HIGH PERFORMANCE REINFORCEMENT PRODUCTS

# HRC400 series –

## Rebar coupler with ultimate performance:

- ✓ Tested and documented quality
- ✓ Fulfil all known requirements to rebar couplers
- ✓ Fast installation
- ✓ Ultimate tensile capacity

- Robust coarse threads, for demanding site conditions
- Easy and reliable installation control
- Produced from recycled steel, documented environmental footprint (EPD)

## Advantages of HRC400 Series rebar couplers

- → Fulfil and exceed all known requirements to reinforcement couplers
- → Capacity beyond actual stress- and strain properties of rebar, independent of steel heat
  - ✓ the full, actual ductility of the rebar is usable (the coupler do not limit the performance)
  - ✓ possible to splice all bars in one section
- → Taper threads, providing fast, easy and self-locking assembly.
- → Coarse threads - robust and suited for rough handling on site
- → Straightforward and reliable quality control by simple visual inspection
- → HRC490 position coupler allows connection without need to rotate the bar
  (cast-in bars, prefabricated reinforcement cages, bend bars)
- → can be combined with other HRC products like HRC100 T-heads, HRC700 cast in connections.

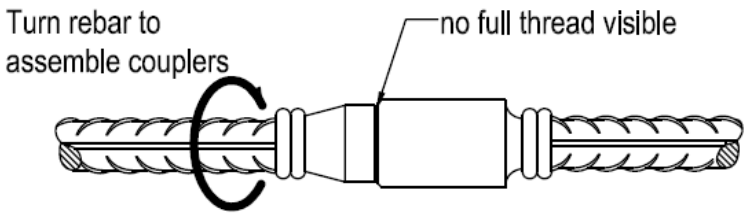
HRC T-head HRC420 (sleeve) HRC410 HRC T-head

**HRC490 Position coupler**

## HRC400 – reliable and straightforward installation control

HRC400 rebar couplers have coarse taper threads. The threads are easy to assemble and self-locking. In general, all taper threads need to be fully installed (all threads engaged) to activate the full capacity of the connection.

HRC400 Series rebar couplers offer a reliable and straightforward quality control by simple visual inspection: If no full thread is visible; the threads are fully engaged. Installation is done by hand. Hand assembled HRC400 test samples achieve development of the full strength and ductility of the rebar. In specific situations, like fatigue or seismic loads, a torque wrench should be used in addition **after** making sure all threads are engaged.

