

HS-BAR Rebar Coupler

Bar ends are cold-upset to enlarge the section, roll-threaded and joined with a coupler. Korea's first — Ministry of Construction and Transportation New Technology No. 30.

— WHAT IS HS-BAR

The upset-thread rebar splice

Mechanical splicing was developed over many years to meet the requirements of large reinforced-concrete structures and seismic design, and is now widely used on civil and building sites.

Manufacture — To raise the strength of the joint, the bar end is cold-upset (swaged) to enlarge its cross-section, a **rolled thread** (no metal removed) is formed, and the bars are joined by an internally threaded coupler.

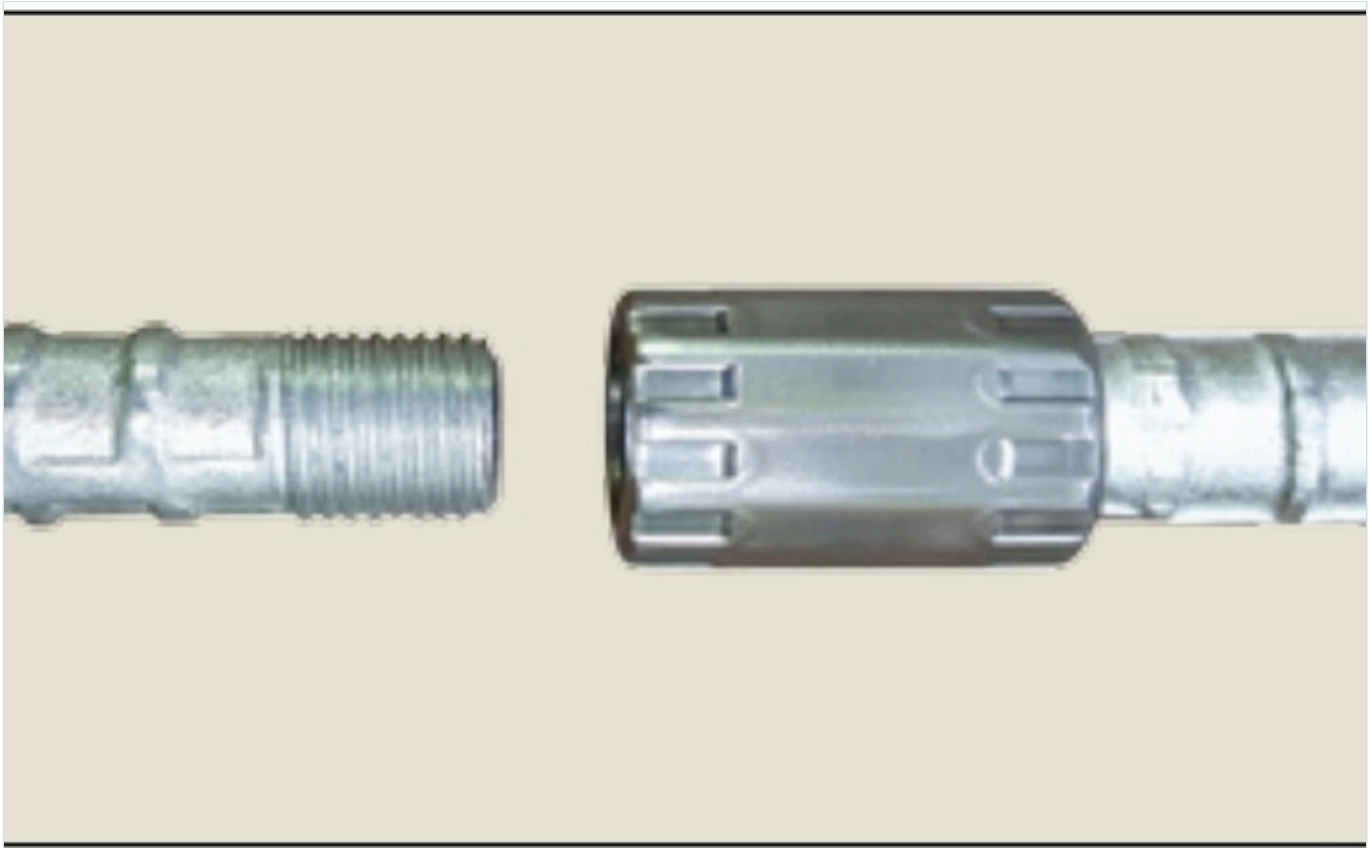
Features — The ribs and lugs are upset over the thread length by the same rolling process used to make the bar, then roll-threaded; there is no incomplete thread, so clamping is excellent. The process was developed to simplify equipment and production, reduce labour and lower construction cost while securing superior quality.

