CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

Sent Stores 5-12-78

Originals of SL-65-1 YLO Sheets in rear folder

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: SUPERHEATERS AND FITTINGS

REGULATION NO. SL-65-1
NO. OF SHEETS 1 of 3
DATE September 1950
SUPERSEDES 65-MR-1 April 1925 (see note

ISSUE: ROAD AND SHOP.

1. GENERAL. These regulations apply to the maintenance of type "A" and type "C" locomotive superheaters. The type "A" previously known as the "Schmidt" is now used for new applications and the type "C" refers to the Vaughan and Horsey equipment. Clauses 2, 11, 12 and 13 are common to both types of superheaters. 4-53

2. AT A No. 1 LOCOMOTIVE REPAIR all superheater equipment must be thoroughly inspected and tested as follows:
   (a) All parts worn below limit, or defective, must be replaced.
   (b) A hydrostatic test must be given to each pipe unit at a pressure of 300 pounds per square inch, after all repairs are completed, before coupling to header. If necessary to alter the length of the unit pipes so they will line up with header fittings, a further test must be applied after alterations have been made.
   (c) After application of complete superheater to boiler a hydrostatic test of 25% above the boiler working pressure must be applied. All parts and joints must be carefully inspected for leaks while under the above pressure. Leaky units or parts, if any, must be repaired and a further test given.

TYPE "C" SUPERHEATERS (VAUGHAN & HORSEY).

3. UNITS. Header end of units to be cleaned up with a disc grinder. Unit pipes having collars worn to 1/8" thick must have the end cut off and a new one formed. Pipes having flat spots worn on them 3/8" wide must be removed and replaced. The length of the units must be such that the top return bend will not be directly over the bottom one; the bottom unit should be at least 4" longer than the top one. For standard length of pipes see drawing B-65-L-47. New units must extend back into the flue to within 24" of the back tube sheet; no shortened units are to be applied that will not come within 3'6" of the back tube sheet. Pipes must be so mated that their length will suit the fittings in the header. Units must not be sprung into place so as to cause a strain on the coupling nut.

4. HEADERS. New headers must be tested, before applying, with water at a pressure of 300 pounds. Headers must rest on supports when in working position, so that there will be no strain on the dry pipe connection.

5. FITTINGS. At each repair all fittings must have a die nut, to list No. 15-T-223, run over the threads to clean them of scale and to bring them back to standard size, it not being necessary to remove fittings from the header. Thread in coupling nuts must also be clean of scale. 45° seats in fittings to be cleaned by grinding with emery and oil. Ball rings to be cleaned with wire brush, and if they are not of the proper contour they must be removed.

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Approved as System Standard by Chief of Motive Power & Rolling Stock

TYPE "A" SUPERHEATERS (SCHEDI)

6. UNIT LENGTH. Maximum and minimum distance from back tube sheet to the end of the longest portion of unit is shown on drawing B-65-L-484 and must be strictly adhered to.

UNIT AND HEADER SEATS. Ball end on superheater pipes and seats in headers must be cleaned by using soft metal grinders with emery and oil. Hard grinders with dry emery must not be used under any consideration; ball joints may be re-cut with tools as shown on drawings B-15-T-988 and B-15-T-989 if the seats are scored or steam cut such that they cannot be restored to their proper contour with soft grinders. Red lead, varnish, or any other foreign substance must not be applied to joints in order to make them steam tight. Gauges for checking the contour of ball joints are shown on drawing B-15-T-987. Grinder holders and dies for making soft metal grinders are shown on drawings B-15-T-989, B-15-T-992 and B-15-T-993. When shipping units the ball joints must be protected with wooden blocks held in place by bolts and nuts. When drawing units up to header seats, use a wrench with a leverage of not more than three feet.

7. HEADER. Headers must rest on supports so that there will be no strain on the dry pipe connection. Slots in headers must be kept clean so that the unit bolt heads will have a metal to metal bearing. New headers are tested by the Superheater Company, it is not necessary to re-test them; for method of applying headers see drawing D-65-L-482.

8. UNIT CLAMPS AND WASHERS. All seats on washers and clamps are to be kept clean so that there will be a good metal to metal bearing.

9. UNIT SUPPORTS AND BANDS are to be maintained in positions as shown on standard drawings, care being taken to see that they properly support the units in the flue. Tools required for applying supports and bands are shown on drawings B-15-T-984 and B-15-T-985. Lump of spot welding should be placed on bottom of unit pipes, at both sides of bands and supports, to keep them from shifting.

10. MONTHLY SERVICE TEST. Hydrostatic test must be given to the superheater, steam pipes, exhaust pipes and nozzles, with warm water at a maximum pressure of 60 pounds and a minimum pressure of 40 pounds, at least once every month and when possible at the monthly staybolt test. Exhaust pipe nozzle to be blanked off and vent valve and gauge applied. All leaks must be repaired immediately and a further test given. A square set or chisel must not be used to tighten joints or nuts. The boiler must be thoroughly cooled down before testing.

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Approved as Canadian Standard by Chief of Motive Power & Rolling Stock.

CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: SUPERHEATERS AND FITTINGS

REGULATION NO. SL-65-1
NO. OF SHEETS 1 of 3
DATE September 1950
SUPERSEDES 65-MR-1 April 1925 (see note

ISSUE: ROAD AND SHOP.

