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Mechanical Guide
B3.1.7.01

NZR Lubrication Specifications

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Amendment History

Version	Section	Amendment

New Zealand Government Railways

Lubrication Specifications

Introduction

The specifications in this document have been extracted from New Zealand Government Railways specifications for lubricants dating from 1966 to 1984. Only those sections considered relevant have been included (ie tender and inspection procedures have been omitted). In general specification designations included a specification number and a version number (eg. 398, 398/1, 398/2 etc). The latest version available is included.

They are published here in the hope they may be of some assistance to FRONZ Heritage Network Operators. Operators should remember that oil technology has changed in the intervening years and terms and specifications used may no longer be relevant.

Disclaimer

All care has been taken in the conversion to electronic format but no responsibility is accepted for errors and omissions, nor for any use to which the information contained is used.

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CCE Specification No. 364 1 October 1970

RAIL AND WHEEL FLANGE LUBRICATOR GREASE

(1) SCOPE

This Specification covers a graphited grease for use in automatic rail and wheel flange lubricators.

(2) GENERAL REQUIREMENTS

(a) The grease shall be composed of a minimum quantity of lime soap made from best grades of tallow combined with well refined mineral oil stock.

(b) The grease shall contain between 9.75 and. 10.25 per cent by weight of best quality, powdered artificial lubricating graphite.

(c) The grease shall be free from dyes, corrosive matter, grit, resin, waxes, talc, mica, clay or free lime.

(d) The grease shall be of uniform composition.

(3) DETAILED REQUIREMENTS

	Max	Min	Test Method
Penetration at 77^{O}F, worked.	330	300	I.P. 50
Dropping point, ^{O}F		175	I.P. 31
Free acidity (as oleic acid), %	0.2		I.P. 37
Free alkali (as calcium hydroxide), %	0.2		I.P. 37
Water content, %	2		I.P. 74
Unsaponifiable oil content, %		70	I.P. 136
Viscosity of oil, centistokes at 100^{O}F	150	70	I.P. 71
Pour point of oil, ^{O}F	0		I.P. 15

(5) PACKAGING

The grease shall be supplied in new open headed pails of approximately 45 pounds capacity with air tight lids.

Each pail shall be legibly marked with the name of the manufacturer of the grease, the words RAIL AND WHEEL FLANGE LUBRICATOR GREASE, the CCE Specification number, the number of the Railways order and the batch number of the grease.

CME Specification No. 353/5 17 July 1974

AIR BRAKE GREASE

1. SCOPE

This Specification covers a grease for the lubrication of air brake equipment on railway vehicles.

2. GENERAL REQUIREMENTS

(a) The grease shall be composed of a minimum quantity of soda soap made from best grades of tallow combined with a maximum percentage of well refined mineral oil stock.

(b) The grease shall be free from dyes, corrosive matter, grit, resin, waxes, talc, mica, graphite, clay or free lime.

(c) The grease shall contain mainly medium length soap fibres.

(d) The grease must not harden, decompose, gum or deteriorate to noticeably affect lubrication within a period of two years in service.

(e) The grease shall be suitable for easy application by hand and shall firmly adhere to the surfaces as required.

3. DETAILED REQUIREMENTS

	Max	Min	I.P. Test Method
Penetration at 25^{O}C, worked	380	350	50
Penetration at 5^{O}C, worked		330	50
Dropping point, ^{O}C		110	31
Free acid (as oleic acid), %	0.2		37
Free alkali (as Na OH), %	0.1		37
Oil separation on storage at 25^{O}C (For 42 hrs), %	1.0		121
Corrosion test at room temperature for 24 hrs	Negative		112
Water %	1.5		74
Unsaponifiable oil %		80	284
Viscosity of oil, at 40^{O}C CST	250	200	71
Pourpoint of oil, ^{O}C	Minus 18		15

5. PACKAGING

The grease shall be supplied in new open - headed tins of approximately 3.5 kilogrammes and 18 kilogrammes with airtight lids. The total requirement of each capacity shall be stated when tenders are called.

