

FRONZ / ONTRACK
APPROVED CODE OF PRACTISE
FOR
HERITAGE NETWORK OPERATORS

Mechanical Supplementary Code
B3.1.2.03
Non-Ferrous Castings

Issue	Prepared (P), Reviewed (R), Amended (A)	Approved by	Effective Date
1	P McCallum (P)	Heritage Technical Committee	27 June 2006

Reference Material

Source	Description	Date
NZ Railways	Mechanical Branch Code No 60, Issue 5	1/7/1972

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Amendment History

Version	Section	Amendment

Non-Ferrous Castings

1 Introduction

This Supplementary Code relates to:-
B3.1.1.01 - Mechanical Code Of Practice, Section 3.17 - Materials

It contains:-

- NZ Railways Mechanical Branch Code No 60, Issue 5 of 1/7/1972

which contains information relevant to non-ferrous castings. Operators are to use those sections that are relevant to their operation.

NEW ZEALAND GOVERNMENT RAILWAYS MECHANICAL BRANCH	NON-FERROUS CASTINGS	CODE No. 60
		Issue No 5 Date Issued 1/7/72

(1) COMPOSITION

The chemical composition of non-ferrous castings manufactured in Workshops shall conform to the following percentages:

Symbol	Description	Copper Cu	Tin Sn	Zinc Zn	Lead Pb	Manganese Mn	Iron Fe	Aluminium Al	Nickel Ni	Antimony Sb	Phosphorus P	Silicon Si	Magnesium Mg	Total Other Elements
A	Steam or valve bronze	Remainder	5.5-6.5	3-5	1-2	...	...	...	...	...	...	...	...	...
	(maximum)	...	...	...	...	...	0.25	0.005	1.0	...	0.05	...	...	0.35
B	Leaded gunmetal	Remainder	4-6	4-6	4-6	...	...	...	...	...	...	...	...	...
	(maximum)	...	...	...	...	...	0.4	0.005	1.0	0.3	0.05	0.005	0.005	...
C	Leaded bronze	Remainder	4.5-6.5	4-6 [1]	15-17	...	...	...	...	...	...	...	...	...
	(maximum)	...	...	...	...	...	0.4	0.005	1.0	0.5	0.1	0.03	0.005	...
D	Tin bronze	Remainder	9-11	1-3	0.5-1	...	...	...	...	...	...	...	...	...
	(maximum)	...	...	...	...	...	0.4	0.005	1.0	0.3	0.05	0.005	0.005	...
E	Manganese bronze	Remainder	0.5-1.5	38-42	...	0.5-3.5	0.4-2	1-2	...	...	...	...	...	...
	(maximum)	...	...	...	0.2	...	...	...	0.5	...	...	0.03	...	...
F	Brass to be brazed	Remainder	...	15-17	0.5-1.0	...	...	...	...	...	...	...	...	...
	(maximum)	...	0.25	...	...	...	0.4	0.005	...	0.3	0.05	0.005	...	...
G	Aluminum (B.S. 1490)	2-4	...	...	...	0.3-0.7	...	Remainder	...	...	...	4-6	...	...
	LM 4 (max.)	...	0.05	0.5	0.1	...	0.8	...	0.3	...	...	...	0.15	...
	LM 6 (max.)	0.1	0.05	0.1	0.1	0.5	0.6	...	0.1	...	...	10-13	...	0.1
H	Lead base bearing metal	...	4-6	...	Remainder	...	...	...	...	...	9-11	...	...	...
	(maximum)	0.5	...	0.005	...	...	0.1	0.005	...	...	...	...	...	...
J(i)	50/50 solder	...	49-51	...	Remainder	...	...	...	...	...	...	...	...	...
	(maximum)	0.08	...	0.005	...	...	0.02	0.005	...	0.5	...	...	...	0.08
J(ii)	Tin base solder	...	59-61	...	Remainder	...	...	...	...	...	...	...	...	...
	(maximum)	0.08	...	0.005	...	...	0.02	0.005	...	0.5	...	...	...	0.08
J(iii)	Tin base solder	...	84-86	...	Remainder	...	...	...	...	...	...	...	...	...
	(maximum)	0.08	...	0.005	...	...	0.02	0.005	...	0.5	...	...	...	0.08
K	Lead base packing metal	...	5-6	...	Remainder	...	...	...	...	5-6	...	...	...	...
	(maximum)	0.5	...	0.005	...	...	0.1	0.005	...	...	...	...	...	...
L	Tin base bearing metal	3-4	Remainder	...	3-4	...	...	...	...	7.5-8.5	...	...	...	...
	(maximum)	...	...	0.005	...	...	0.08	0.005	...	...	...	...	...	...

Melts of aluminium alloy LM 6 should not be prepared without modification treatment.

The percentages of the principal elements occurring in all melts of the alloys shall be determined by chemical analysis of a representative sample and the results recorded. The determination of impurities by chemical or other means shall be carried out when considered necessary by the Foundry Metallurgist or when instructed by the Chief Mechanical Engineer.

(2) SCRAP

Only clean scrap of known composition is to be used for the manufacture of non-ferrous castings. Scrap of unknown composition must be melted, the chemical composition adjusted, and then cast into ingots for subsequent use in the manufacture of castings to the chemical compositions shown in Clause (1).

(3) APPLICATION

Unless otherwise instructed by the Chief Mechanical Engineer, non-ferrous castings will be applied in service as follows:

Symbol A—Castings subjected to steam pressure at temperatures not exceeding 550^o F.

Symbol B—Castings subjected to air pressure and miscellaneous castings such as oil cups, facings, number plates, car fittings, etc. Also castings subjected to steam pressure at temperatures not exceeding 450^o F, otherwise Symbol A composition is to be used.

Symbol C—Side and connecting rod brasses, locomotive axlebox brasses and liners, journal bearing shells, etc.

Symbol D—Bushes, gear blanks, etc. Also castings subjected to temperatures not exceeding 450^o F, otherwise Symbol A composition is to be used.

Symbol E—Propeller blades, water turbine buckets, gear blanks, and castings for electrical machinery requiring non-magnetic and non-corroding properties combined with strength. Not to be used for castings subjected to temperatures exceeding 350^o F.

Symbol F—Pipe flanges and parts which are to be brazed.

Symbol G—LM 4: For good casting characteristics, good machinability, good weldability, pressure tightness and moderate strength.

Lm 6: For thin walled and intricately shaped castings, and resistance to corrosion.

Symbol H—Linings for axleboxes, journal bearing shells, bearings, etc.

Symbol J—(i) For the tinning of bearing shells to be lined with bearing metal to Symbol H and for general purpose work.

(ii) Electrical work including small armatures.

(iii) Electrical work including large armatures.

Symbol K—Packing for steam piston and valve rods.

Symbol L—Linings for bearings subjected to high speeds and pressures. Shells to be tinned with pure tin.