Test method T905

Tensile properties of high tensile steel wire and strand for tendons in prestressed concrete (force/elongation curve)

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Revision Summary

Ed/Rev Number	Clause Number	Description of Revision	Authorisation	Date
		Reformatted and Revision Summary Added	D. Dash	Jun 2001
Ed 2/ Rev 0	All	Reformatted RMS template	J Friedrich	November 2012

Note that Roads and Maritime Services is hereafter referred to as 'RMS'.

The most recent revision to Test method T905 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T905

Tensile properties of high tensile steel wire and strand for tendons in prestressed concrete (force/elongation curve)

1. Scope

This method sets out the procedure for the preparation of force/elongation plots for the determination of the various force/elongation relationships required. The procedure is adapted from Australian Standard 1391.

2. Materials for Test

(a) 7-Wire Stress-Relieved Strand for Tendon in Prestressed Concrete. AS1311.

(b) Steel Wire for Tendons in Prestressed Concrete. AS1310-1972.

3. Equipment

(a) Extensometer. A sensitive extensometer with a gauge length as specified in the appropriate specification (either AS1310,1311 or 1312) for the determination of the force/elongation properties of the test piece. Grade D is the minimum standard required.

(b) Tensile testing machine calibrated in technical units of force in accordance with the Australian Standard AS 2193 and maintained to Grade A standard. The test pieces are to be held by wedge grips and if necessary protected against premature fracture by the insertion of aluminium angle between the grips and the test piece. Locking of the grips is ensured by the use of anchorages similar to those used in prestressing practice fitted to the strand outside the wedge grips and hard up against them.

(c) X-Y Chart Recorder for plotting Force/Elongation Curve.

4. Procedure

(a) Place and lock the test piece in the testing machine and lock the sample in by bringing the force up to the force required, i.e. 20kN for 12.7mm strand, 25kN for 15.2mm strand and 10kN for 7mm wire.

(b) Fix the extensometer to the test piece and set the pen on the X-Y recorder at the reading estimated for the initial force setting.

(c) Apply the force until the stressing force for the particular strand is just exceeded, ie 160kN for 12.7mm strand, 225kN for 15.2mm strand and 50kN for 7mm wire.

(d) Remove the extensometer and continue the application of force until fracture occurs.

(e) On the graph draw the lines appropriate to the required test parameters defined below and read off the values required.

5. Calculation and Reporting

The plot of force against elongation is considered as part of the report and the test parameters set out below are obtained from the plot as required.

6. Test Parameters

From the plot of force against elongation the following parameters may be calculated and reported as required:

(a) Secant Modulus at the stressing force. Read off the elongation at the stipulated stressing force. Calculate the secant modulus as follows:

$$\text{Secant Modulus} = \frac{Stres\,sin\,gLoad \times GaugeLength}{CrossSectionalArea \times Elongation}$$

(b) Proportional Limit (0.01% Offset)

Draw a line, parallel to the section of the force/elongation curve where proportional extension occurs, (the graph is a straight line) and 1 $\times 10^{-4}$ of the gauge length to the right of it. Where this line intersects the graph read the force at 0.01% offset.

(c) 0.2% Proof Load or Stress

Draw a line parallel to the section of the force/elongation curve where proportional extension occurs, and 2 $\times 10^{-3}$ of the gauge length to the right of it. Where this line intersects the graph is the force corresponding to the 0.2% proof load.

To convert this proof load to proof stress divide this figure by the cross sectional area of the wire. (This applies to 5 mm and 7 mm single wires only).