Each tin shall be legibly marked with the name of the manufacturer of the grease, the words AIR BRAKE GREASE, the quantity in the tin, the CME Specification Number, the number of the Railways' order and the batch number of the grease.

CME Specification No. 398/3 29 March 1963

LOCOMOTIVE STEAM CYLINDER OIL

1. SCOPE:

The oil shall be suitable for the lubrication of steam locomotive cylinders using superheated. steam, the temperature of which may reach 750^{O}F.

2. GENERAL REQUIREMENTS:

The oil shall be a refined dark mineral oil suitably compounded with approximately 5% of refined tallow or a synthetic additive that will fulfill the same purpose.

3. DETAILED REQUIREMENTS:

The oil shall comply with the following detailed requirements.

	Min.	Max.	I.P. Spec. No.
Open Flash Point ^{O}F.	635		36
Viscosity at 100^{O}F.			
Kinematic (ctsks)		1200	71
Approx. Redwood No. 2 (secs.)		486	—
" S.U.V. (secs.)		5544	—
Viscosity at 210^{O}F.			
Kinematic (ctsks)	53		71
Approx. Redwood No. 1	222		—
" S.U.V. (secs.)	248		—
Viscosity Index	90		73
Pour Point ^{O}F.		50	15
Acidity :			
Inorganic		Nil	1
Organic (mgs. KOH/gm.)		0.25	1
Alkalinity		Nil	95
Asphaltenes		0.5%	143
Ramsbottom Carbon Residue		3%	14
Water %		0.1	74
Sediment		Nil	53

5. PACKAGING:

The oil shall be supplied in new or A1 reconditioned drums of approximately 45 gallons capacity each. Each drum shall be legibly marked with the name of the supplier, the words "Locomotive Steam Cylinder Oil". Each drum shall also be port marked "N.Z.R. Order No. .....".

Tenderers shall state whether it is proposed to supply the oil in new or in Al. quality re-conditioned drums.

CME Specification No. 399/2 Date unknown

LOCOMOTIVE BEARING OIL

1. SCOPE

The oil shall be suitable for lubrication of the axle journal bearings and motion of steam locomotives.

2. GENERAL REQUIREMENTS

The oil shall be a refined and filtered mineral oil compounded with either 10% of refined fatty oil, or with special process additives, such that the finished oil adheres to wetted surfaces as strongly as, and lubricates under wet conditions as well as, an oil compounded with 10% of unblown clear refined bright rape seed oil.

It shall not separate on standing at 20^0F. and must syphon freely through worsted trimmings.

3. DETAILED REQUIREMENTS

The oil shall comply with the following detailed requirements:

	Min.	Max.	I.P. Spec.No.
Closed Flash Point OF	380		34
Viscosity at 100^OF			
Kinematic (ctsks).		370	71
Approx. Redwood No.1 (secs).		1,500	-
Approx. S.U.V. (secs)		1,710	-
Viscosity at 210^OF			
Kinematic (ctsks).	20		71
Approx. Redwood No.1 (secs).	85		-
Approx. S.U.V. (secs).	98		-
Viscosity Index.	70		73
Pour Point ^{O}F		20	15
Acidity			
Inorganic		Nil	1
Organic (mgs. of KOH)		1	1
Alkalinity		Nil	95
Asphaltene Content %		.5	6
Water %		.1	74
Sediment		Nil	53

5. PACKAGING

The oil shall be supplied in new or reconditioned drums of approximately 45 gallons capacity each. Each drum shall be legibly marked with the name of the supplier, the words “Locomotive Bearing Oil”, and each drum shall also be port marked “N.Z.R. Order No. ……..”.

Tenderers shall state whether it is proposed to supply the oil in new or in Al. quality re-conditioned drums.

C.M.E. Specification No. 408/7 12 January 1966

HARD GREASE FOR LOCOMOTIVES

(1) SCOPE:

The grease shall be suitable for the lubrication of locomotive side and connecting rods by pressure grease guns, also axle journals by means of grease blocks.

