

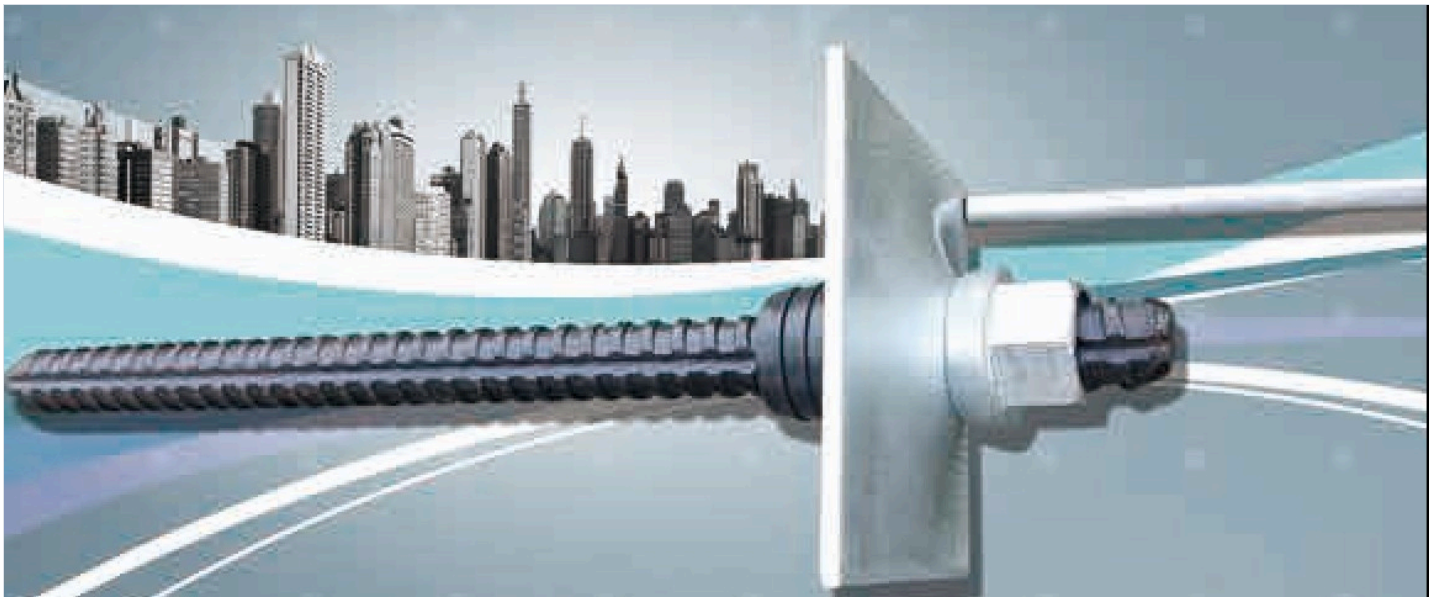
Tunnel & Ground Support

Rock bolts, steel fibre and removable soil nailing — materials that hold the ground in tunnels and excavations, produced in-house to KS-certified quality.

ROCK BOLT · KS E 3132

Rock bolt, all-screw type

Rock bolts and components for NATM tunnel rock support, produced under Korean Industrial Standard KS E 3132 certification No. 99-0650. The thread runs the full length (all-screw), so a nut can be fitted at any position.



Rock bolt · bearing plate · nut

Mechanical properties KS E 3132

Diameter	Yield point	Ultimate tensile strength	Elongation	Test standard
25 mm	≥ 350 kg/mm ²	≥ 490 kg/mm ²	≥ 18%	KS E 3132 (rock bolts and components)

Dimensions and unit mass

Size	Unit mass (kg/m)	Nominal dia. (mm)	Nominal area (mm ²)	Pitch p (mm)	Thread height a (mm)
D25	3.98	25.4	5.067	12	2.0
D29	5.04	28.6	6.424	14	2.0

※ All-screw thread · pitch 12 mm, thread height 2 mm ± 0.3 mm

Advantages

- A nut can be fitted at any position along the bolt.
- Bolts can be joined end to end with sleeves to any length.
- The bolt end is pre-finished so the nut runs on easily.



