

NEW ZEALAND GOVERNMENT RAILWAYS MECHANICAL BRANCH	NON-FERROUS CASTINGS	CODE No. 60
		Page No. 1 of 2 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	Mang- anese Mn	Iron Fe	Aluminium Al	Nickel Ni	Antim- ony Sb	Phos- phorus P	Silicon Si	Magne- sium Mg	Total Other Elements
A	Steam or valve bronze (maximum)	Remainder ...	5.5-6.5 ...	3-5 ...	1-2 ...	...	0.25 ...	0.005 ...	1.0 ...	...	0.05 ...	...	...	0.35 ...
B	Leaded gunmetal (maximum)	Remainder ...	4-6 ...	4-6 ...	4-6 ...	...	0.4 ...	0.005 ...	1.0 ...	0.3 ...	0.05 ...	0.005 ...	0.005 ...	...
C	Leaded bronze (maximum)	Remainder ...	4.5-6.5 ...	4-6 [1] ...	15-17 ...	...	0.4 ...	0.005 ...	1.0 ...	0.5 ...	0.1 ...	0.03 ...	0.005 ...	...
D	Tin bronze (maximum)	Remainder ...	9-11 ...	1-3 ...	0.5-1 ...	...	0.4 ...	0.005 ...	1.0 ...	0.3 ...	0.05 ...	0.005 ...	0.005 ...	...
E	Manganese bronze (maximum)	Remainder ...	0.5-1.5 ...	38-42 ...	0.2 ...	0.5-3.5 ...	0.4-2 ...	1-2 ...	...	0.5 ...	...	0.03 ...	...	...
F	Brass to be brazed (maximum)	Remainder ...	0.25 ...	15-17 ...	0.5-1.0 ...	...	0.4 ...	0.005 ...	...	0.3 ...	0.05 ...	0.005 ...	...	...
G	Aluminum (B.S. 1490) LM 4 (max.)	2-4 ...	0.05 ...	0.5 ...	0.1 ...	0.3-0.7 ...	0.8 ...	Remainder ...	...	...	...	4-6 ...	0.15 ...	...
	LM 6 (max.)	0.1 ...	0.05 ...	0.1 ...	0.1 ...	0.5 ...	0.6 ...	Remainder ...	0.1 ...	...	...	10-13 ...	0.1 ...	...
H	Lead base bearing metal (maximum)	0.5 ...	4-6 ...	0.005 ...	Remainder ...	...	0.1 ...	0.005 ...	...	9-11 ...	...	...	...	...
J(i)	50/50 solder (maximum)	0.08 ...	49-51 ...	0.005 ...	Remainder ...	...	0.02 ...	0.005 ...	...	0.5 ...	...	...	...	0.08 ...
J(ii)	Tin base solder (maximum)	0.08 ...	59-61 ...	0.005 ...	Remainder ...	...	0.02 ...	0.005 ...	...	0.5 ...	...	...	...	0.08 ...
J(iii)	Tin base solder (maximum)	0.08 ...	84-86 ...	0.005 ...	Remainder ...	...	0.02 ...	0.005 ...	...	0.5 ...	...	...	...	0.08 ...
K	Lead base packing metal (maximum)	0.5 ...	5-6 ...	0.005 ...	Remainder ...	...	0.1 ...	0.005 ...	...	5-6 ...	...	...	...	...
L	Tin base bearing metal (maximum)	3-4 ...	Remainder ...	0.005 ...	3-4 ...	...	0.08 ...	0.005 ...	...	7.5-8.5 ...	...	...	...	...

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° 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° 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° 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° 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.

NEW ZEALAND GOVERNMENT RAILWAYS	<b>NON-FERROUS CASTINGS</b>	<b>CODE No. 60</b>
<b>MECHANICAL BRANCH</b>		Page No. 2 of 2 Issue No 5      Date Issued 1/7/72

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.