(2) GENERAL REQUIREMENTS:

The grease shall be composed of soda soap made from best grades of tallow combined with a well refined mineral stock. It shall be free from dyes, corrosive matter, grit, resin, waxes, talc, mica, clay, free lime or other fillers of any kind. Alternatively, greases containing a mixture of calcium and sodium soaps, or containing graphite or other compounding will be considered, but supplier will require to state their reasons for recommending greases of these types.

The grease shall be smooth and of uniform composition. The oil used in the manufacture of the grease shall be a heavy bodied oil from refined stock.

(3) DETAILED REQUIREMENTS:

The grease shall conform to the following detailed requirements-

		Maximum	**Minimum**	Test Method
Consistency or sticks at 77^{O}F.	)	70	60	I.P. 50/56
Consistency of sticks at 50^{O}F.	) Unworked	—	40	I.P. 50/56
Consistency of blocks at 77^{O}F.	)	80	70	I.P. 50/56
Consistency of blocks at 50^{O}F.	)	—	50	I.P. 50/56
Dropping Point; Degree F.		—	175	I.P. 31/57
Acidity Organic; Mgs. KOH		.4	—	I.P. 37/55
Acidity Inorganic;		Nil	Nil	I.P. 37/55
Alkalinity Percent NaOH		1	Nil	—
Free Moisture		l½	Nil	—
Mineral Oil Content Percent		—	50	—
Viscosity of oil centistokes at 100^{O}F.		2400	2000	I.P. 71/57

(6) PACKING:

The grease is to be supplied in the form of wrapped sticks, 2 oz. and 8 oz. nett, and blocks as shown in sketch below. The sticks are to be wrapped in grease proof paper. The grease must not stick to the paper to such an extent that the sticks cannot be readily unwrapped.

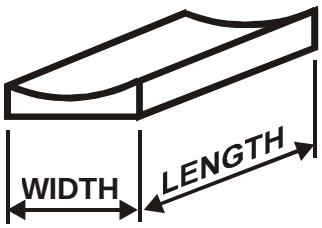
The sticks and blocks are to be packed in wooden cases measuring approximately 24” long x 16” wide x 13” high and containing the following quantities :—

2 oz and 8 oz sticks — 100 lbs

Class C blocks — 34 blocks

Class K blocks — 18 blocks

The cases are to be of sound construction, securely nailed and wire bound in two places. Each case shall be branded with the manufacturer’s name, batch number, and date of manufacture.



LOCO.	WIDTH	LENGTH	WEIGHT LBS.
Class C	5-¾“	6-$^{5}/_{8}$”	3-½
Class K	7-¾“	7-$^{3}/_{8}$”	6-¼

N.Z.R. Specification No. 411/1 20 February 1963

SOFT GREASE FOR LOCOMOTIVES

(1) SCOPE

This grease shall be suitable for the lubrication of locomotive valve motion.

(2) GENERAL REQUIREMENTS

The grease shall be composed of a minimum quantity of lime soap made from best grades of tallow combined with clean, well refined mineral stock. The grease shall be smooth and of uniform composition. It shall be free from dyes, corrosive matter, grit, resin, waxes, talc, mica, graphite, clay, free lime, or other fillers of any kind. It must not harden or decompose with age.

(3) DETAILED REQUIREMENTS

The grease shall conform to the following detailed requirements :-

	Max:	**Min**:	**Test Method**:
Worked consistency at 77^{O}F.	340	310	I.P. 50/56
Worked consistency at 40^{O}F.	As little change as possible desired.		
Dropping Point ^{O}F.	—	175	I.P. 31/57
Acidity Organic mgs.KOH.	.4	Nil	I.P. 37/55
Acidity Inorganic	Nil	Nil	I.P. 37/55
Alkalinity % NaOH	.1	Nil	—
Free Moisture %	1.5	Nil	—
Free saponifiable oil content %	1.0	Nil	—
Unsaponifiable oil content %	—	80	—
Viscosity of oil : CS at 100^{O}F.	270	90	I.P. 71/57
Viscosity Index of Oil	—	70	I.P. 73/53
Separation	No appreciable		I.P. 121/48

The grease shall be comparatively easy to stir at 10^{O}F

(4) CORROSION TEST

Clean bright copper and steel plates shall show no signs of etching, pitting or discoloration after having been submerged in the grease for 24 hours at room temperature. The test shall be carried out accordance with specification I.P. 112/56.