MOCT New Technology No. 30

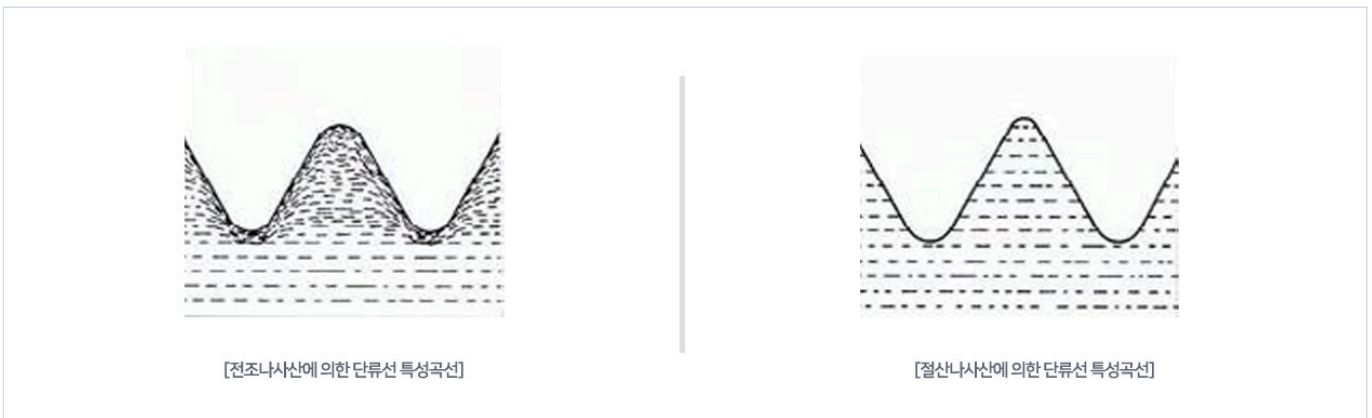
Tested to KS D 0249

≥ 125% yield strength

D13 - D51



Roll-threaded bar end and HS-BAR coupler



Rolled thread (left) keeps the grain flow continuous – cut thread (right) for comparison

— ADVANTAGE

Advantages of HS-BAR

The decisive advantage: the bar is plastically worked (upset) before the thread is rolled, so the bar's properties are unaffected. Rebar has a fibrous grain flow created during rolling; a rolled thread keeps that grain flow continuous and dense, giving the thread very high strength.

01 Safety

- Better bar spacing than lap splices; easier concrete placement
- Tensile or compressive strength of at least 125% of parent-bar yield strength
- Stress centres of both bars stay on the same axis — structurally very safe

02 Economy

- Eliminates rebar lost to lap lengths (rising steel prices)
- Primary fabrication to site request — no secondary work
- Easy assembly reduces labour cost and schedule

03 Constructability

- Advantageous for high-rise buildings and Top-Down, ILM and Pre-Fab methods
- Suits difficult second- and third-stage pours
- Visual inspection during assembly — precise work and easy checking
- Suited to members that must develop tension, keeping bar continuity

— SPECIFICATION

Coupler specifications

Thread size, coupler outer diameter and length, and bar thread lengths (short thread S1 / long thread S2) by bar size. Unit: mm.

Bar size	Thread	COUPLER		Bar thread length	
		O.D.	Length	Short (S1)	Long (S2)
D13	M13 × 1.5P	19 ±2	30 +2	15	30
D16	M16 × 2.0P	23 ±2	38 +2	19	38
D19	M19.5 × 2.0P	29 ±2	45 +2	22.5	45
D22	M22.6 × 2.5P	34 ±2	50 +2	25	50
D25	M26.2 × 3.0P	38 ±2	58 +2	29	58
D29	M29.6 × 3.5P	43 ±2	65 +2	32.5	65
D32	M32.5 × 3.5P	48 ±2	70 +2	35	70
D35	M36 × 4.0P	53 ±2	75 +2	37.5	75
D38	M39.2 × 4.0P	57 ±2	80 +2	40	80
D41	M42 × 4.0P	60 ±2	86 +2	43	86
D51	M52 × 4.0P	75 ±2	110 +2	55	110

※ Specifications may change for quality improvement. Coupler material: cold-forged from KS D carbon steel for machine structural use — SM40C, SM45C or 51B20, SM25C or better.

