AS 1313—1989

Australian Standard®

# Steel tendons for prestressed concrete—Cold–worked high–tensile alloy steel bars for prestressed concrete

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Australian Institute of Steel Construction

Bureau of Steel Manufacturers of Australia

Confederation of Australian Industry

Institute of Steel Service Centres of Australia

Metal Trades Industry Association of Australia

National Association of Australian State Road Authorities

Railways of Australia Committee

Steel Reinforcement Promotion Group

University of New South Wales

University of Sydney

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# Steel tendons for prestressed concrete—Cold–worked high–tensile alloy steel bars for prestressed concrete

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# PREFACE

This Standard was prepared by the Standards Australia Committee on Structural Steel as a replacement for AS 1313–1972, *Cold–worked high–tensile alloy steel bars in prestressed concrete (metric units).*

This Standard differs from the previous edition as follows:

(a) The introduction of the ‘Referenced Documents’ clause.

(b) Australian Standards replace British Standards as referenced documents.

(c) ‘Proof stress’ is changed to ‘yield force’ and ‘breaking load’ to ‘breaking force’.

(d) There is a change in the relaxation test procedure which is now in an appendix.

(e) The marking (identification) requirements are revised.

(f) 15 mm and 19 mm bars are introduced in Tables 1 and 3.

(g) Some editorial variations in accordance with current Standards Australia style have been introduced.

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STANDARDS AUSTRALIA

# Australian Standard
# Steel tendons for prestressed concrete—Cold-worked high-tensile alloy steel bars for prestressed concrete

**1 SCOPE**. This Standard specifies requirements for two grades of high-tensile steel bar, made from hot-rolled alloy steel bars by cold-working, intended for use in prestressed concrete and prestressed ground anchors.

The two grades of bar are 'regular' and 'super'.

Bars may be plain or ribbed.

NOTE: Guidelines to purchasers on requirements that should be specified by the purchaser and those that should be agreed at the time of enquiry or order are given in Appendix A.

**2 REFERENCED DOCUMENTS.** The following documents are referred to in this Standard:

AS

1391 Methods for tensile testing of metals

1545 Methods for the calibration and grading of extensometers

2193 Methods for calibration and grading of force-measuring systems of testing machines.

2706 Numerical values—Rounding and interpretation of limiting values.

**3 DEFINITIONS.** For the purpose of this Standard, the definitions below apply.

**3.1 Breaking force**—the force where failure of the parent bar occurs.

**3.2 Rib bar**—a deformed bar of substantially circular cross-section.

**3.3 Nominal diameter of rib bar**—the diameter of a plain bar having the same mass per metre as that of the rib bar.

**3.4 Length**—a piece of bar cut to a specified length.

**3.5 Lot**—a quantity of finished bars manufactured under essentially the same conditions and at essentially the same time. A consignment or shipment may consist of one or more lots, or parts thereof.

**3.6 Parent bar**—the bar in the as-cast condition as received from the steelmaker.

**3.7 Relaxation**—loss of force on a test piece that is being maintained at constant length and constant temperature.

**3.8 Rolled threads**—threads formed by cold-rolling a plain bar.

**3.9 Yield force**—force determined from the force-elongation curve based on a non-proportional elongation of 0.2 percent.

**4 BASE MATERIAL.** On check analysis, the chemical composition of the steel shall have not more than 0.050 percent of sulphur and not more than 0.050 percent of phosphorus.

NOTE: No other limitations are given for the composition of the steel. The tensile strength and other requirements imply that the bars will be manufactured from a steel of suitable composition.

**5 PROOF LOADING DURING MANUFACTURE.** All bars shall be proof loaded either during cold-working or after cold-working, the proof load being at least 0.85 times the minimum breaking force given in Table 3, as appropriate.

**6 QUALITY OF FINISHED BARS.** Bars shall be manufactured to the specified dimensions (see Table 1) and shall be sound and free from harmful defects such as splits, surface flaws and piping.

Light surface rusting is permissible, provided no pitting detrimental to the performance of the bar is present.

Where bars are threaded, the threads shall be cold-rolled.

**7 WELDS.** There shall be no welds on any length of bar. Bars shall not be welded under any circumstances.

**TABLE 1**
**DIMENSIONS**

| PLAIN BAR | | | RIBBED BAR | | |
|---|---|---|---|---|---|
| Nominal diameter mm | Nominal area $mm^2$ | Nominal mass kg/m | Nominal diameter mm | Nominal area $mm^2$ | Nominal mass kg/m |
| 15 | 177 | 1.54 | | | |
| 19 | 284 | 2.42 | | | |
| 23 | 416 | 3.49 | 26.5 | 551 | 4.48 |
| 26 | 531 | 4.43 | | | |
| 29 | 661 | 5.48 | 32 | 804 | 6.53 |
| 32 | 804 | 6.64 | | | |
| 35 | 962 | 7.91 | | | |
| 38 | 1 134 | 9.29 | 36 | 1 018 | 8.27 |

NOTES:

1. Nominal area is the area of the threaded portion of the bar
2. Nominal mass is the mass of the bar as delivered.
3. Nominal mass is calculated on the basis of average actual diameter after cold-rolling and a steel density of 7850 $kg/m^3$.