

Approval & Reception Procedure

DMC – Departamento de Materiais de Construção	
High Tensile Steel Wire and Strand for the Prestressing of Concrete	Document no. ARP/DMC/19
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1 Reference Standards

BS 5896 - High Tensile Steel Wire and Strand for the Prestressing of Concrete.

ASTM A416 - Standard Specifications for Steel Strand, Uncoated Seven-wire for Prestressed Concrete.

2 Approval Procedures

Manufacturer's information, such as production catalogue, accredited quality system certificates, and mill certificate of each type and size of steel wire or strand should be submitted for compliance verification before any delivery.

Compliance verification includes the following:

- Cast Analysis
- Geometrical properties: Diameter, Cross-sectional Area and Unit Mass.
- Mechanical properties: Tensile strength, Characteristic breaking load, Characteristic 0.1% proof load, Elongation at maximum load, Relaxation test, Modulus of elasticity
- Ductility (Constriction at break or Reverse bends)
- Evidence of production control implementation

A material sample should be submitted at the same time as the above mentioned information is submitted.

3 Reception Procedure

3.1 Batch

A batch of steel wires or strands is any quantity of steel wires or strands of the same type, size and grade, manufactured by the same manufacturer, covered by the same certificates and delivered to the Site at any one time.

3.2 Stocking on the site

Steel wires and strands shall be tagged with a number to identify the coil or bundle number of the prestressing wire or strand used.

Steel wires and strands shall be stored in a dry and weatherproof store and in a manner that will not result in damage or deformation to the materials or in contamination of the materials.

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Different types and sizes of steel wires and strands shall be stored separately. Steel wires and strands shall not be stored on or adjacent to concrete surfaces that form part of the permanent work.

Steel wires and strands shall be protected from exposure to conditions that may affect the material.

3.3 Information to be submitted

Manufacturer's Mill Certificate and Quality Certificate of each delivery should be submitted for reception. Quality Certificate shall indicate the name of manufacturer, date and place of manufacture, grade of strength, diameter, cross sectional area, unit mass, the name of purchaser, the number of contract, product label, the number of coils, reference standards, test reports for mechanical properties (including breaking load, 0.1% proof load, elongation at maximum load, relaxation and modulus of elasticity) and ductility of prestressing wires or strands, seal of quality and technology supervision.

Quantity of each delivery shall be submitted for reception sampling.

3.4 Sampling for Test

Samples of steel wires or strands shall be provided from each batch of material delivered to the Site and at least 28 days before installation starts.

The number of wire strand samples from each batch shall be as stated in the following Table.

Steel Wire	: 1 for each 50 tonnes or part thereof
Wire strand	: 1 for each 100 tonnes or part thereof

The number of specimens in each sample shall be 15. Each specimen shall be 1.5 metres long and straight. Each specimen shall be taken from different coils in the batch. The ends of specimens shall be cut square without unravelling of wires before delivery to the laboratory.

3.5 Testing

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Each specimen of steel wires or strands shall be tested to determine the breaking load, 0.1% proof load, elongation at maximum load, diameter, cross-sectional area, unit mass and modulus of elasticity. Each shall also be tested to determine the ductility.

The method of testing shall be in accordance with BS5896.

The method of testing for elongation at maximum load shall be in accordance with ASTM A 416.

The Relaxation test for steel wire and strand should be done if requested by the designer or the Quality Control.

4 Acceptance Criteria

The standard deviations of the results of tests for breaking load and 0.1% proof load, expressed as equivalent stress values, of steel wires or strands shall not exceed the following:

- Tensile strength: 55 MPa
- 0.1% proof stress: 60 MPa

The statistical interpretation of the test results shall be in accordance with BS 2846: Part 3, Table 3 and BS 2846: Part 4, Table E, both for a one-sided tolerance interval of 0.95 and for a confidence level of 0.95.

If the result of any test for elongation at maximum load, diameter, cross-sectional area, unit mass, modulus of elasticity or ductility of steel wires or strands does not comply with the specified requirements for the property, one additional sample shall be provided from the same batch and additional tests for the property shall be carried out. The number of specimens in the additional sample shall be 15.

The batch shall be considered as not complying with the specified requirements for the property if the result of any additional test does not comply with the specified requirements for the property.