— SPLICING METHODS

Standard splicing types

Three basic configurations cover most site conditions and construction methods.



A TYPE

Short thread + short thread + coupler

The bar is rotated to engage. **Applications:** ILM, FCM, MSS, PSC-box bridge decks, slip-form columns, slabs and walls.



B TYPE

Short thread + long thread + coupler

One bar is threaded over the full coupler length and the coupler is rotated to engage. The most common type on civil and building sites. **Applications:** pre-assembly, RCD and other long bars.



C TYPE

Short + long thread + coupler + lock nut

For pre-assembled cages in Pre-Fab construction; the coupler is made longer to absorb fabrication tolerance. **Application:** Pre-Fab method.

E Welding coupler

For fixing rebar to H-beams or other steel structures — the coupler is welded to the steel, then the bar is connected.

	D10	D13	D16	D
O.D. (D)	17	19	23	25
Length (L)	11	15	19	22

※ Tolerance ±2 mm

G Terminator (anchorage) coupler

Replaces the hook at the bar end with an anchor plate that develops the bar without the development length.

	D13	D16	D19
A: O.D. Ø	35	36	42
B: thickness	6	6	6

F Form Saver

The coupler is fixed to the formwork before the pour; after form removal the second-stage bars are connected.

	D10	D13	D16
O.D. (D)	17	19	23
Length (L)	22	30	38
Flange (Φ)	62	62	62
Thickness (T)	1.7	1.7	1.7

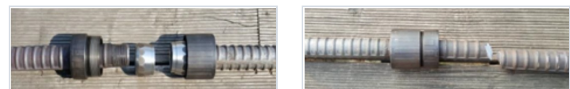
※ Tolerance ±2 mm

H Reducer · PC coupler

Reducer — joins bars of different diameters; the two internal threads are machined to different sizes.

Coupler for precast concrete — designed for ever-larger PC elements. Fully compensates the misalignment of bars protruding from two PC members.

Applications: Pre-Fab method, PSC structures, underground car parks.



PC coupler before test After test

— FIELD-ASSEMBLY COUPLER

U-type · UH-type field-assembly couplers

After years of development we commercialised a field-assembly coupler usable with **SD600** rebar. Specially treated wedge segments and a body engage the parent bar to develop full structural performance ($\geq 125\%$ of yield), overcoming the weaknesses of earlier field couplers; anyone can install it easily.



U-type field-assembly coupler

U-type dimensions mm · tolerance $\pm 3\%$

	D10	D13	D16	D19	D22	D25	D29	D32	D35	D38	D41	D51
A length	52	63	82	98	111	128	143	159	174	185	196	225
B O.D.	23	30	33	36	42	45	50	55	60	65	70	85



UH-type field-assembly coupler

UH-type dimensions mm · tolerance $\pm 3\%$

	D10	D13	D16	D19	D22	D25	D29	D32	D35	D38	D41	D51
A length	52	63	82	98	111	128	143	159	174	185	196	225
B O.D.	30	36	38	45	50	55	60	65	70	75	80	95

U-type installation

- Remove the wedge segments supplied inside the body.
- Fit the segments to both bar ends, sloped side towards the bar end, aligning the segment grooves with the bar lugs so the two segments sit as parallel as possible (rotate a segment 180° to adjust).
- Slide the body over the fixed bar (e.g. the bar cast in concrete) and turn to engage.
- Insert the connecting bar into the other end of the body and turn the bar to engage.
- Finally tighten the connecting bar with a pipe wrench; the fixed-bar side locks completely too.

UH-type installation

- Remove the wedge segments supplied inside the body.
- Fit the segments to both bar ends as for the U-type (slope towards the bar end, grooves aligned with lugs, segments parallel).
- Engage the segments with the long-thread body and the short-thread body.
- Turn the outer body fully onto the long-thread body.
- Connect the short-thread body and tighten the bar with a pipe wrench.

— QUALITY CONTROL

Quality control - testing

Test method: KS D 0249 (test methods for mechanical splices). **Threading:** the bar lugs and ribs are upset into a round section, the end is faced, a thread is rolled and the bar is joined by a tapped (internally threaded) coupler — a mechanical splice.