1. GENERAL. These regulations apply to the maintenance of type "A" and type "C" locomotive superheaters. The type "A" previously known as the "Schmidt" is now used for new applications and the type "C" refers to the Vaughan and Horsey equipment. Clauses 2, 11, 12 and 13 are common to both types of superheaters.

2. AT A No. 1 LOCOMOTIVE REPAIR all superheater equipment must be thoroughly inspected and tested as follows:
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   (c) After application of complete superheater to boiler a hydrostatic test of 25% above the boiler working pressure must be applied. All parts and joints must be carefully inspected for leaks while under the above pressure. Leaky units or parts, if any, must be repaired and a further test given.

TYPE "C" SUPERHEATERS (VAUGHAN & HORSEY). 453

3. UNITS. Header end of units to be cleaned up with a disc grinder. Unit pipes having collars worn to 1/8" thick must have the end cut off and a new one formed. Pipes having flat spots worn on them 3/8" wide must be removed and replaced. The length of the units must be such that the top return bend will not be directly over the bottom one; the bottom unit should be at least 4" longer than the top one. For standard length of pipes see drawing B-65-L-47. New units must extend back into the flue to within 24" of the back tube sheet; no shortened units are to be applied that will not come within 3'6" of the back tube sheet. Pipes must be so mated that their length will suit the fittings in the header. Units must not be sprung into place so as to cause a strain on the coupling nut.

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CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: SUPERHEATERS AND FITTINGS

REGULATION NO. SL-65-1
NO. OF SHEETS 2 of 3
DATE December 1950
SUPERSEDES 65-LR-1 April 1925 (see note)

ISSUE: ROAD AND SHOP

TYPE "A" SUPERHEATERS (SCHMIDT)

6. UNIT LENGTH. Maximum and minimum distance from back tube sheet to the end of the longest portion of unit is shown on drawing B-65-L-484 and must be strictly adhered to.

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7. HEADER. Headers must rest on supports so that there will be no strain on the dry pipe connection. Slots in headers must be kept clean so that the unit bolt heads will have a metal to metal bearing. New headers are tested by the Superheater Company, it is not necessary to re-test them; for method of applying headers see drawing D-65-L-482.

8. UNIT CLAMPS AND WASHERS. All seats on washers and clamps are to be kept clean so that there will be a good metal to metal bearing.

9. UNIT SUPPORTS AND BANDS are to be maintained in positions as shown on standard drawings, care being taken to see that they properly support the units in the flue. Tools required for applying supports and bands are shown on drawings B-15-T-984 and B-15-T-985. Lump of spot welding should be placed on bottom of unit pipes, at both sides of bands and supports, to keep them from shifting.

10. MONTHLY SERVICE TEST. Hydrostatic test must be given to the superheater, steam pipes, exhaust pipes and nozzles, with warm water at a maximum pressure of 60 pounds and a minimum pressure of 40 pounds, at least once every month and when possible at the monthly staybolt test. Exhaust pipe nozzle to be blanked off and vent valve and gauge applied. All leaks must be repaired immediately and a further test given. A square set or chisel must not be used to tighten joints or nuts. The boiler must be thoroughly cooled down before testing.

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INDEX TO MAINTENANCE REGULATIONS - EFFECTIVE February 1, 1960

STEAM LOCOMOTIVES

REGULATION NO.	SUBJECT	LATEST ISSUE
SL-11-1	Maintenance and Inspection of Fire Preventive Appliances on Locomotives and Miscellaneous Equipment.	April 1951.
SL-11-2	Maintenance of Ashpans, Hoppers and Gear.	April 1951.
SL-12-1	Friction Bearing Axles of Leading and Trailing Engine Trucks.	September 1952.
SL-12-2	Maintenance and Limits of Wear for all Locomotive Crank Pins.	December 1951.
SL-13-1	Locomotive Boiler Inspecting and Testing.	January 1952.
SL-13-5	Location and Proving Position of Water Glass and Try-Cocks.	December 1950.
SL-13-7	Boiler Repairs.	January 1952.
SL-13-8	Installation and Maintenance of Locomotive Brick Arches.	January 1952.
SL-13-10	Reduction of Boiler Pressure while effecting repairs.	March 1957.
SL-17-1	Driving Boxes - Shoes and Wedges.	January 1953.
SL-17-2	Application of Driving Box Brasses.	December 1951.
SL-21-1	Tender Brake Beams.	December 1950.
SL-22-1	Daily Brake Tests and Weekly Gauge tests.	April 1951.
SL-22-2	Monthly and Other Brake Tests.	December 1950.
SL-22-3	Method of Testing Brake Valves, Distributing Valves, Safety Valves, Brake Pipe Vent Valves, Feed Valves, Signal Valves.	December 1950.
SL-22-4	Locomotive Air Compressor Tests, Maintenance and Repairs.	August 1953.
SL-22-5	Cleaning, Inspection and Testing Etc., of Main Reservoirs.	September 1951.