Rock bolt installation, NATM tunnel

Accessories ACCESSORIES

Item	Material · size	Notes
Ring nut	KS B 1012 SS400	Hot-forged, excellent mechanical properties. M ring washer combined w threaded int saves materi easy installa maximum cl over a short KT mark
Hex nut	KS B 1012 SS400	Machined fro hexagonal b:
Domed plate	for Ø25 · d Ø40±3 · h1 20±5/30±5 · ℓ 150/120 · t 6/9/10/12	Made to orde
Flat plate	for Ø25 · d Ø30±3 · ℓ 150/120 · t 6/9/10/12	Made to orde
Double plate	H-beam 250: L500 H350 t10 · H-beam 300: L550 H400 t12	Made to orde
Sleeve	hex 42 × 38 × L150 · bore 25	For joining rc bolts
Cast plate	D Ø32±3 · B 168±5 · H 40±5	Grout inlet a outlet holes
Expansion shell	—	Anchors the bolt in the rc Usable in vai ground, effe dry or wet rc spring preve dislodging; g injected afte

— INDICATOR

Protective caps and indicator rods for rock bolts and soil nails

Our **rock-bolt indicator rod** makes installed bolts visible even after shotcrete, so supervisors can verify installation at a glance.

- ✓ Low cost.
- ✓ Simple to install.
- ✓ Bolt installation can be verified after shotcreting.
- ✓ As the bolt manufacturer we can reconcile indicator count with bolt deliveries.



Soil-nail / rock-bolt caps (for D25, D29) · indicator rod installed

[Tunnel materials datasheet \(PDF, English\)](#)

[Rock bolt catalogue \(PDF, Korean, 3.2 MB\)](#)

— HS STEEL FIBER

Steel fibre for concrete reinforcement

HS Steel Fibre is already used in tunnel shotcrete across Korea and recognised for its quality. Fibres disperse evenly through the concrete so strength is uniform everywhere, turning brittle behaviour into ductile behaviour and improving durability.



HSSF01 bundled
Hooked ends



HSSF02 bundled
Centre embossing



HSSF03 loose
Single type

Product range

Product	Size	Packaging
HSSF01 · 02	30 mm × Ø0.5	20 kg bags · 1 t bulk bags
	35 mm × Ø0.7	
HSSF03	0.37T × 1.0W × 30 mm	

※ Other sizes made to order.

Technical data Ø0.5 × 30 mm, hooked ends

Material	ASTM A820 Type 1
Length / diameter	30 mm (1.18 in.) / Ø0.5 (0.0276 in.)
Shape	Hooked ends · clean bright steel
Tensile strength	≥ 1,044 N/mm ² (700–1,200 MPa)
Aspect ratio	≥ 60
Features	High aspect ratio gives strong bond to concrete · cold-drawn at room temperature

Features of HS Steel Fibre

- No balling during mixing or placing — easy to batch
- Increases tensile, shear, toughness and impact strength of concrete
- Very high tensile strength — excellent crack control
- Can replace rebar or mesh depending on the works
- Made to KS (ASTM) standards
- Strict quality control; several fibre types available
- Prevents the voids that form behind wire mesh in shotcrete — full adhesion

Shotcrete mix guidance

- ✓ Add fine aggregate and fibre while mixing → add sand and cement → add water → mix one more minute after fully blended

- ✓ Fibre dosage 40–45 kg/m³ standard (adjust to flexural-toughness tests)
- ✓ W/C ≤ 50%, max. aggregate 13 mm, fine-aggregate ratio ≥ 65%
- ✓ Cement content typically 400–500 kg/m³ · accelerator 5% of cement by mass (standard)

Applications

Tunnels	Follows the excavated profile (material saving) · leak prevention · longer life
Pavements	New roads, runways · crack control · factory floors · fatigue resistance · lower repair cost · thinner slabs
Dams · breakwaters	Lighter sections · longer life · crack control (heat of hydration) · no steel reinforcement · abrasion resistance
Elevated roads · bridge decks	Fatigue and abrasion resistance · thinner overlays