Mechanical property tests KS D 3504

Item	SD 300	SD 400	SD 500	SD 600	SD 400S	SD 500S	SD 600S
Yield strength (N/mm ²)	300–420	400–520	500–650	600–780	400–520	500–620	600–720
Tensile strength	≥ 1.15 × yield	≥ 1.15 ×	≥ 1.08 ×	≥ 1.08 ×	≥ 1.25 ×	≥ 1.25 ×	≥ 1.25 ×

Types of test

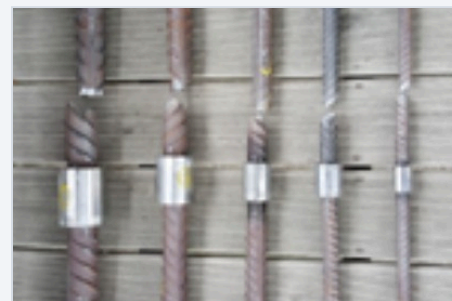
- ✓ **Appearance** — no substances on coupler or threaded bar that reduce concrete bond; bar end faces flat for tight seating
- ✓ **Visual inspection** — 100% of incoming couplers checked for oil, dirt etc.; bar threads checked for cleanliness, end flatness, straightness and cold working
- ✓ **Tensile test (monotonic)** — yield and tensile strength per KS B 0802 (area per KS D 3504)
- ✓ **Low-cycle test** — 100 cycles between 5% and 90% of bar yield, then tension to fracture (Korea Expressway Corp. mechanical splice QC standard, April 2002)
- ✓ **High-stress cyclic test** — static test procedure repeated 30 times; stiffness change and maximum deformation recorded
- ✓ **Static strength test** — load to 95% of yield, unload to 2%, measure axial stiffness and residual deformation, then tension to fracture
- ✓ **Low-temperature test** — held 15 min at –120 °C in liquid nitrogen gas, then tensile test; the threaded joint must not fracture
- ✓ **High-cycle fatigue** — sine-wave load between 3 and 13 kgf/mm² at 3–10 Hz for 2 million cycles; residual deformation and fracture checked



Before tensile test



After tensile test



Results (export couplers)

Applicable standards STANDARDS

KS D 0249

Test methods for mechanical splices of reinforcing bars

KASS

Korean Architectural Standard Specification (MOCT)

KS

KS B 0802 tensile testing of metallic materials · KS D 3504 steel bars for concrete reinforcement · KS D 3517 carbon steel tubes for machine structural purposes · KS D 3752 carbon steels for machine structural use

ASME Sec. III

RCD pre-assembly, Yeonyuk Bridge 1 (HD51) · Incheon LNG connecting bars (HD35, HD51) · ILM diaphragm · building pre-assembly · World Cup stadiums (Gwangju, Suwon) · tie bars · welding couplers

※ Standards apply partially, as referenced by the project specification. Copies of test reports (KICT etc.) are provided on request.

— MANUFACTURING

Thread-forming and coupler-socket production

Bar threading is a semi-automatic line — upsetting press → end-facing machine → thread roller → handling line — producing up to D51. Coupler sockets are cold-forged from bar stock on a former and tapped automatically.

Rebar upset threading REBAR THREADING



01 Upsetting press

Roller-type upsetting up to D51; semi-automatic.



02 End-facing machine

Removes irregularities from cutting and upsetting so the thread can be rolled cleanly.



03 Thread roller

Thread formed by rolling dies; semi-automatic.



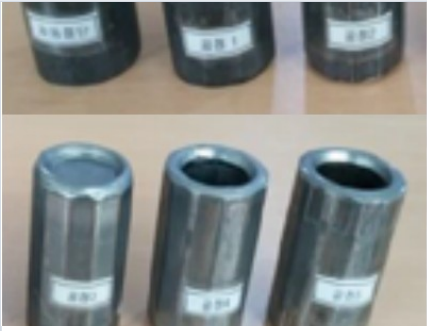
04 Handling line

Channel conveyors move bars between stations; semi-automatic.

Coupler socket production COUPLER SOCKET



01 Raw material



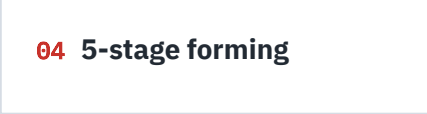
02 Former (exterior)



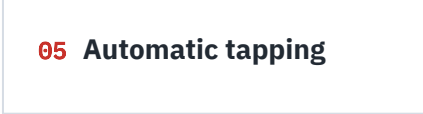
03 Former (interior)



04 5-stage forming



05 Automatic tapping



06 Finished socket



HS-BAR datasheet (PDF, English)

Full catalogue (PDF, Korean, 2.3 MB)

References

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