(5) OIL CONTENT

The tenderer shall submit with his tender a statement showing the following constants for the oil used in the manufacture of the grease :-

Constants

Viscosity at 100^{O}F and 210^{O}F (centistokes)
Viscosity Index
Specific gravity at 60^{O}F/60^{O}F.
Pour point
Flash point

The grease should contain an oil of the best quality it is possible to incorporate in it as bearing pressures are high where it is required to function.

(7) PACKING

The grease must be supplied in supplied in open headed drums of approx. 400 lbs. capacity with tightly fitting lids, and the manufacturer's brand and batch number and date of manufacture must be clearly marked on each drum, together with the words "Locomotive Soft Grease".

N.Z.R. Specification No. 439/2 9 July, 1962

SIDE-ROD CUP GREASE
FOR "Ab" AND "Wab" LOCOMOTIVES

(1) SCOPE

This grease shall be suitable for the lubrication of locomotive classes Ab and Wab side rod bearings to which it is applied by means of spring cups.

(2) GENERAL REQUIREMENTS

The grease shall be composed of a minimum quantity of lime soap made from best grades tallow combined with clean, well refined mineral oil. The grease shall be smooth and of uniform composition. It shall be free from dyes, corrosive matter, grit, resin, waxes, talc, mica, graphite, clay, free lime or other fillers of any kind. It must not harden or decompose with age.

(3) DETAILED REQUIREMENTS

The grease shall conform to the following detailed requirements :-

	MAXIMUM	MINIMUM	TEST METHOD
Worked consistency at 77^{O}F.	160	130	I.P. 50/56
Worked consistency at 40^{O}F.	As little change as possible desired.		
Dropping point ^{O}F.	—	200	I.P. 31/57
Acidity organic MGS KOH.	0.4	Nil	I.P. 37/55
Acidity inorganic	Nil	Nil	I.P. 37/55
Alkalinity % NaOH	.1	Nil	—
Free moisture %	1.5	Nil	—
Free saponifiable oil content %	1.0	Nil	—
Unsaponifiable oil content %	—	70	—
Viscosity of oil : CS at 100^{O}F.	270	90	I.P. 71/57
Viscosity index of oil	—	70	I.P. 73/53
Separation	No appreciable		I.P. 121/48

(4) CORROSION TEST

Clean bright copper and steel plates shall show no signs of etching, pitting or discoloration after having been submerged in the grease for 24 hours at room temperature. The test shall be carried out accordance with specification I.P. 112/56.

(5) OIL CONTENT

The tenderer shall submit with his tender a statement showing the following constants for the oil used in the manufacture of the grease.

Viscosity at 100^{O}F and 210^{O}F (centistokes)
Viscosity Index
Specific gravity at 60^{O}F/60^{O}F.
Pour point
Flash point

The grease should contain an oil of high quality suitable for the service for which the grease is intended.

(7) PACKING

The grease must be supplied in supplied in [open headed] drums of approx. 120 lbs. capacity with tightly fitting lids, and the manufacturer's brand, batch number and date of manufacture must be clearly marked on each drum, together with the words "Side Rod Cup Grease".

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88/464

24 August 1988

Glenbrook Vintage Railway
P.O. Box 2429
AUCKLAND

ATTENTION: Mr J.L. Stichbury

Dear Sir

With reference to your letter dated 16 August 1988. I wish to advise that a suitable alternative side rod cup grease is available commercially, which will fulfil your requirements.

It is manufactured by Caltex Oil NZ Ltd. under their description of "Cup Grease No. 5".

Yours faithfully

For J.E. Burley
MANAGER

CME Specification No. 483/2 31 October 1983

OIL FOR TIMKEN ROLLER BEARING AXLEBOXES

(1) SCOPE

The oil shall be suitable for the lubrication of Timken axlebox bearings on Railways rolling stock.