27

INDEX TO MAINTENANCE REGULATIONS - EFFECTIVE February 1, 1960

STEAM LOCOMOTIVES

REGULATION NO.	SUBJECT	LATEST ISSUE
SL-22-6	Reports and Records of Tests and Cleaning of Air Brake and Signal Equipment.	December 1950.
SL-24-1	Regulation Covering Application of Tubular Glasses to Water Gauge Mountings.	November 1950.
SL-24-2	Maintenance of Top and Line Checks.	February 1952.
SL-26-1	Crosshead, Wrist Pin and Key.	January 1952.
SL-31-1	Couplers and Drawbars.	January 1952.
SL-33-1	Eccentrics and Straps.	November 1950.
SL-49-1	Maintenance of Inspiretors, Lifting, Non-Lifting and Exhaust Steam Injectors.	February 1952.
SL-51-1	Maintenance of Radius Rods.	August 1953.
SL-52-2	Grease Lubrication of Driving Boxes.	February 1952.
SL-52-3	Instructions for checking and Lubricating Stokers.	December 1950.
SL-52-4	Detroit Lubricators - Engine House and Shops Instructions.	November 1950.
SL-53-1	Method of Inspecting for Cracks and Flaws, Main and Side Rods.	January 1952.
SL-53-2	Defects which will Prohibit Locomotive being supplied for Service. Inspection by Board of Transport Commissioners for Canada and Interstate Commerce Commission Inspectors.	November 1950.
SL-53-11	Examination of Persons who will be Responsible for Lighting-up and Care of Locomotive under Steam.	August 1950.
SL-53-12	Locomotive Painting.	February 1952.

28

INDEX TO MAINTENANCE REGULATIONS - EFFECTIVE February 1, 1960

STEAM LOCOMOTIVE

REGULATION NO.	SUBJECT	LATEST ISSUE
SL-53-13	Preparation of Steam Locomotives for No. 1 Repair.	June 1953
SL-53-14	Maintenance of Paint Finish on Steam Locomotives at Roundhouse.	February 1952.
SL-56-1	Piston Rods - New and Maintenance of Present Rods.	August 1951
SL-57-1	Approved Packings.	January 1958.
SL-62-1	Main and Side Rods.	January 1952.
SL-62-2	Knuckle Pins and Bushings.	May 1954.
SL-63-1	Testing and Care of Boiler Steam Gauges.	February 1952.
SL-63-2	Testing and Care of Locomotive Safety Valves.	August 1959.
SL-64-1	Maintenance of Main Steam Chests, Valves, Bushings, Guides, Valve Rods, Etc.	February 1952.
SL-65-1	Superheaters and Fittings.	September 1950.
SL-66-1	Pyle Electric Headlight Equipment.	January 1953.
SL-71-1	Maintenance of Locomotive Tenders.	February 1952.
SL-74-1	Throttle and Rigging.	April 1951.
SL-91-1	Handling of Steam Locomotives at Terminals.	August 1951.
SL-95-1	Identification Storing and use of Iron and Steel Bars and Billets.	August 1951.

(29)

CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: FRICTION BEARING AXLES OF LEADING AND TRAILING ENGINE TRUCKS.

REGULATION NO. SL-12-1
PAGE 1 of 3
DATE September 1952
SUPERSEDES 12-MR-1 May 1932 (See note)

ISSUE: ROAD AND SHOP. No Trailing Truck on 2469

NOTE: This regulation supersedes 12-MR-1 dated May 1932 for friction bearing leading and trailing truck axles only.

PARA. 1. The centres of all axles must be maintained true and to correct angle as shown on drawing A-12-L-954.

PARA. 2. Axles must be removed from service when -

(a) Either journal or hub liner seat, or both, cannot be refinished to the final turning diameter shown in table on page 3.
(b) When wheel seat cannot be refinished to 1/4" below its original diameter.

PARA. 3. The final turning diameter for the journal and hub liner seat, where used, is to be as shown on page 3. Also the thickness to which the outer collar on axles may wear before being restored to original thickness by welding.

PARA. 4. JOURNALS

Axles must be re-finished when the journals are out of round .010 or tapered .015 or more, or if they are scored or show other surface defects.

If the journal end or bearing shows pronounced colouring from overheating, or if circumferential checks or cracks are found in any portion of the axle, it may be refinished within the limits specified. If all defects cannot be removed without exceeding these limits or if all defects cannot be removed by turning to suit dimensions for a smaller axle, then the axle must not be returned to service.

PARA. 5. WHEEL SEATS

When the wheels on inside friction bearing axles are removed for renewal of axle, the wheel seat bore should be examined and trued up if necessary and new axle machined to suit new wheel seat diameter.

When 45" trailing truck wheels with cast steel centres are pressed off for magnaflux testing of axle, the wheel may be re-applied to the same axle provided no defect is found in same. This re-application of wheel may be performed as often as a proper fit can be obtained and provided that both wheel and axle are found to be in good condition.

When 36¼" rolled steel wheels of friction bearing trailing trucks are removed for renewal, the wheel seats on the axle should be examined for evidence of poor fit and trued up if necessary before applying the new wheel.

CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: FRICTION BEARING AXLES OF LEADING AND TRAILING ENGINE TRUCKS.

ISSUE: ROAD AND SHOP.

REGULATION NO. SL-12-1
PAGE 2 of 3
DATE September 1952
SUPERSEDES 12-MR-1 May 1932 (See note)

When truing up the wheel seats on axles or the bore of the wheel, care should be taken to see that the minimum amount of material necessary to procure a good fit is only removed.

