

SECTION 707 - FENCING

~~##This section cross-references Section 703.~~

~~If Section 703 is relevant, it should be included in the specification.~~

~~If Section 703 is not included in the specification, all references to it should be struck out, ensuring that the remaining text is still coherent:~~

707.01 GENERAL

This section covers the requirements for the supply and quality of materials, preparation of the site, removal of existing fencing, supply and installation of all fencing materials, including gates and connections to existing fencing at the locations shown on the drawings or described in this specification.

The Contractor shall conduct its operations in such a manner as to prevent the escape or improper movement of livestock.

Existing fencing shall not be removed until the new fencing has been erected and is stock-proof.

Existing fencing which has been damaged by the Contractor and which is required to remain in place shall be repaired or replaced to the satisfaction of ~~the Superintendent~~ Council at the Contractor's expense.

707.02 AUSTRALIAN STANDARDS

AS 1074	Steel tubes and tubulars for ordinary service
AS/NZS 1111	ISO Metric hexagon commercial bolts and screws
AS/NZS 1112	ISO Metric hexagon nuts, including thin nuts, slotted nuts and castle nuts
AS/NZS 1163	Cold-formed structural steel hollow sections
AS 1214	Hot-dip galvanized coatings on threaded fasteners
AS 1237	Flat metal washers for general engineering purposes (metric series)
AS/NZS 1390	Cup head bolts with ISO metric coarse pitch threads
AS 1397	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS 1450	Steel tubes for mechanical purposes
AS 1604	Timber, preservative treated, sawn and round
AS 1725.1	Chain link fabric fencing - Security fences and gates - General requirements
AS 2082	Timber – hardwood – visually graded for structural purposes
AS 2334	Steel nails – metric series
AS 2423	Coated steel wire fencing products for terrestrial, aquatic and general use
AS 2858	Timber – softwood – visually graded for structural purposes
AS 3600	Concrete Structures
AS 3750.9	Paints for steel structures – Organic zinc-rich primer
AS 4534	Zinc and zinc/aluminium-alloy coatings on steel wire
AS 4680	Hot dipped galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS 4792	Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process

707.03 MATERIALS

Unless specified otherwise, all fencing materials and products shall be supplied by the Contractor and shall be of the dimensions, manufacture, quality and structural grade in accordance with the requirements of this specification and drawings.

(a) Untreated Timber Posts and Stays

Untreated timber posts and stays shall be hardwood timber in accordance with AS 2082 and shall be cut from sound timber, stripped of all bark and backed off with ends sawn square and dried to equilibrium moisture content. Posts and stays shall be straight and of dimensions not less than shown on the detailed drawings.

(b) Treated Timber Posts and Stays

Treated timber posts and stays shall be hardwood timber in accordance with AS 2082 or pine in accordance with AS 2858 and be of sound timber treated to comply with the requirements of AS 1604 for Hazard Level 4 protection. Treated timber posts and stays shall be of round or sawn rectangular shape and be free of any defect making them unsuitable for the purpose intended.

Round posts and stays shall be peeled to remove all bark, except that strips of inner bark may remain if not over 15 mm wide or over 75 mm long. All knots shall be trimmed flush with the sides, spurs and splinters removed and ends cut square.

The slope of grain in sawn rectangular posts, for the full length, shall not exceed 1 in 10; and knots shall be sound, tight, well spaced, and shall not exceed 40 mm in size in any face.

Treated timber posts and stays shall be straight and of dimensions not less than shown on the detailed drawings. Posts to be driven shall be square ended, or shall be blunt pointed prior to treatment to a bevel angle not exceeding 30 degrees.

(c) Tubular Steel Posts, Rails and Stays

Steel posts shall be manufactured from steel complying with one of AS 1074, AS/NZS 1163, AS 1397 or AS 1450, and having a minimum yield strength of 195 MPa. The dimensions of tubular steel shall be in accordance with the requirements for medium tubes to AS 1074.

Steel posts shall be either:

- hot dipped galvanised in accordance with AS/NZS 4680; or
- pre-galvanised prior to forming in accordance with Z275 coating class to AS 1397 (total minimum coating mass on both surfaces of 275 g/m²). The finished tube must be equivalent to AS/NZS 4792 ZB135/135. The weld seam made during forming of pre-galvanised steel post sections shall be repaired in accordance with AS/NZS 4792, Section 3, by applying a coating using a metal spraying system employing a suitable zinc or zinc-alloy wire/powder.

All steel shall be free from distortion, with the galvanizing intact, and protected from damage at pipe connections.

Posts shall be either adapted before galvanizing, or modified and protected after galvanizing, to provide means for attaching the fencing to the posts in a manner that will not damage the posts or fencing material, and shall be fitted with watertight galvanized steel tops.

Any damage to the galvanized coating of tubular steel posts, rails and stays and other galvanized products specified in this section shall be repaired using an organic zinc-rich primer complying with AS 3750.9.

(d) Steel Posts other than Tubular Steel Posts

Non-tubular steel posts shall be of 'Star' or other specified cross section and shall be black varnished or hot-dip galvanized in accordance with AS/NZS 4680 and drilled to suit the spacings of the wires and the lengths shown on the drawings.