(2) GENERAL REQUIREMENTS

The oil shall be a refined and filtered mineral oil with the addition of any additives which the supplier considers to be necessary to improve the quality of the oil for the application intended.

(3) DETAILED REQUIREMENTS

	Max.	**Min**	Test Method
Flash point (^{O}C)		270	I.P. 34
Viscosity at 40 ^{O}C (cSt)	600		I.P. 71
Viscosity at ~~40~~ [100] ^{O}C (cSt)		30	I.P. 71
Pour point (^{O})	minus 7		I.P. 15
Acidity, inorganic (mgKOH/g)	Nil		I.P. 1
Acidity, organic (mg KOH/g)	0.25		I.P. 1
Strong base number	Nil		I.P. 139
Asphalt (%)	0.5		I.P. 143
Water (%)	0.1		I.P. 74
Sediment (%)	Nil		I.P. 53

(5) PACKAGING

The oil shall be supplied in new or A-1 reconditioned drums of approximately 200 litres capacity. Each drum shall be legibly marked with the name of the manufacturer of the oil, the words “TIMKEN ROLLER BEARING AXLEBOX OIL”, THE CME Specification number, the number of the Railways order and the batch number of the oil. Each drum shall be sealed at the time of filling. Any drum delivered with a broken seal will not be accepted.

CME Specification No. 1083/2 31 October 1983

CAR AND WAGON AXLE OIL

(1) SCOPE

The oil shall be a compounded type suitable for the lubrication of plain bearing axle journals on Railways rolling stock by means of woollen packing to CME Specification No. 365.

(2) GENERAL REQUIREMENTS

The base oil shall be a refined straight mineral oil free from all suspended matter and without pour point depressants or viscosity index improvers. Oxidation inhibitors shall be added to ensure a high resistance to oxidation.

Unblown refined rape seed oil shall be added to the base mineral oil to give a homogeneous compound of 90% mineral oil and 10% rape oil by weight.

The compounded oil shall syphon freely through the woollen packing at 10^0C.

(3) DETAILED REQUIREMENTS

	Max.	Min	Test Method
Flash point (^{O}C)		170	I.P. 34
Viscosity at 40 ^{O}C (cSt)	160		I.P. 71
Viscosity at 100^{O}C (cSt)		11.5	I.P. 71
Viscosity index		38	I.P. 226
Pour point (^{O}C)	minus 15		I.P. 15
Acidity, inorganic (mgKOH/g)	Nil		I.P. 1
Acidity, organic (mg KOH/g)	1		I.P. 1
Strong base number	Nil		I.P. 139
Asphalt (%)	0.5		I.P. 143
Water (%)	0.1		I.P. 74
Sediment (%)	Nil		I.P. 53

(5) The compounded oil shall be supplied in new or A-l re-conditioned drums of approximately 200 litres capacity. Each drum shall be legibly marked with the name of the manufacturer of the oil, the words "CAR AND WAGON AXLE OIL", the CME Specification number, the number of the Railways order and the batch number of the oil. Each drum shall be sealed at the time of filling. Any drum delivered with a broken seal will not be accepted.

CME Specification No. 1148 30 November 1977

HARD GREASE FOR OVERHEATED AXLEBOXES

1. SCOPE

This Specification covers hard grease for the emergency lubrication of overheated plain bearing axle journals on rolling stock.

2. GENERAL REQUIREMENTS

The grease shall be composed of soda soap made from best grades of tallow combined with well refined heavy-bodied mineral oil stock and shall contain best quality powdered artificial lubricating graphite. It shall be free from dyes, corrosive matter, grit, resin, waxes, talc, mica, clay or free lime.

The grease shall be of uniform composition.