PARA. 6. HUB LINER SEATS

The hub liner seat, limit of wear for all axles is 3/8" less than the original diameter. If it is necessary to exceed this limit and the axle is not condemnable for any other reason, advice should be obtained from the office of the Chief of Motive Power as to whether the limit shown may be exceeded.

PARA. 7. COLLARS OF AXLES

When worn to the limit thickness shown, may be restored to original thickness by welding in accordance with instructions in Welding Manual sheet WL-168. While welding, the axle should be held vertical in a jig similar to that shown on drawing D-16-T-477. Welding may be done at Angus, Ogden and Weston only.

PARA. 8. INSPECTION

All axles must be magnaflux tested as shown below wherever the equipment is available or if the equipment is not available, they are to be white lead tested.

(a) Before any wheels are mounted on a new axle.
(b) Whenever wheels are removed from the axle for any reason.
(c) Before returning to service any axle on which the journal has been turned down to remove defects or to a smaller size.
(d) When 45" trailing truck wheels are pressed off every two years specifically for testing of axle.

PARA. 9. STAMPING OF AXLES

All axles will be assigned a serial number at the time of ordering. This serial number will be given to the manufacturer who will stamp same in a groove on one end of the axle in accordance with drawing B-12-L-806.

On the opposite end of the axle must be stamped the list number of axle, date applied, class of material and original diameter of the journal as called for on drawing B-12-L-806.

PARA. 10. SCRAPPING OF AXLES

All axles when discarded as scrap must be identified in such a manner as to prevent their being returned to service.

All axles are to have the letter "S" painted on the body of the axle near the centre. The letter should be large and legibly stencilled or otherwise painted on.

Approved as System Standard by Chief of Motive Power & Rolling Stock.

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CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

no trailing truck on D4

29 B

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: FRICTION BEARING AXLES OF LEADING AND TRAILING ENGINE TRUCKS.

REGULATION NO. SL-12-1
PAGE 3 of 3
DATE September 1952
SUPERSEDES 12-MR-1 May 1932 (See note)

ISSUE: ROAD AND SHOP.

FINAL TURNING DIAMETERS AND LIMIT COLLAR THICKNESS

Type of Truck	Class	Final Turning Diameters				Outer Collar Thickness	
		Journal		Hub Liner Seat			
		New	Final Turning	New	Final Turning	New	Limit Before Weldin
2-Wheel Inside Bearing Leading Engine Trucks	J3	5"	4 5/8"	—	—	—	—
	M3, M4	6"	5 5/8"				
	N2, N4						
	P1, P2ab						
	R2, R3						
	S2						
	P2cd	6 1/2"	6 1/8"				
	P2e as equipped						
4-Wheel Outside Bearing Leading Engine Trucks	A1, A2, D4 X	5"	4 5/8"	—	—	—	—
	D6, D9, D10	6"	5 5/8				
	G1, G2						
	G3abc, G4	6 1/2"	6 1/8"				
2-Wheel Outside Bearing Leading Engine Trucks	P2e as equipped	6"	5 5/8"	7 1/4"	6 7/8"	7/8"	1/2
	P2fghjk						
	T1						
2-Wheel Trailing Trucks	G1, G2, G5	7"	6 5/8"	9"	8 5/8"	1"	1/2"
	P1						
	G3, G4	8"	7 5/8"	11 1/4"	10 7/8"	1 1/8"	1/2"
	P2						
	S2						
4-Wheel Trailing Trucks	F1, H1, K1, T1 Front axle	7"	6 5/8"	8 1/2"	8 1/8"	NONE	
	F1 Rear axle						
	H1, K1, T1 Rear axle	8"	7 5/8"	10 1/4"	9 7/8"		

Approved as System Standard by Chief of Motive Power & Rolling Stock.

CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: MAINTENANCE AND LIMITS OF WEAR FOR ALL LOCOMOTIVE CRANK PINS.

ISSUE: ROAD AND SHOP.

REGULATION NO. SL-12-2
PAGE 1 of 4
DATE December 1951
SUPERSEDES July 1951

1. LIMITS OF WEAR.

The tables on pages 3 and 4 of this maintenance regulation show for all classes of steam locomotives, the following information:

(a) The correct diameter for all crank pins when new, as called for on standard drawings.
(b) The limit diameter at which any crank pin may remain in service.

Note - The final turning diameter for all front, intermediate or back crank pins shall be 1/32" over the limit of wear diameter. The final turning diameter for the main rod bearing on all main crank pins shall also be 1/32" over the limit of wear diameter. The final turning diameter for the main side rod bearing on the main crank pin shall be 1/32" over the limit of wear diameter for all classes except G-3, G-4, H-1, K-1 and P-2 for which the final turning diameter shall be 1/16" over the limit of wear diameter.