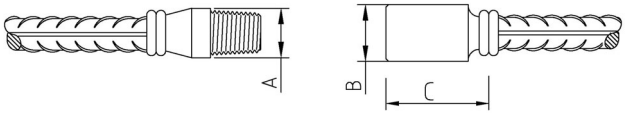


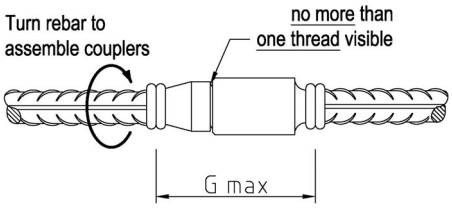

easy installation – easy control

# HRC400 series – rebar couplers with coarse taper threads

Standard Coupler

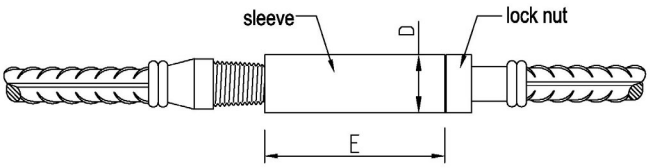
**HRC410 (male)** **HRC420 (female)**

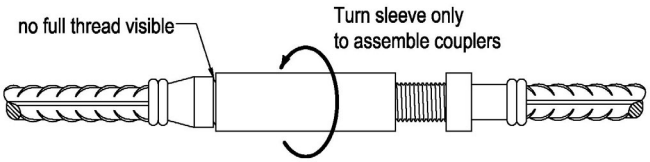


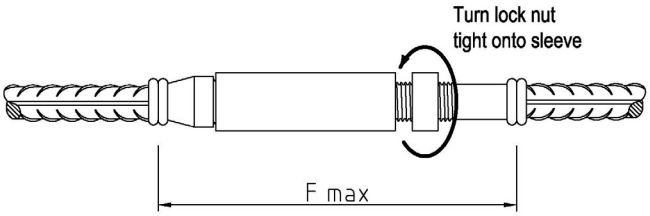



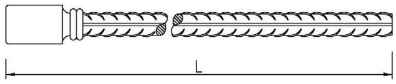
Position coupler

**HRC410 (male)** **HRC490 (sleeve)**




*HRC400 series is supplied in lengths 250 - 14 000mm (12 000mm in Norway)*

| Nominal rebar diameter | Ultimate strengt | Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Ø | $R_{m,act}$ | A | B | C | D | E | F max | G max | moment |
| mm | MPa | mm | mm | mm | mm | mm | mm | mm | Nm |
| 12 | >850 | 22 | 22 | 45 | - | - | - | 72 | 160 |
| 16 | >850 | 28 | 28 | 50 | - | - | - | 76 | 200 |
| 20 | >850 | 35 | 35 | 55 | - | - | - | 85 | 200 |
| 25 | >850 | 35 | 42 | 76 | 45 | 140 | 280 | 115 | 200 |
| 32 | >850 | 45 | 55 | 90 | 55 | 157 | 330 | 135 | 270 |
| 32 C | >750 | 45 | 45 | 90 | - | - | - | 130 | 200 |
| 40 | >850 | 55 | 70 | 105 | 70 | 200 | 440 | 155 | 330 |

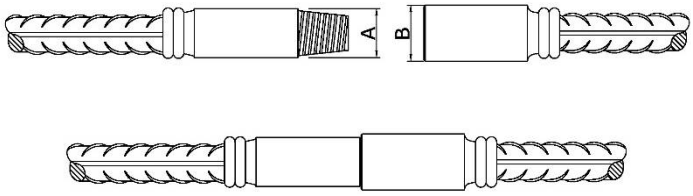
- → Developed to exceed the strength- and strain capacity of the rebar.
- → Fulfils all requirements of ISO 15835 “Reinforcement couplers for mechanical splices of bars” (including requirements to seismic- and fatigue loading).
- → Mechanical performance fulfilling the ductility requirements of rebar with yield strength of 500 MPa acc. to EN 1992-1-1. Ultimate load above **700 MPa**.
- → Delivered with thread protection; nail-on flange is possible.
- → Transition between rebar sizes possible.
- → Can be combined with HRC100 T-heads or threaded bolts.

# HRC400XS – stainless rebar coupler

HRC400XS rebar couplers combines the hight performance of HRC400 series with advantages of stainless steel.

## Geometry:

**HRC410XS (male)** **HRC420XS (female)**

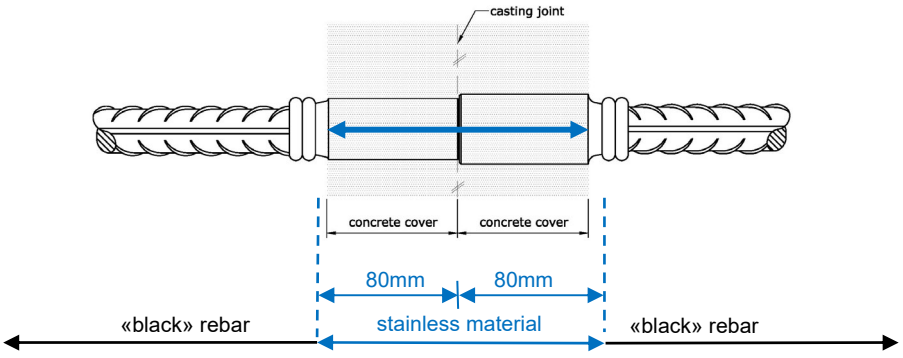



| Nominal rebar diameter [mm] | ø20 | ø25 | ø32 |
|---|---|---|---|
| outer diameter male-part (A) [mm] | 30 | 35 | 45 |
| outer diameter female-part (B) [mm] | 30 | 40 | 45 |

## Material combinations:

**Each HRC400XS coupler part has a length of app. 80mm. This makes is possible to combine stainless couplers HRC400XS with «black» carbon rebar. This option limits the use of stainless material, is cost effective and reduces the environmental footprint.**

| | Coupler parts | Rebar alternatives | |
|---|---|---|---|
| combination 1 | Duplex stainless steel grade 1.4462 | "black" rebar | B500B or B500C acc. EN 1992-1-1, Annex C |
| combination 2 | | stainless steel | Grade 500 acc. BS6744 or similar |




*Principle for combination of stainless rebar couplers with «black» rebar: only stainless material within the concrete cover*

## Performance and certification:

HRC400XS rebar couplers are tested and certified acc. ISO 15835 for category B, F and S, i.e. including fatigue and seismic loads. Failure load is minimum 30% higher than specified yield strength. This implies the development of the full actual strength and ductility of the parent rebar and the transfer of the full capacity over the splice.