(e) Reinforced Precast Concrete Posts

Precast concrete posts shall be steel reinforced and designed in accordance with AS 3600. Unless otherwise specified or shown on the drawings, concrete shall be N32 standard strength grade, placed, compacted and cured in accordance with the requirements of Section 703. Steel reinforcement shall comply with the requirements of AS 3600.

(f) Droppers

Timber droppers shall be sawn hardwood timber in accordance with AS 2082 or pine in accordance with AS 2858 and free from cross grain and large knots and of the length shown on the drawings.

Bored hardwood droppers shall be of 50 mm x 38 mm nominal size timber. Treated hardwood droppers to AS 1604 attached without boring shall be not less than 35 mm x 19 mm section.

Pine droppers shall be 42 mm x 35 mm minimum size timber and be pressure treated with preservative to AS 1604.

Metal droppers shall be hot dipped galvanized in accordance with AS/NZS 4680 and to the lengths shown on the drawings.

(g) Wire

All wire products including tie wire shall comply with the requirements of AS 2423, galvanized in accordance with AS 4534 and be of the gauge and type specified on the drawings.

Fabricated wire fencing shall be standard proprietary manufactured item. The width, mesh and gauge shall be as specified or as shown on the drawings.

(h) Gates

Gates shall be standard proprietary manufactured items with galvanized tubular steel frame in accordance with AS 4680 of the type and dimensions specified or shown on the drawings.

Hinges, catches and other fittings for gates shall be standard proprietary manufactured items fabricated from grade 250/300 structural steel and hot-dipped galvanized in accordance with the requirements of AS 4680.

(i) Miscellaneous Materials

All ferrous bolts, nuts and washers, shall be standard proprietary manufactured items complying with the requirements of AS/NZS 1111, AS/NZS 1390, AS/NZS 1112 and AS 1237. Bolts, nuts and washers shall be hot-dipped galvanized in accordance with the requirements of AS 1214. Ties, staples and other minor fittings for fences shall be galvanized standard proprietary manufactured items.

All brackets for steel posts and treated timber posts shall be standard proprietary manufactured items fabricated from grade 250/300 structural steel and hot-dipped galvanized in accordance with the requirements of AS 4680.

All concrete specified or shown on the drawings shall be strength grade N20 complying with the requirements of Section 703.

Steel nails shall be manufactured in accordance with AS 2334 and shall be hot-dipped galvanized to 300 g/m² coating mass in accordance with AS 4680.

(j) Electrical Insulation Materials

All fittings shall be standard proprietary manufactured items of the type and dimensions specified or shown on the drawings.

(k) Certificate of Compliance

The Contractor shall submit for review by ~~the Superintendent~~ Council not less than 14 days prior to the proposed use of fencing materials, gates and connections to existing fencing, a signed Certificate including relevant test reports demonstrating the compliance of the materials and components required for the construction of each type of fencing, gates and connections to existing fencing, comply with the requirements of this specification.

The Certificate of Compliance shall identify the item and record the product certification, inspection or test records that verify conformance. All certification, inspection and test records shall be available for review upon request by ~~the Superintendent~~ Council.

707.04 CONSTRUCTION

Fences shall be constructed true to the lines pegged on the ground. All logs, stumps, saplings and undergrowth within 1 m of the fence line, and all trees which will interfere with the proper construction of the fence shall be removed and disposed of by the Contractor. Any high points which interfere with the placing of wire or wire netting shall be cut down to provide the clearance shown on the detailed drawings, and any low spots shall be filled with surplus earth from holes and trimmings.

Fences shall be constructed in accordance with the drawings. All posts shall be set in line so that the tops line up uniformly without sudden dips or irregularities.

Unless otherwise specified, surplus earth from holes and trimming shall be spread within the road reserve and the area shall be left clean and tidy on completion of the work.

Straining of wires shall be done using an approved friction type wire strainer which incorporates a non-scarring wire grip and a tensioning gauge with calibrating springs for measurement of the tension as shown on the drawings or to the manufacturer's recommended maximum tensions. The Contractor shall take all precautions necessary to avoid kinking and overstraining of the wire during handling and installation.

(a) Post and Wire Fences

Timber and concrete posts shall be set in dug or drilled holes, except that posts of treated round timber may be driven provided the method of driving does not damage the post. Posts shall be set solidly and any space left around the posts shall be backfilled and the backfilling compacted. Posts to be driven shall be driven small end down. Other posts shall be placed butt end down.

Steel posts shall be set by driving using a method that does not damage the posts or their galvanizing.

At all grade changes where posts are liable to be lifted by strained wires, posts shall be at least 2.1 m long, set at least 900 mm into the ground and tied down. Tie down posts comprising 600 mm galvanized star steel posts shall be driven into the ground at an angle of 45 degrees, and the bottom four wires preferably adjacent to a post or dropper shall be tied to it by galvanized tie wire at least 2 mm diameter.

Unless otherwise shown on the drawings all other posts shall be set at least 600 mm into the ground.