2. NEW PINS AND RENEWALS:

(a) All pins must be machined to proper and uniform diameters and must be finished on surfaces and fillets with a burnishing roller or ground true.
(b) All main pins before being applied are to be magnaflux tested.
(c) Main crank pins are to be pressed in with grease hole in vertical position when crank pin is on front and back quarter in accordance with drawing A-12-L-994.
(d) When crank pins are worn to the extent that they cannot be turned or trued up to final turning diameter, they are to be removed and replaced by new pins of standard diameters.
(e) Crank pins removed because they cannot be turned or trued up to final turning diameter but otherwise in good condition, may be turned down to make pins forengines requiring a smaller diameter pin. Any such pin must be thoroughly annealed before being machined down and must be magnaflux tested before being applied.
(f) It is important that all sharp corners be removed from pins and all burrs removed from grease holes after drilling.

3. MAINTENANCE OF PINS IN SERVICE:

Main crank pins must all be turned at every general repairs. All other crank pins to be trued up if .010" or more out of round or out of quarter.

4. STAMPING:

All crank pins are to be stamped in accordance with drawing B-12-L-806 and stamping is to be kept in a legible condition. If a crank pin is re-used by machining it to a smaller size, the stamping showing the original diameter and list number is to be maintained but the correct list number for the

30A

4. STAMPING (Cont'd)

re-machined pin is also to be stamped on the end under the original list number which should be cancelled in such a manner that it can still be read if desired.

An accurate shop record is to be kept of the manufacture and application of all crank pins.

5. INSPECTION:

All crank pins are to be thoroughly cleaned, white lead tested and carefully inspected for flaws or fractures at least every six months and a record kept of the inspection.

All main pins must be magnaflux tested at every no. 1 repair.

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CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: MAINTENANCE AND LIMITS OF WEAR FOR ALL LOCOMOTIVE CRANK PINS.

REGULATION NO. SL-12-2
PAGE 3 of 4
DATE December 1951
SUPERSEDES July 1951

ISSUE: ROAD AND SHOP.

Diameter new and Limit of Wear for Main Crank Pins

Class	Main Rod Bearing		Main Side Rod Bearing	
	Diameter New	Limit Wear Diameter	New	Limit Wear Diameter
A1, A2	4	3-3/4	3-1/2	3-1/4
D4g	5-7/8	5-5/8	6	5-3/4
D6a	7	6-5/8	7-1/2	7
D6bd	6-1/2	6-1/8	6-3/4	6-1/2
D9, D10	7	6-5/8	7-1/2	7-1/8
F1	6-3/4	6-1/2	7	6-3/4
F2	6	5-3/4	6	5-3/4
G1, G2	7	6-5/8	7-1/2	7-1/8
G3abcd	8	7-5/8	9-1/4	8-7/8
G3efgh	8	7-5/8	10	9-5/8
G4	8	7-5/8	9-1/4	8-7/8
G5	7	6-5/8	8	7-5/8
H1	8	7-3/4	10	9-5/8
J3	4-1/2	4-1/4	5-1/4	5
J5	6	5-3/4	7	6-5/8
K1	8-1/2	8-1/8	10-1/2	10-1/8
M3	6-1/2	6-1/8	7-1/4	7
M4	7	6-5/8	7-1/2	7-1/8
N2	7-1/2	7-1/8	8	7-5/8
N4ab	7	6-5/8	7-1/2	7-1/8
N4cd	7-1/2	7-1/8	8	7-5/8
P1	7-1/2	7-1/8	8	7-5/8
P2abcdef	8	7-5/8	8-3/4	8-3/8
P2ghjk	8	7-5/8	9-1/2	9-1/8
R2, R3	7-1/2	7-1/8	8	7-5/8
S2	8-1/4	7-7/8	9	8-5/8
T1	8-1/2	8-1/8	10-1/2	10-1/8
U3c	5-3/4	5-3/8	6	5-3/4
U3de	5-7/8	5-1/2	6	5-3/4
V1	6-3/4	6-3/8	7	6-3/4
V3, V4	7	6-5/8	7-1/2	7-1/8
V5	8	7-5/8	8-3/4	8-3/8
W1	7-1/2	7-1/8	8	7-5/8
Q.C. 42, 43, 45	6	5-5/8	6-3/4	6-3/8
D.A.R. (QC.44)	6	5-5/8	6-3/4	6-3/8

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CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: MAINTENANCE AND LIMITS OF WEAR FOR ALL LOCOMOTIVE CRANK PINS.

REGULATION NO. SL-12-2
PAGE 4 of 4
DATE December 1951
SUPERSEDES July 1951

ISSUE: ROAD AND SHOP.

Limits of Wear for Front, Intermediate & Back Crank Pins.