## HRC400 series – tested and documented high performance

HRC400 rebar couplers are certified acc. ISO 15835, for category B, F and S by *Kontrollrådet*, a Norwegian notified body, and by *UK Cares* acc. TA1-B&C. The HRC400 Series fulfils the technical requirements of other European standards and certification schemes as well. Examples are BS 8597 (UK), "DIBt: Grundsätze für Zulassungs- und Überwachungsprüfungen von mechanischen Betonstahlverbindungen" (Germany), Kiwa BRL 0504 (The Netherlands), NF A35-020 (France), BY4B (Finland), "Boverkets handbok om betongkonstruktioner - BBK" (Sverige).

The fulfilment can be proven directly via the existing certifications or via test results. Tensile test result consistently in rupture of the rebar, i.e. the coupler is NOT limiting the capacity of the connection- regardless of the actual rebar strength, since the ultimate tensile stress is above 700 MPa.

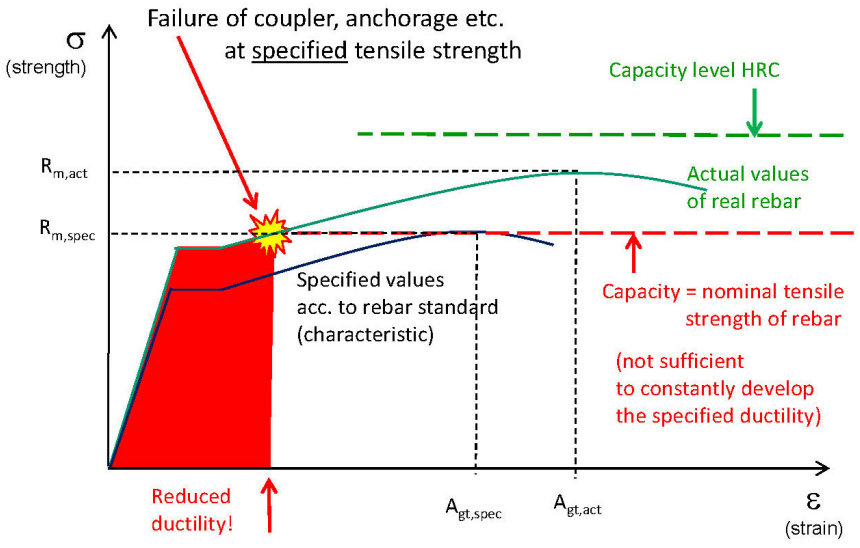
| Technical aspect | Performance of HRC400 Series |
|---|---|
| Strength | $R_{m,act}$ - (real rebar strength) |
| Ductility | $A_{gt,act}$ - (real elongation) |
| Slip | ≤ 0,10mm |
| Fatigue | fulfils the requirements (+ S/N-curve) |

**HRC400 and HRC400XS fulfill ALL requirements.**

HRC400 rebar couplers can be used in Europe acc. to EU-regulation No. 764/2008 (9th July 2008).

## The importance of high capacity for sufficient ductility

The diagram to the right shows how a rebar coupler with insufficient capacity limits the development of the full ductility of the rebar. Commonly, the actual (real) stress- and strain of reinforcing steel heats exceeds the minimum requirements, defined in the rebar standards; typical values for $f_{y,spec}$ ($f_{y,nom}$) and $A_{gt,nom}$. If the specified rebar capacity (n% of $f_{y,spec}$) is too low, the described strength can be achieved, but the possible elongation is limited considerably. This reduces the robustness of the structure, because the actual capacity and ductility of the reinforcement cannot be developed in extreme (accidental) load situations.




HRC400 series rebar couplers exceed the real stress- and strain capacity of the reinforcing steel, independent of the steel head used. Therefore, the full, actual ductility (strength and strain) can be developed. The coupler is not limiting the performance of the splice (not a "weak link").

## HRC400 series – environmental aspects

**Recycled material /recyclable**

| | |
|---|---|
| End-component in “black” carbon steel | 100% based on recycled material |
| End-component in stainless steel | app. 60% based on recycled material |
| Rebar | more than 90% based on recycled material |

**All HRC products are fully recyclable.**

**Environmental effects and -declaration (EPD)**

HRC products (HRC 100-, HRC 200-, HRC 400 og HRC 700-series) are covered by following environmental products declaration:

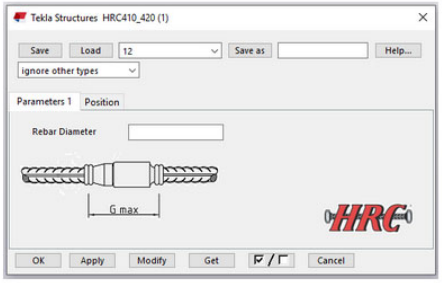
| | |
|---|---|
| HRC Europe AS (Norway) | • NEPD-1612-640-EN (EPD Norge)<br>• S-P-01373 (The International EPD System)<br>• ECO-platform 00000746 |
| HRC Europe NL BV (The Netherlands) | MRPI® registration 1.1.00193.2021 |

The EPDs contain environmental information for each stage, from raw material to the delivered product. HRCs production represents only 3-6 % of the entire environmental footprint. This contribution has to be measured against the **positive environmental effects** of HRC-products for the building process:

- ✓ Reduction in rebar
- ✓ Reduction in construction time and resources based on:
  - → Fast and easy installation
  - → Improved constructability by easier and safer access

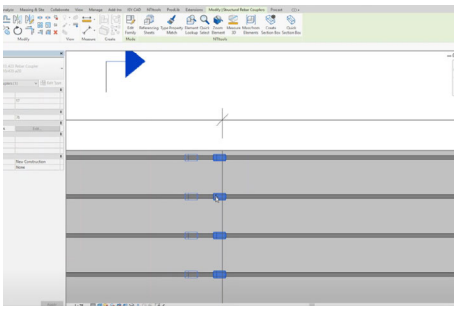
## HRC400 series – BIM support

“BIM” Tools for HRC400 and HRC400XS:




**Tekla**

*Custom components* for HRC400 series are available via Tekla Warehouse.



**Revit**

*Product Families* for HRC410/420 standard couplers and HRC410/490 position couplers can be downloaded from HRCs website.

**Allplan**

HRC400 series is included in the product library from version 2020.

Information and links to BIM-tools are available from HRCs website.

## Use of HRC400 rebar couplers - examples

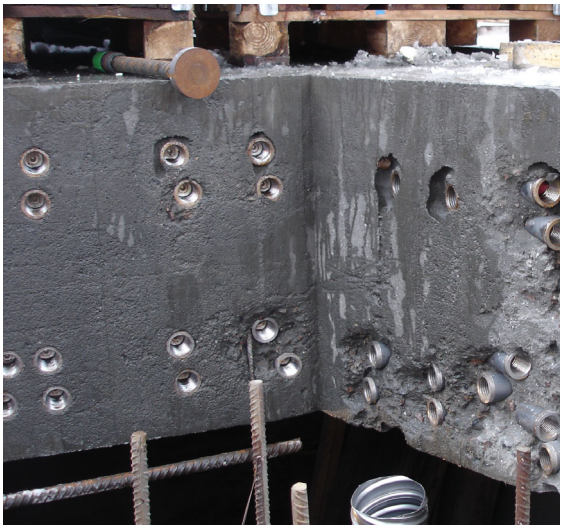
Slab-wall connection:
Use of rebar couplers allows the wall to be cast as one unit.

HRC490 position coupler for reinforcement cage in piles

Closure of a wall opening

Use during slip forming

Connection of precast elements: HRC400 Serie rebar couplers
combined with HRC150 T-heads for reduced lap length



No protruding rebar – improved access and safety

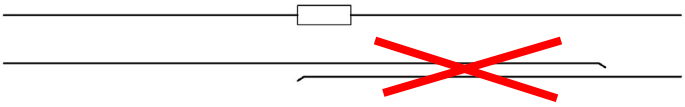
# Don't make the splice the weak link!

## Rebar splices with HRC400 series couplers offer …

- **Safety**
  - ✓ Easy inspection of couplers for reliable installation control.

- **Structural performance**
  - ✓ HRC400 series rebar couplers transfer the full, actual stress- and strain capacity of the reinforcing steel – the entire, real ductility of the rebar can be exploited, allowing all bars to be spliced in one section.

- **Material savings**
  - ✓ **Avoids** lap splice



- **Functionality**
  - ✓ Coarse taper threads are robust, fast and easy to install.
  - ✓ Positional coupler allows splicing of prefabricated, bend or cast-in reinforcement.
  - ✓ Combination with HRC T-heads possible.

- **Flexible service**
  - ✓ Supplied in quantities and lengths acc. to your order.
  - ✓ Possible with special packaging or marking, e.g. bar code.

**Please contact us if your project has special needs or challenges!**

Contact:

**HRC Europe AS**
Postboks 591, N-3412 Lierstranda
N-3412 Lierstranda, Norge
+(47) 32 24 04 70

**HRC Europe NL BV**
Mortelstraat 7
NL-8211 AD Lelystad, The Netherlands
+(31) 320 72 70 30

info@hrc-europe.com