set”, which is constituted of a taper stud, a long caging stud, a caging nut and a lock-nut which are pre-assembled together. The tapered caging stud is screwed into a female sleeve (typically on the bottom bar), while, the set of a long caging stud, a caging nut and a lock-nut is screwed onto another female sleeve. Then, in order to accomplish the connection, the caging nut is screwed out of the caging stud and onto the tapered caging stud. The two bars do not need to be brought butt-to-butt: the GRIPTEC caging splice system can bridge a gap between the bars.

Caging Coupler



Size (mm)	Art No	D1 (mm)	D2 (mm)	L1 (mm)	A (mm)	L2 (mm)	Weight (kg)	Plastic protection colour	Tensile Slip	Fatigue Class D	Compression Slip
40	GCA40	63 to 65	65	167 to 170	35	269	7.4	Green	B500B/B500C	B500B/B500C	B500B/B500C
50	GCA50	71 to 73	80	220 to 225	48	317	13.0	Grey	B500B/B500C	B500B/B500C	B500C only

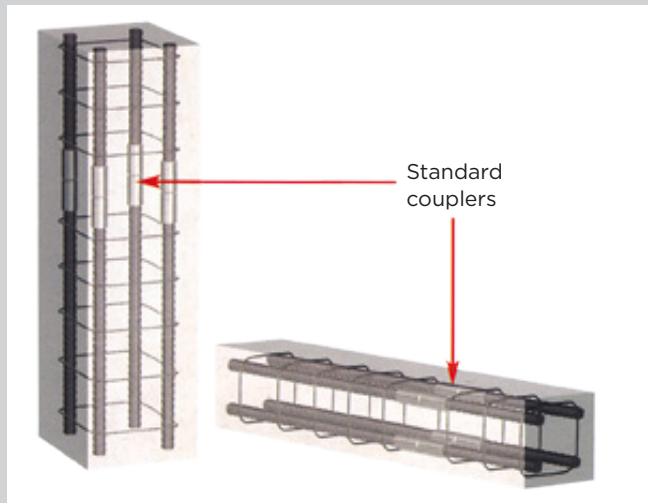
Table 3

3 Product Performance and Characteristics

Full tests have been carried out to demonstrate compliance with the performance requirements defined in CARES Appendix TA1-A and BS 8597, when used with reinforcing bars to BS 4449 Grade B500B and B500C as detailed in tables 1 -3.

CARES APPENDIX TA1-A

- Permanent deformation is less than 0.10mm after loading to $0.65f_y$ in tension or compression or effective strain of $\leq 0.65f_{yk}/200 \times 10^3$, at a stress of $0.65f_{yk}$ in compression. Compression slip is an optional requirement.
- 99% characteristic tensile strength is greater than 575 Mpa for grade B500C reinforcement, and greater than 540 Mpa for grade B500B reinforcement. See Tables 1 to 3 for details.
- Fatigue Class D.



Typical application of GRIPTEC standard coupler

The GRIPTEC standard couplers are for use in situations where one or both bars to be joined can be rotated freely

4 Installation

The bars to be spliced must be sheared with suitable shears that do not bend or deform the bar or leave a significant rag.



**Griptec sleeve
before extrusion**



**Griptec sleeve
after extrusion**

Sleeves must be extruded onto the bar ends exclusively using the Dextra GRIPTEC extrusion machine operated by suitably trained staff in accordance with the Dextra operating manual. The parts are screwed together and tightened using a suitable tool/wrench. A torque wrench is not necessary.

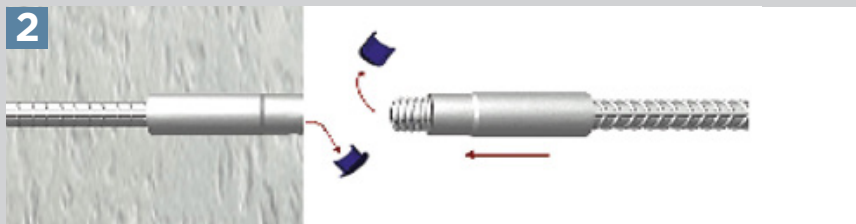


Griptec extrusion machine

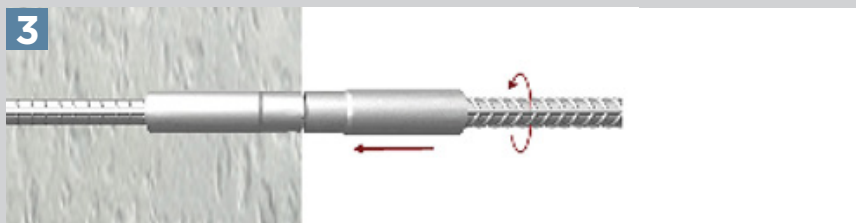
4.1 Standard Range



Position the 1st stage bar

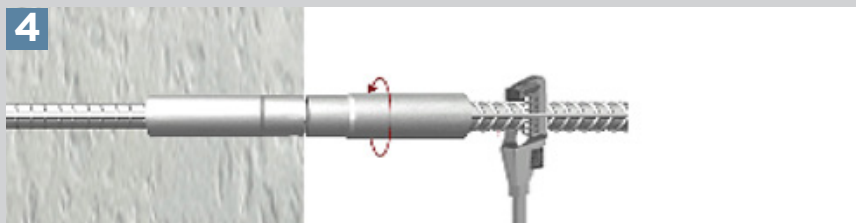


Position the continuation bar
Remove caps



Screw in the continuation bar

A suitable tool/wrench maybe used to ensure no threaded portion is visible outside the coupler