Class	Front		Inter.		Back	
	New	Limit	New	Limit	New	Limit
A1, A2	-	-	-	-	3-1/2	3-1/4
D4g	4	3-3/4	-	-	4	3-3/4
D6a	5-1/8	4-7/8	-	-	5	4-5/8
D6bd	4-3/4	4-1/2	-	-	4-3/4	4-1/2
D9, D10	5-1/8	4-7/8	-	-	5	4-5/8
F1	6-1/4	5-7/8	-	-	-	-
F2 *	-	-	-	-	5-1/2	5-1/8
G1, G2	5-1/8	4-7/8	-	-	5	4-5/8
G3abcd	6-1/2	6-1/8	-	-	6-1/2	6-1/8
G3efgh	6-1/2	6-1/8	-	-	6-1/2	6-1/8
G4	6-1/2	6-1/8	-	-	6-1/2	6-1/8
G5	6	5-5/8	-	-	5	4-5/8
H1	6-1/2	6-1/8	-	-	6-1/2	6-1/8
J3	4	3-3/4	-	-	4	3-3/4
J5	5	4-5/8	-	-	5	4-5/8
K1	6-1/2	6-1/8	7	6-1/2	6-1/2	6-1/8
M3	5-1/8	4-7/8	5-1/2	5	5-1/8	4-7/8
M4	5-1/8	4-7/8	5-1/2	5	5-1/8	4-7/8
N2	5-1/2	5-1/8	6	5-1/2	5-1/2	5-1/8
N4ab	5	4-3/4	5-1/2	5	5	4-3/4
N4cd	5-1/2	5-1/8	5-1/2	5-1/8	5-1/2	5-1/8
P1	5-1/2	5-1/8	6	5-1/2	5-1/2	5-1/8
P2abcdef	5-3/4	5-3/8	6-1/2	6	5-3/4	5-3/8
P2ghjk	5-3/4	5-3/8	6-1/2	6	5-3/4	5-3/8
R2, R3	4-3/4	4-1/2	4-3/4	4-1/2	4-3/4	4-1/2
S2	6-1/4	5-7/8	6-3/4	6-1/4	6-1/4	5-7/8
T1	6-1/2	6-1/8	7	6-1/2	6-1/2	6-1/8
U3c	4	3-3/4	4	3-3/4	-	-
U3de	4	3-3/4	4-1/2	4-1/4	-	-
V1	4-1/2	4-1/4	4-1/2	4-1/4	4-1/2	4-1/4
V3, V4	5-1/8	4-7/8	5-1/2	5	5-1/8	4-7/8
V5	5-3/4	5-3/8	5-3/4	5-3/8	5-3/4	5-3/8
W1	5-1/2	5-1/8	6	5-1/2	5-1/2	5-1/8
Q.C. 42, 43, 45	4-3/4	4-1/2	-	-	4-3/4	4-1/4
D.A.R. (QC.44)	4-3/4	4-1/2	-	-	4-3/4	4-1/4

Asterisk denotes line which has been revised.

CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

32

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: LOCOMOTIVE BOILER INSPECTION AND TESTING. (IN ACCORDANCE WITH GENERAL ORDER 473 OF THE BOARD OF TRANSPORT COMMISSIONERS).

REGULATION NO. SL-13-1

PAGE 1 of 5

DATE January 1952

SUPERSEDES 13-MR-1 July 1932

ISSUE: ROAD AND SHOP.

THESE REGULATIONS GOVERN INSPECTION AND TESTS OF LOCOMOTIVE BOILERS ONLY. For rules governing inspection and tests of stationary boilers, and boilers on steam shovels, wrecking cranes, pile drivers, snowplows, or any rolling stock, other than locomotive, see Maintenance Regulation Cards 96-MR-1 and 96-MR-2.

1. LOCOMOTIVE BOILERS MUST BE INSPECTED AND TESTED AS FOLLOWS:

	NATURE OF TEST	DUE AT INTERVALS NOT MORE THAN	WITH EXTENSION FOR PERIODS OUT OF SERVICE TO A LIMIT OF
a.	Water Glass must be blown out, Gauge Cocks tried, Injectors tried.	Before every trip.	No extension.
b.	Service Staybolt Test.	One calendar month.	No extension, except as noted in Section No. 2.
c.	Boiler washed out. Remove all washout and arch tube plugs; water glass and gauge cock spindles must be removed and cocks cleaned. Examine firebox sheets for mud burn, bulging and indication of broken staybolts. Line checks, top checks, superheated steam valve, and emergency shut off valve at turret must be thoroughly examined.	One calendar month or less as required by special instructions.	No extension, except as noted in Section No. 2.
d.	Shop Staybolt Test. Steam Gauge Test. Safety Valve Test.	Three calendar months.	No extension, except as noted in Section No. 2.
e.	Hydrostatic Test.	Twelve calendar months' service.	24 months, from date of previous hydrostatic test.
f.	Flexible Staybolt Cap Removal, except hollow flexible staybolts which are tested with an electric or other instrument.	Twenty-four months' service, except as noted in Section No. 6-b.	36 months from date of last previous removal of caps, except as noted in Section No. 6-a and No. 6-b.
g.	Internal Inspection.	Forty-eight calendar months. New boilers, before placing into service, and whenever sufficient number of flues are removed.	60 months from date of last previous internal inspection.

CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: LOCOMOTIVE BOILER INSPECTION AND TESTING. (IN ACCORDANCE WITH GENERAL ORDER 473 OF THE BOARD OF TRANSPORT COMMISSIONERS).
ISSUED ROAD AND SHOP.

REGULATION NO. SL-13-1
PAGE 2 of 5
DATE January 1952
SUPERSEDES 13-MR-1 July 1932

h.	External Inspection.	Sixty months' service. New boilers, before placing into service, and whenever jacket and lagging is removed.	72 months from date of last previous external inspection.

2. TESTS COMING DUE WHEN LOCOMOTIVES ARE LAID UP must be made before engine is returned to service. Reports must be submitted when test becomes due, in accordance with 13-MR-2, Section No. 4. No extension for any test will be granted for a period out of service of less than one calendar month.