3. DETAILED REQUIREMENTS

	Max	Min	Test Method
Penetration at 77^{O}F, unworked	70	60	I.P. 50
Dropping point, ^{O}F		175	I.P. 31
Free acid (as oleic acid), %	0.5		I.P. 37
Free alkali (as sodium hydroxide), %	1		I.P. 37
Water content, %	1.5		I.P. 74
Unsaponifiable oil content, %	50	47.5	I.P. 136
Viscosity of oil, centistokes at 100^{O}F	2400	1600	I.P. 71
Graphite, % by weight	5.25	4.75	–

5. PACKAGING

The grease shall be supplied in the form of blocks measuring 300 x 100 x 25. Each block shall be individually wrapped in greaseproof paper and the grease must not adhere to the paper to such an extent that the blocks cannot be readily unwrapped.

The blocks shall be packed in strong, well secured, double corrugated, board containers in quantities of 36.

Each container shall be legibly marked with the name of the manufacturer of the grease, the words HARD GREASE FOR OVERHEATED AXLEBOXES, the C.M.E. Specification Number, the number of the Railways order and the batch number of the grease.

C.M.E. Specification No. 1163 12 December 1978

ROLLER BEARING GREASE

1. SCOPE

This Specification covers a grease used principally for the lubrication of axlebox roller bearings on Railways locomotives and rolling stock and complies with Association of American Railroads Specification M - 942 - 75.

2. GENERAL REQUIREMENTS

(a) Soaps, Oils and Inhibitors

The grease shall be a smooth, well manufactured product of uniform quality, composed of high grade lithium soaps, refined and filtered mineral oils, suitable oxidation and rust inhibitors and such other additives as are necessary for desired performance.

The oxidation inhibitor shall be such that the grease will satisfactorily lubricate the roller bearings for not less than eight years without evidence of undesirable oxidation or deterioration.

The rust inhibitors shall be such as to prevent rusting of the roller bearings in service due to moisture which may accumulate in the bearings from condensation.

(b) Fillers and Other Foreign Matter

The grease shall be free from corrosive and abrasive matter. Bentones are acceptable as thickeners. Use of viscosity index improver additives is not permitted.

(c) Consistency

The grease shall be homogeneous and free from lumps.

3. DETAILED REQUIREMENTS

	Max	Min	Test Method
(a) Mineral Oil			
Flash Point, ^{O}F		340	A.S.T.M. D 92
Viscosity			A.S.T.M. D 88
Saybolt Viscosity at 100^{O}F, SUS	950	750	
Viscosity Index		80	A.S.T.M. D 2270
(b) Grease			
Corrosion			A.S.T.M. D 1743
Rating 1 is acceptable			
Rating 2 is rejectable			
Penetration at 77^{O}F, worked	320	290	A.S.T.M. D 217
Dropping Point, ^{O}F		325	A.S.T.M. D 566
Oxidation stability			A.S.T.M. D 942
Psi drop in 100 hours	10		
Psi drop in 500 hours	25		
Structure stability			A.S.T.M. D 217
Permissible change in penetration at 77^{O}F	+25	-25	

	Max	Min	Test Method
after 100,000 double strokes in a standard grease worker			
Water content, %	0.5		A.S.T.M. D 128
Wheel bearing leakage test Tenderer is to submit his test results.			A.S.T.M. D 1263

4. TENDER SAMPLES

The Tenderer shall submit with his tender a sample of 2 kg of the grease being offered and one litre of oil used in making the grease. Full test results of the grease shall also be submitted.

5. PACKAGING

The grease shall be supplied in new open headed drums of approximately 50 kg capacity with air-tight lids. Each drum shall be legibly marked with the name of the manufacturer of the grease, the words ROLLER BEARING GREASE, the C.M.E. Specification number, the number of the Railways order and the batch number of the grease.

SPECIFICATIONS FOR GRAPHITE GREASE

[Substitute for Morgan's Lubricant]

1. The lubricant shall consist of pure mineral grease compounded with 35% of graphite.
2. The graphite may be either mineral or synthetic graphite, the ash content of which must not exceed 7%.
3. The worked consistency of the grease when determined by the Institute Petroleum Technologists method I.P.50/55 shall be between 310 and 330.
4. The dropping point of the grease shall not be less than 110^{O}F.
5. No soap thickeners or resinous substances shall be employed in the compounding at the grease