Transport Roads & Maritime Services

NSW GOVERNMENT

Test method T901

Tensile properties of steel bar and wire (Tensile strength)

NOVEMBER 2012

Revision Summary

Ed/Rev Number	Clause Number	Description of Revision	Authorisation	Date
		Reformatted and Revision Summary Added.	D.Dash	June 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 T901 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T901

Tensile properties of steel bar and wire (Tensile strength)

1. Scope

This test method sets out the procedure for determining the tensile strength of reinforcing steel bar, prestressing steel bar for use in concrete structures and test pieces cut from structural steel and is adapted from those laid down in the Australian Standard 1391.

2. Definitions

Term	Definition
Yield stress	The lowest stress at which the elongation of the test piece increases without increase of load, or with decrease of load. The yield stress may be noted as the point at which there is a distinct hesitation in the movement of the gauge pointer even though the force is being increased at a moderately fast rate. It may also be defined as the stress at which a visible permanent increase occurs in the distance between the gauge points on the test piece (proof stress).
Proof Stress	The stress which produces, while the force is still applied, a non-proportional extension equal to a specified percentage of the extensometer gauge length.
Tensile strength	The maximum force divided by the original sectional area of the test piece.

3. Materials for Test

The following materials with their appropriate standards are covered in this method:

(a) Hard Drawn Steel Reinforcing Wire for Concrete. Australian Standard 1303.

(b) Steel Reinforcing Bars for Concrete. Australian Standard 1302.

(c) Hard-Drawn Steel Wire Reinforcing Fabric for concrete. Australian Standard 1304.

NOTE: Weld test pieces and galvanised chain wire are tested for tensile strength by the procedure set out in this Test Method.

4. Equipment

Tensile testing machine calibrated in technical units of force in accordance with the British Standard 1610 part 1 and maintained to Grade A Standard. The test pieces are to be held by wedges, screwed holders, shouldered holders or other positive means as most convenient. The test pieces are to be held in such a way that the load is applied axially so that no premature break may occur due to deformation of the test piece in the grips.

5. Rate of Application of Force

The Australian Specifications for Steel Reinforcing Bars (1302) states that the rate of straining when approaching the yield stress or proof stress shall lie within the highest range of the strain rate given in AS 1391.
The Australian Standard for Hard-drawn Steel Reinforcing Wire (1303) states that the tensile force shall be applies steadily and the rate of staining when approaching 0.4% total strain shall lie within the highest range of strain rate given in AS 1391.

6. Procedure

(a) Determine the cross sectional area of the test bar by direct measurement of the diameter with a micrometer.

(b) The tensile properties of deformed specimens are determined on the nominal cross sectional area of the bar as set out in the following table:

Bar Size mm	Calculated mass Per metre Kg/m	Nominal Area mm^2
10	0.616	80
12	0.888	110
16	1.579	200
20	2.466	310
24	3.551	450
28	4.834	620
32	6.313	800
36	7.991	1020
40	9.864	1260
50	15.413	1960

(c) Place and lock the test specimen in the grips and apply the tensile force at the speed specified and taking into account the requirements set out in (6) above.

(d) During the application of the force in the case of steel other than high tensile steel or unless otherwise stated, note the force at which a distinct drop or hesitation occurs in the movement of the gauge pointer and record as the yield force.

(e) In the case of Hard Drawn Wire and Cold Worked Reinforcing Bars prepare a force elongation curve according to Test Method T904. The 0.4% Proof Stress may be read from the curve. An alternative method is to measure the 0.4% extension of the gauge length using trammel points, dividers or some suitable form of extensometer.

(f) Continue the application of force until fracture of the specimen occurs, noting the final force achieved.

7. Calculation and report

(a) Calculate the yield stress and the tensile strength of the bar by dividing the yield force and final force by the cross sectional area of the test piece. Report the yield stress or proof stress and the tensile strength in megapascals (MPa).

Or

Report the yield forced and the tensile strength in kilonewtons (kN) if required.