Strainer assemblies shall be provided at all ends, angles, abrupt changes of grade, and intersections of cross fences as shown on the drawings. Intermediate strainer assemblies shall be provided on straights at intervals not exceeding 200 m, and spaced to the best advantage in the circumstances.

Strainer assemblies at ends and gates shall be single strainer except where provision of double strainer assemblies is specified. Intermediate strainer assemblies shall be single strainer assemblies with both diagonals braced. Corner posts shall be braced in two directions and gate posts shall be braced in one direction.

Plain wires shall be reeved through holes drilled in the posts except that where treated round posts are used wires may be attached with staples after straining. The length of staples shall be 50 mm for pine posts and 40 mm for hardwood posts. Barbed wire shall be secured with galvanized tie wire of not less than 2.5 mm diameter passed through holes bored in the posts, and twisted to the barbed wire on each side of the post, or shall be stapled to treated posts with staples. Top and bottom wires shall be firmly attached to droppers by preformed ties or twisted galvanized tie wire of not less than 2.5 mm diameter. Intermediate wires shall be similarly attached or shall be threaded through holes bored in the droppers.

(b) Wire Netting Fences

Posts and wire shall be erected as for post and wire fences. The netting shall be tightened between posts, and shall be fastened to timber posts and droppers with 25 mm staples at 150 mm intervals and to steel posts and droppers with proprietary galvanized clips or 2.5 mm galvanized tie wire, at 150 mm intervals. The netting shall also be fastened to each wire with 2.5 mm diameter galvanized tie wire or proprietary galvanized clips at intervals not exceeding 1 m.

(c) Wire Mesh Fences

Posts and wire shall be erected as for post and wire fences.

Wire mesh shall be attached to posts and droppers by stapling or tying the top and bottom line wires and at least every alternate intermediate wire to each post after straining.

(d) Chain Wire Fences

Posts shall be set in concrete footings of the dimensions shown on the drawings, with the top of the concrete crowned to shed water. End, corner and gate posts shall be braced as shown on the drawings. Line posts shall be braced as shown on the drawings at not more than 120 m intervals. Chain wire shall comply with the requirements of AS 1725.

Chain wire shall be tightened and securely fastened to posts and line wires on the side as shown on the drawings. Fastening to end, corner and gate posts shall be by lacing through each outer mesh with 2.5 mm diameter galvanized tie wire. Chain wire shall be fastened to line posts and line wires with 2.5 mm diameter galvanized tie wire or clips. The fastenings shall be spaced at not more than 400 mm intervals on line posts and at not more than 500 mm intervals on line wires.

(e) Steel Post and Welded Mesh Fences

Posts shall be set in concrete footings of the dimensions shown in the drawings, with the top of the concrete crowned to shed water.

Welded mesh panels shall be attached to posts with standard proprietary manufactured galvanized fittings.

(f) Paling and Timber Post Sound Attenuation Fences

Posts shall be set in concrete and the fence shall be constructed to the dimensions and locations as shown on the drawings.

Palings shall be straight and clean, and free from splits and major defects. Palings shall be fixed to each rail as shown on the drawings.

(g) Electrical Insulation of Fences

Where specified, insulation panels and fittings shall be incorporated in fences in close proximity to overhead power transmission lines, in accordance with the drawings.

707.05 GATES

The Contractor shall install gates of the type, size and location as specified, or shown on the drawings. Gate posts shall be of the dimensions shown on the drawings and be firmly set into the ground to the depth specified or as shown on the drawings. Each post shall be fitted with a strut as shown on the drawings. Tubular metal posts shall be set in concrete as detailed. At gateways in wire netting fences, a timber sill shall be set tightly between the posts and flush with the ground.

All gates shall be hung with galvanized hinges securely attached to the gate posts and be able to swing freely. Each gate shall be fitted with a galvanized catch for holding them securely closed, of a type to suit the gate and adjoining fence. For wire netting fences, gates shall be finished so as to be rabbit-proof when closed.

707.06 JUNCTIONS WITH EXISTING FENCES

New fences shall be connected to existing cross fences and existing fences which continue the line of the new fences. Posts with braces for every direction of strain shall be placed at the junction with existing fences. The wire in existing fences shall be strained and securely fastened to the junction posts.

707.07 REMOVAL OF EXISTING FENCES

Where specified or shown on the drawings, existing fences, including all wires, mesh, posts, rails, strainers, netting and concrete footings shall be removed and re-erected to the pattern existing prior to removal.

Fences no longer required shall be removed. All materials comprising the removed fences shall become the property of the Contractor and shall be removed from the site. All footing, post and strainer holes shall be backfilled and compacted in layers of a maximum depth of 150 mm with surplus earth or topsoil to the relative compaction of the surrounding ground material.

707.08 CONSTRUCTION TOLERANCES

Unless stated otherwise, tolerances for the construction of fencing shall be as follows:

- (a) the vertical tolerance on the height of fencing shall be ± 20 mm from the design line;
- (b) the longitudinal line tolerance for fencing shall be ± 20 mm in plan view; and
- (c) the tolerance on the verticality of fencing shall be 1 in 50.