Further extensions of time for internal inspection than are permitted in Section No. 1 may be granted under special circumstances. Requests for such extensions must be filed with the Superintendent of Motive Power at least two months in advance of the date due for which the extension is sought. The Superintendent of Motive Power must advise the Chief of Motive Power and Rolling Stock all particulars in detail covering such extension of time.

3. SERVICE STAYBOLT TEST. All firebox and combustion chamber staybolts, including flexible staybolts, must be tested by the hammer process, while the boiler is subjected to a hydraulic hot water pressure equal to 75% working steam pressure.

Bolts must be replaced if found broken or plugged, as follows:
(a) Two adjacent bolts.
(b) Three bolts or more within a circle of forty-eight inches in diameter.
(c) Five bolts or more in the entire boiler.
At the time of service staybolt test, boiler must also be washed out, injectors tested and gauge cocks and water glass cleaned.

4. SHOP STAYBOLT TEST. All firebox and combustion chamber staybolts, including flexible staybolts, must be tested by the hammer process while the boiler is subject to a hot water pressure equal to 75% of working steam pressure.

Immediately after any hydrostatic test, a shop staybolt test must be made. In such cases the hydraulic pressure must be equal to the authorized working pressure of the boiler.

All broken or plugged staybolts found during shop staybolt test must be renewed. When two or more adjacent bolts are found broken, continue to remove adjacent bolts until no additional fractured bolts are found, unless Cab Card 181 shows a record of sheet renewals less than two years old. Examine firebox sheets closely for bulges or signs of broken staybolts.

At every shop staybolt test, the steam gauges and safety valves must also be tested; see Maintenance Regulation Card 63-MR-1.

5. HYDROSTATIC TEST. In addition to complying with requirements of Section No. 1, a hydrostatic test must be made; first, at every No. 1 repair, second, on engines shopped for heavy running repairs when next hydrostatic test is due within 30 days; third, when

(34)

5. HYDROSTATIC TEST. (Continued)

repairs have been made which effect the strength of the boiler.

The hydrostatic test must be applied by water pressure 25% above the authorized working pressure, with water at a temperature over 100 degrees Fahrenheit.

Before testing, the following procedure must be observed:

(a) Three notices calling attention to the fact that safety valves are blocked must be erected. Locate one over fire door, one over front number plate, and one over safety valves.
(b) Dome casing must be removed.
(c) Jacket and lagging around dome base, throat sheet and backhead panels must be removed.

The test pressure must be maintained a sufficient time to permit the location of any defects.

The hydrostatic test is not complete until a shop staybolt test in accordance with Section No. 4 has been made.

After testing, the dome cover must be removed, throttle stand pipe removed if necessary, and a careful inspection be made of all accessible interior surfaces, braces, crown stays, flexible staybolts, etc.

Should the inspector enter the boiler without removing the stand pipe special mention of this must be made on the required reports.

The hydrostatic test must be witnessed by an authorized officer of the Company, who must personally examine the boiler under pressure, to be prepared to certify that the test has been duly and properly performed.

6. (a) FLEXIBLE STAYBOLT CAP REMOVAL, except as provided in Paragraph 6-(b). All flexible staybolt caps must be removed and stays inspected at every No. 1 and No. 2 repair, also whenever deemed necessary by an inspector of the Railway Company, Board of Railway Commissioners, or Interstate Commerce Commission.
Following the removal of caps, staybolts should be tested by means of a plug wrench and bar.

(b) Caps need not be removed from flexible staybolts of the hollow type, which have tell-tale holes running the entire length of the bolt, and extending into the head, and which have the inner, or firebox, end of the tell-tale hole kept closed with a fireproof porous plug. Each time the hydrostatic test is applied, flexible bolts of this type must have the tell-tale holes opened, and tested with an electric, or other instrument, approved by the Chief of Motive Power & Rolling Stock, to determine whether the tell-tale holes are open their entire length or not. After the hydrostatic test has been completed, all staybolts that showed leakage through the tell-tale holes must be removed.

Dftg has Solid Flex. bolts with removable caps

over -

APPROVED as Supplement [illegible]

(35)

CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: LOCOMOTIVE BOILER INSPECTION AND TESTING. (IN ACCORDANCE WITH GENERAL ORDER 473 OF THE BOARD OF TRANSPORT COMMISSIONERS).
ISSUE: ROAD AND SHOP.

REGULATION NO. SL-13-1
PAGE 4 of 5
DATE January 1952
SUPERSEDES 13-MR-1 July 1932

6. Continued.

The ends of the tell-tale holes, after hydrostatic test has been completed, must be plugged with fireproof porous plugs of a different color than those just removed, and record kept of the color used.

7. INTERNAL INSPECTION. The interior of every boiler must be thoroughly inspected before the boiler is put into service and whenever a sufficient number of flues are removed to allow examination.

The following method must be followed in making internal inspections:

(a) All small tubes and flues must be removed.
(b) Clean and scale barrel and dome.
(c) Examine the whole interior of the barrel for cracks, grooves, pitting or other defects.
(d) See that all bracing is tight, pins secure and crown stays in good condition.
(e) Examine all parts of the firebox that are accessible.

