

*Manganese Steel Castings*

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**STANDARDS  
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ESTABLISHED UNDER THE AEGIS  
OF THE COMMONWEALTH AND  
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PROMOTION OF STANDARDISATION  
AND SIMPLIFIED PRACTICE



INCORPORATING

AUSTRALIAN COMMONWEALTH ENGINEERING STANDARDS ASSOCIATION, FOUNDED 1922  
AUSTRALIAN COMMONWEALTH ASSOCIATION OF SIMPLIFIED PRACTICE, FOUNDED 1927  
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S T A N D A R D S  
A S S O C I A T I O N  
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Established under the Aegis of the Commonwealth and  
State Governments for the Promotion of Standardisation  
and Simplified Practice.

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AUSTRALIAN STANDARD SPECIFICATION

for

Manganese Steel Castings

for

Tramway Trackwork

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PAGES.

AUSTRALIAN STANDARD SPECIFICATION

FOR

MANGANESE STEEL CASTINGS FOR TRAMWAY TRACKWORK.

(Including Provisions for Finishing and the Fitting of Fishplates).

1. CHEMICAL COMPOSITION. The chemical composition of the steel shall conform to the following limits :-

Carbon.....	1.00 to 1.35	per cent.		
Manganese.....	11	" 14.5	"	"
Silicon.....	not to exceed	0.80	"	"
Phosphorous.....	" " "	0.07	"	"
Sulphur.....	" " "	0.05	"	"

2. CHEMICAL ANALYSIS. The manufacturer shall make an analysis of a sample of the steel from each cast, and shall supply a copy of the result to the Inspector.® If the material does not comply with the requirements of Clause 1 it shall be rejected.

3. CHECK ANALYSIS. The manufacturer shall furnish the Inspector when directed with samples for check analysis. If the result of any check analysis shows that the material of any cast does not comply with the requirements of Clause 1 such material shall be rejected.

4. METHODS OF SAMPLING AND ANALYSIS. All sampling and analysis shall be carried out in accordance with the requirements of A.S. No. K.1, "Methods of Sampling and Analysis of Plain Steels, Alloy Steels and Pig Iron", or by other methods approved by the Inspector.

5. SOUNDNESS. The castings shall be reasonably smooth. They shall contain no cracks and no large blow-holes. Small blow-holes or sandholes, except in the running surfaces and flange-bearing grooves, shall not constitute a defect if they are not such as to impair the strength or serviceability of the castings. Castings shall be out of winding and free from lumps, fins, sand or chills. Internal chills or inserts shall not be used unless specifically allowed by the Purchaser.

6. LIMITING THICKNESS. The castings shall be of full section throughout and true to approved patterns or drawings. No parts shall be less than 1/2 in. in thickness. All angles in castings shall be provided with fillets, and large differences in thickness of metal shall be avoided as much as possible.

7. WELDING AND CUTTING. Electric or oxy-acetylene welding or cutting shall not be employed on castings without the permission of the Inspector in each instance. Any castings upon which welding or cutting has been done without the permission of the Inspector shall be rejected. Where cutting is permitted, at least 1/32 in. shall be ground from each cut surface. Where welding is permitted the electrodes employed shall be of a type approved by the Purchaser.

®The word "Inspector" shall mean any person acting under the express written authority of the Engineer or of the Purchaser.



8. REJECTION OF DEFECTIVE CASTINGS. If defects are such that repairs are not sanctioned, or if sanctioned repairs are not carried out to the satisfaction of the Inspector, the castings may be rejected.
9. REMOVAL OF RISERS. Where it is necessary to remove risers by flame cutting, care shall be taken to make the cut at such a distance from the body of the castings as will prevent any defect due to local heating. Cut surfaces shall be ground off as specified in Clause 7, Cutting and Welding, above.
10. HOLES. Holes shall be smoothly cored to full size in the positions specified or shown on the Drawings supplied by the Purchaser. Holes shall be within  $3/32$  in. of the specified positions, and within plus  $3/32$  in. of the specified diameters. All rectangular holes shall have the corners rounded to a suitable radius.
11. BEND TESTS. (a) Selection of Test Specimens and Witnessing of Tests. Bend test specimens shall be detached, ground and tested in the presence of the Inspector.
- (b) Casting of Bend Test Specimens. Bend test specimens shall be cast on to the castings supplied under the Contract.
- (c) Treatment of Bend Test Specimens. Bend test specimens shall not be hammered or forged. They may be protected from oxidation in the oven by enclosing them in pipes containing a small amount of carbonaceous material, partly sealed or luted to prevent furnace gases from coming in contact with the test specimens.
- (d) Dimensions of Bend Test Pieces. Test pieces shall be approximately 8 in. long, and 1 in. x  $\frac{1}{2}$  in. in cross section. They shall be ground on one face only, and the edges rounded to a radius of  $1/16$  in.
- (e) Bend Test Requirements. Test pieces shall be bent in the direction of the smaller dimension, by blows or pressure, around a bar 1 in. in diameter, and shall withstand without any sign of fracture being bent through an angle of 45 degrees (i.e. from  $180^{\circ}$  to  $135^{\circ}$ ).
- (f) Number of Bend Tests. One bend test shall be made on a test piece taken from each casting supplied under the contract.
- (g) Defective Test Pieces. If any test specimen shows flaws and does not conform to the specified requirements, it may be discarded, in which case the Inspector may adopt other means of determining whether the heat-treatment has been satisfactory.
- (h) Reheat Treatment and Retests. If the result of the bend test for any casting does not conform to the specified requirements, and if the other tests and analyses are satisfactory, such casting may be reheat-treated and a further bend test carried out as specified. Only one reheat-treatment shall be allowed, and if the resulting bend test does not conform to the specified requirements the casting shall be rejected.
12. HARDNESS TESTS. (a) Test Samples. Samples shall be ground but not hammered or forged in any way.