Tunnel



Dam · breakwater



Fibre dispenser



Shotcrete spraying

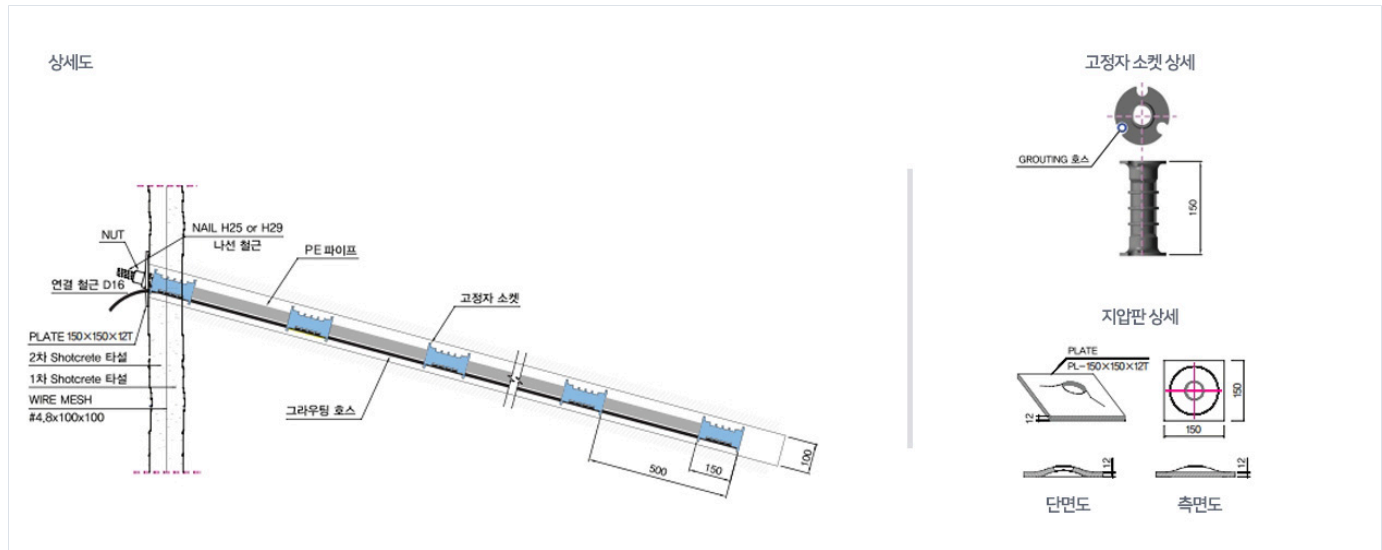
HS Steel Fibre catalogue (PDF, Korean, 6.8 MB)

— REMOVE SOIL NAILING METHOD · NEW TECHNOLOGY NO. 257

Removable Soil Nailing method

For temporary vertical excavation walls, **fixing sockets** and **PE pipe** separate the threaded bar from the cement grout so it functions like a conventional nail — then,

after excavation and the basement wall are complete, the bar is **removed**, leaving the ground free for future construction.



Detail – NAIL H25/H29 threaded bar · PE pipe · fixing socket (150) · bearing plate PL-150×150×12T. The plate may be placed inside the shotcrete depending on site conditions; size per designer.

System components

- ✓ D25 / D29 threaded bar (rock bolt), SD350 or higher to KS D 3504
- ✓ PE pipe separating the bar from the cement grout
- ✓ Fixing socket bonding the nail to the grout and acting as spacer
- ✓ Bearing plate and nut fixing to the outer wall

Pull-out behaviour

In conventional soil nailing the grout and bar act as one, so skin friction concentrates near the nail head. In the removable system the grout and bar are united only at the fixing sockets, so **skin friction peaks at each socket** and decreases away from it. Socket spacing (500 / 1,000 mm) tunes the pull-out response to the design.

Features

- Fixing sockets and PE pipe allow the nail to be **100% removed**.
- Nails are reused — minimal waste of resources.
- No corrosion, low environmental risk.
- Removal after completion helps resolve neighbour disputes.
- Land-use fees apply only for the temporary period — economical.
- No underground obstruction for future works — improves the subsurface environment.
- Ground–nail interaction is well understood, so over- or under-design can be predicted and adjusted.

Procedure PROCEDURE



01 Drilling



02 Face preparation before shotcrete



03 Drain · bearing plate · nut

After shotcrete



04 Retaining wall complete

References REFERENCES



Dogok-dong site I, Seoul



Dangsan-dong apartments, Seoul



Seocho-dong mixed-use tower, Seoul



Dogok-dong site II, Seoul



Sinjeong redevelopment (SCW + removable S/N)



Seongsan-dong redevelopment (face prep + removable S/N + shotcrete)

Removable soil nailing catalogue (PDF, Korean, 4.3 MB)

Ask about materials or the method

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