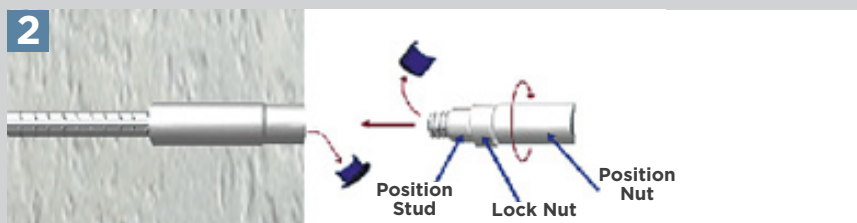
Lock the splice

Use a suitable tool/wrench on the continuation bar and tighten until the internal end faces of the couplers show close physical contact with each other

4.2 Positional Range



Position the 1st stage bar

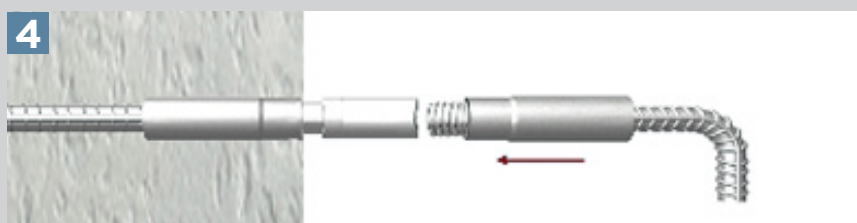


Remove caps and screw the position set into the female sleeve



Lock the position stud

Use a suitable tool/wrench to tighten the position stud



Position the continuation bar

Connect bar ends



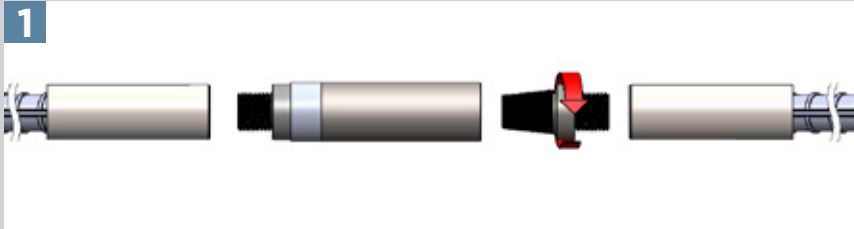
Join the bars by rotating the position nut



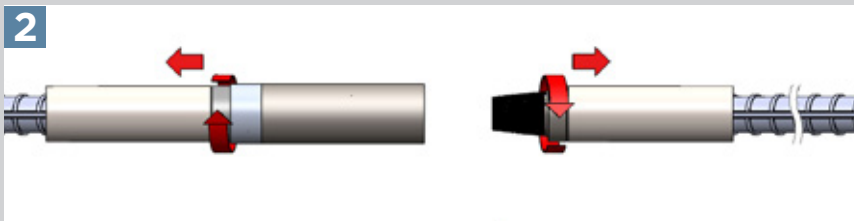
Lock the splice

Use a suitable tool/wrench on the continuation bar and tighten until the internal end faces of the couplers show close physical contact with each other

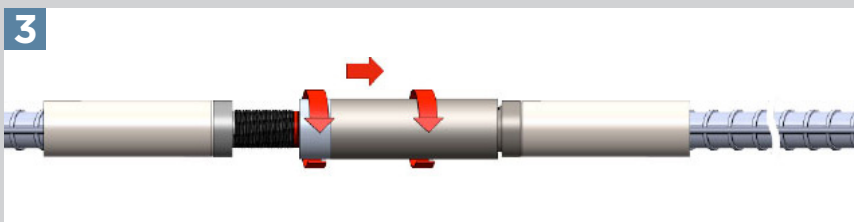
4.3 Caging Range



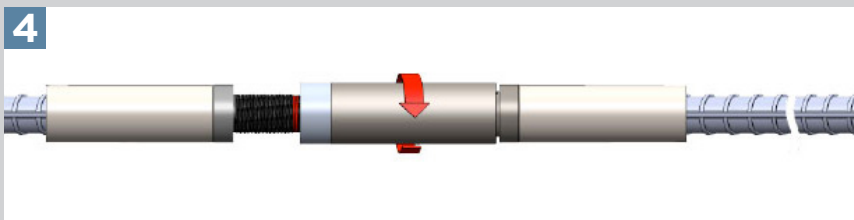
Remove the tapered caging stud from the Griptec caging assembly set