(b) Test Requirements. The Brinell Hardness number shall be ascertained by testing a sample from each heat-treatment batch, and shall not be less than 170 nor more than 250.

13. FINISH. (a) Straightening. Castings shall be straightened by gradual pressure so as to present no kinks perceptible to the eye. After straightening, the under surface of the flanges shall be substantially in one plane, free from projections, hollows, or unevenness which will impair the bearing for sleepers. This surface shall be substantially parallel to the finished top face of the casting.

(i) On the top running surface to a profile specified by the Purchaser. The tolerance shall be  $1/32$  in. on a 36 in. straight edge. The surface shall be free from perceptible corrugations.

(ii) On the sides of the grooves for a depth of  $3/4$  in. from the top.

(iii) On the surfaces of the flange-bearing grooves with a tolerance as for (i) above.

(iv) On the end faces of the legs which shall be ground square, or undercut to an extent not exceeding  $1/16$  in.

(v) On all faces of tongues with a tolerance as for (i) above. The bottom faces of the tongues and also floors of castings carrying tongues shall be in one plane without ridges or recesses

(vi) On the full area of floors carrying tongues with a tolerance as for (i) above.

(vii) On the bearings for fishplates, so as to provide a smooth even bearing for the full length of the fishplate, top and bottom, and on the bearings for the soleplates similarly if specified by the Purchaser.

(viii) On any other parts specified by the Purchaser, or where required to make parts or mechanism a good fit without appreciable play.

(ix) On the base to present a smooth bearing surface parallel to the running surface if specifically stated in the Purchaser's Enquiry or Order.

(c) General Finishing Tolerances. After grinding the depth of the castings shall be within the following limits:  $1/16$  in. under to  $1/8$  in. over the specified depth.

If Clause 13, Sub-clause (b) (ix) applies, the overall depth shall be within plus or minus  $1/16$  in. of the specified depth. Straights and curves shall vary no more than  $1/16$  in. from a 5 ft. straight edge or from a 5 ft. curve template respectively.

14. FERRULES FOR BONDS. Ferrules for bonds shall be fixed in the manner specified by the Purchaser, if required.

15. FISHPLATES. Fishplates shall be fitted so as to provide smooth joints between castings and on to closing rails. Fishplates shall be of the standard rolled sections specified by the Purchaser, and shall not be forged or machined in any way. When fishplates are tightened up, they shall fit evenly on top and bottom for their full length, and their inner surfaces shall have  $3/16$ " to  $3/8$ " clearance from the webs of castings. The running surfaces and gauge lines of rails and castings at joints shall be flush (maximum tolerance  $1/64$  inch).

16. PAINING. No painting of any kind, other than marking for identification, shall be employed on the castings.

17. INSPECTION. The Inspector shall have free entry, at all times, while work on the Contract is being performed, to all parts of the Manufacturer's works with which the manufacture of the castings is concerned. The Manufacturer shall afford the Inspector all reasonable facilities in the performance of his duties. All tests, except check analyses, shall be made at the place of manufacture prior to shipment (unless otherwise agreed between Purchaser and Manufacturer) and shall be so conducted as not to interfere unnecessarily with the operation of the Works.

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APPENDIX I.

Manufacturers's Guarantee.

It is considered inappropriate, as a general practice to include in a standard specification for the supply of materials, clauses relating to conditions of the contract between the purchaser and the supplier.

In cases in which it is desirable that a particular condition should be uniformly adopted, it is preferable that that condition be the subject of a recommendation appended to the specification but not constituting a mandatory feature of the specification.

The following clause is recommended for adoption in the conditions of contract for the supply of materials conforming to this specification.

Manufacturer's Guarantee. The Supplier shall guarantee all manganese steel castings supplied under the Contract for a period of 12 months under normal traffic conditions, measured from the date of installation, or for a period of 18 months from date of delivery (whichever period expires the sooner). Should any defect occur during that period, such as in the opinion of the Purchaser's Engineer will impair the life or wearing quality of the casting, the defective material shall be replaced by the Supplier at his own expense. Replacements shall be subject to the same guarantee and to the other requirements of this Specification.

The time allowed for delivery of replacements and the place of delivery shall be as specified for the original materials and the Supplier shall not be required to pay the cost of installation.