

- **Transfer of shear forces**
- **Continuous corrosion protection**
- **Flexibility in design**

**The only cohesive strand on the market**

Technical data sheet reference: FT En C I 3 3

## Definition of Cohestrand®

Cohestrand® is a seven wire strand coated with a fully bonded high density polyethylene (HDPE) sheath. It is used for suspension cables and stay cables, to enable clamping along the cable without interruption of the HDPE coating.

Similar to the semi-bonded Freyssinet Monostrand used in stay cables, Cohestrand® is sheathed by extrusion of specific polymers with an external HDPE coating.

Cohestrand® is protected against corrosion by three nested barriers applied in factory, guaranteeing quality, homogeneity and reliability that can only be provided by industrial methods:

- hot dip galvanisation of the wires
- bond protective filler
- HDPE sheath extruded on the protective filler

The bond compound is capable of transferring compression and shear forces from the HDPE sheath to the strand itself.



## Advantages

- Continuous corrosion protection ensuring, **over 100 year durability**
- Strand by strand installation with light plant (monostrand jack and light winch)
- **Flexibility for designers:** compact anchorage with no need for relay or adjustment elements (bars, nuts...)

## Seven wire strand

The Cohestrand® shall comply with the requirements for strand referenced in NFA 35-035.

## Geometrical characteristics

Nominal diameter	: 15.7 mm (+/- 0.1mm)
Nominal section	: 150 mm <sup>2</sup> (+/- 2%)
Nominal mass	: 1,172 g/m (+/- 24 g/m)

## Mechanical characteristics

Resistance class	: 1,860 N/mm <sup>2</sup>
Characteristic breaking load	: 279 kN
Characteristic 0.1% proof load	: 248 kN
Strain under maximum load	: > 3.5 %
Maximum relaxation at 1000 h, 20°C	: < 2.5 % (initial tension 0,7 F <sub>m</sub> )
Young modulus	: 195 ±5% GPa

## Additional characteristics

### Fatigue behaviour

The strand shall undergo without breaking 2 millions cycles with:

Fatigue stress range	: $\Delta f = 300$ MPa
Maximum stress	: $\sigma_{max} = 0.45 \cdot 1860 = 837$ MPa
Deflected tensile test	: $D < 20$ %

### Galvanisation

Zinc grade	: Z2-99.99% purity (as per EN 1179)
Zinc mass	: between 190 and 350 g/m <sup>2</sup>
Zinc coating shall be applied before the last drawing operation.	

## Bond protective filler product (patented)

The **bond compound** is constituted by:

- a polybutadiene resin
- an adhesive binder to the HDPE sheath

The bond compound shall fill the inter-wire voids and the space between the outer wires and the outer sheath.

**Minimum shear resistance of the compound** : > 4 MPa at 20°C\*

*\*between the outer sheath and the seven wire strand*

## Applications

Being a 15.7 mm strand, Cohestrand® is anchored by standard Freyssinet stay cable anchorages using individual conical wedges.

There is no theoretical upper limit to the number of strands in the cable (Typically 19 to 330 strands).

### Main cables on suspension bridges

Cohestrand® has been developed to produce main cables made of parallel strands.

A special type of hanger collar (cable band) has been developed, enabling clamping directly onto the Cohestrand® HDPE sheath. Thus, the corrosion protection of the main cable is continuous from anchorage to anchorage, with a durability exceeding 100 years.

Moreover, steel to steel contact is avoided, providing the best possible conditions for fatigue resistance and eliminating fretting corrosion.



### Stay cables with deviation saddle or extradossed cables

Cohestrand® is well suited for high durability stay cables or extradossed cables, with continuous corrosion protection through the pylon.

A special deviation saddle, called the multitube saddle, has been developed for the Cohestrand® (see related technical sheet):

- Each strand of the cable is deviated individually by an individual sleeve, within the saddle tube.
- The bond of the Cohestrand® sheath ensures the resistance to asymmetrical forces on either side of the saddle, by friction of the sheath on the individual sleeve.

## HDPE sheath

### Material

The HDPE raw material shall be HDPE class PE 80 or PE 100 as defined in XPA 35-037. It shall be virgin HDPE (not recycled).

The HDPE shall contain the following **additives**:

Carbon black	: 2.3 % +/- 0.3 %
Antioxidant	: 1000 ppm

### Geometry

The inner periphery of the HDPE coating shall follow the outer wires contour.

Thickness	: 1.5 mm + 0.5mm – 0.2mm
Outer diameter of the coated strand	: < 19.5 mm.

### Strength

Stress at yield	: > 18 MPa
Elongation at break	: > 500% at + 23°C > 100% at -20°C

Impact strength	: No perforation after 1 kg falling weight from 0.5 m height as per XPA 35-037.
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## References



*Kanne Bridge (Belgium)*



*Sungai Muar Bridge (Malaysia)*

## Local sales contact