Screw the tapered caging stud into the female sleeve of one bar, and screw the Griptec caging assembly set into the female sleeve of the other bar



Assemble the splice by hand screwing the caging nut and lock nut onto the tapered caging stud



Use a torque wrench to tighten the caging nut onto the tapered caging stud. Adjust it to the torque value specified in the table below

Bar Size	Torque (Nm)
32	350
40	500

5 Safety Considerations

Couplers are supplied in wooden containers and have a maximum weight of 2500 kg and must be handled with appropriate lifting equipment. It is advisable to wear protective gloves during handling the containers, couplers and reinforcement; during the swaging process and during coupler installation.

6 Product Testing and Evaluation

DEXTRA Griptec swaged couplers have been tested to satisfy the requirements of CARES Appendix TA1-A with reinforcing bars to BS4449 Grade B500B and B500C (as detailed in tables 1 to 3). The testing comprised the following elements:

- Tensile Strength
- Permanent Deformation in tension or compression (as detailed in tables 1 to 3)
- High cycle fatigue (Class D)

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 swaged 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

DEXTRA Griptec standard, positional and caging swaged 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 DEXTRA Griptec standard, positional and caging swaged 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 DEXTRA Griptec standard, positional and caging swaged 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 DEXTRA Griptec standard, positional and caging swaged mechanical couplers comply with the material requirements of EC2 by virtue of *Clause 0.8*.

Structure

DEXTRA Griptec standard, positional and caging swaged 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

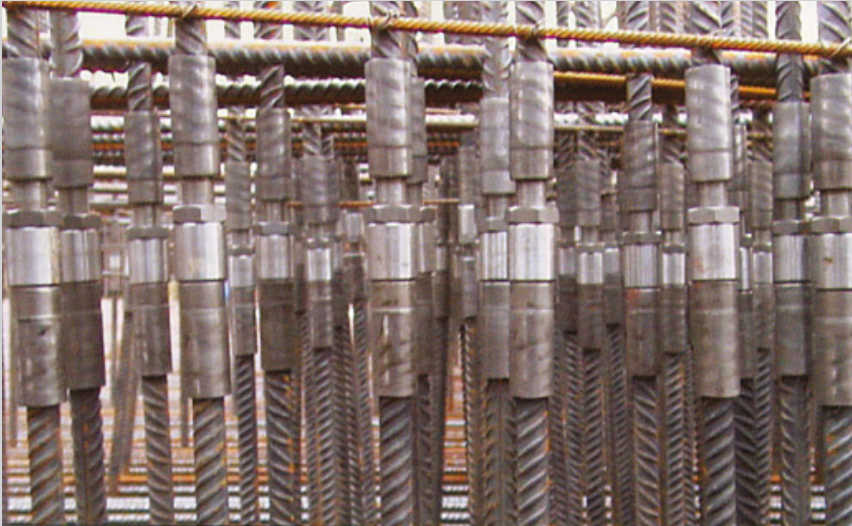
- BS 4449: 2005 Steel for the reinforcement of concrete - Weldable reinforcing steel - Bar, coil and decoiled product - Specification.
- BS8110: Part 1: 1997 (amended 2007): Structural Use of Concrete, Code of Practice for Design and Construction.
- BS EN ISO 9001: Quality management systems - Requirements.
- BS EN 1992-1-1:2004 Eurocode 2 Design of concrete structures - General rules for buildings.
- BS 8597: 2015 Steels for the reinforcement of concrete - Reinforcement couplers - Requirements and test methods.
- 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.

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 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 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 5051. Confirmation that this technical approval is current can be obtained from CARES.



GRIPTEC Coupler Applications



The use of GRIPTEC couplers allows the design and installation of reinforcement in congested areas or where the continuation bars cannot be rotated.



GRIPTEC couplers allow reinforcing bars to be butt jointed.



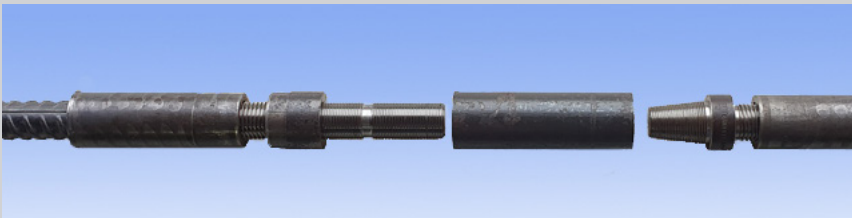
Griptec bar end preparation takes about 30 seconds.



GRIPTEC standard coupler



GRIPTEC positional coupler



GRIPTEC caging coupler



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