8. EXTERNAL INSPECTION. Jacket and lagging, sandbox, bell, or any other obstruction, must be removed. Inspect the entire exterior of the boiler carefully while under a hydraulic pressure of not less than 25% in excess of authorized working pressure.

Before jacket and lagging are replaced, boilers should be given a coat of preservative paint.

Jacket and lagging must also be removed to permit inspection of leaks, whenever requested by Inspectors of the Railway Company, Board of Railway Commissioners' or Interstate Commerce Commission.

9. TELL-TALE HOLES, 7/32" diameter, must be drilled or pierced in the outer end of all rigid staybolts, in accordance with Drawings B-15-L-426 and B-15-L-782, latest issues. These tell-tale holes must be cleaned out at every No. 1 repair. Tell-tale holes must be reamed out to 7/32" after staybolts have been riveted over.

10. ARCH TUBES. Whenever making any of the above tests, fire-bricks must be removed from arch tubes and the tubes carefully inspected for defects, such as blisters, pitting or cracks. When boiler is empty, arch tubes must be hammer tested to locate thin spots.

Arch tubes which have been in service over 100,000 miles on locomotives in switching service, or over 150,000 miles on locomotives in road service, must be renewed when the locomotive is in shop for No. 1 repair. Arch tubes must not be welded or safe ended. In order to keep record of arch tube mileage, show the words "arch tubes applied" and date in lower right hand corner of form 181.

11. NEW BOILERS must receive all tests mentioned on this card before locomotive is placed in service. Steam pressure used for testing new boilers must be approved by the Chief of Motive Power & Rolling Stock.

12. STEAM TEST. After any repairs are made to the boiler it must be examined under full working steam pressure, and all leaks made steam tight.

over -

Approved as System Standard by Chief of Motive Power & Rolling Stock.

Boiler 1952 is from 483

(36)

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: LOCOMOTIVE BOILER INSPECTION AND TESTING. (IN ACCORDANCE WITH GENERAL ORDER 473 OF THE BOARD OF TRANSPORT COMMISSIONERS).
ISSUE: ROAD AND SHOP.

REGULATION NO. SL-13-1
PAGE 5 of 5
DATE January 1952
SUPERSEDES 13-MR-1 July 1932

13. PROTECTION OF EMPTY BOILERS. Whenever all water has been removed from a boiler, two notices bearing the words "Boiler Empty" must be applied, located one over fire door and one over front number plate.

14. RULES FOR INSPECTION. The Mechanical Officer in charge at each point where boiler work is done will be held responsible for the inspection and repair of all locomotive boilers and their appurtenances under his jurisdiction. He must know that all defects disclosed by inspection are properly repaired before the locomotive is returned to service.

15. LEAKS UNDER LAGGING. If a leak develops under lagging the locomotive must be removed from service at once, examination made immediately, and if there is a crack in the barrel of the boiler, and before any repair is commenced, notify the Superintendent of Motive Power giving detail particulars of crack or cracks. The method of repair must be approved by the Chief of Motive Power & Rolling Stock.

16. METHOD OF TESTING FLEXIBLE STAYBOLTS WITHOUT CAPS. Flexible staybolts which do not have caps shall be tested once each month, the same as rigid bolts. Each time a hydrostatic test is applied, such staybolt test shall be made while the boiler is under hydrostatic pressure not less than the allowed working pressure, (and proper notation of such made on form M.P. 72).

17. STEAM GAUGES. Every boiler shall have at least one steam gauge which will correctly indicate the working pressure, see Regulation SL-63-1.

18. BOILER NUMBER. The builders' number of the boiler, if known, shall be stamped on the dome. If the builders' number of the boiler cannot be obtained, an assigned number, which shall be used in making out specification card, shall be stamped on the dome.

19. BADGE PLATES. A metal badge plate showing the allowable steam pressure shall be attached to the boiler head in cab, lagging and jacket must be cut away so plate can be seen.

20. SAFETY VALVES. Every boiler must be equipped with at least two safety valves, see card 63-MR-1.

21. WATER GLASS LAMPS. All water glasses must be supplied with a suitable lamp properly located to enable the engineer to see easily the water in the glass.

NOTE: Pending revision, this Maintenance Regulation supersedes immediately regulation 13-MR-1, cards 1 and 2 (dated July 1932), which should be destroyed.

Approved as System Standard by Chief of Motive Power & Rolling Stock.

(37)

CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: LOCATING AND PROVING POSITION OF WATER GLASS AND TRY-COCKS.

REGULATION NO. SL-13-5
NO. OF SHEETS 1 of 1
DATE December 195
SUPERSEDES 13-MR-5 May 1930

ISSUE: ROAD AND SHOPS

1. General

Before attempting to locate crown indicator stud, detail of which is shown on drawing B-16-L-46, particular attention must be paid to see that the boiler is properly levelled both longitudinally and transversely in accordance with approved methods.

2. Location of Crown Indicator Stud - is obtained by the use of apparatus shown on latest issue of drawing B-53-L-207. The use of this method will show the same level at the back head as at the under side of the crown sheet at the front end of the crown. To the position shown by the water level in the tube at the back head must be added the thickness of the crown sheet and a line suitably scribed on the back head to locate the proper position for drilling for the crown indicator stud.

3. Location of Extensions for Water Glass Mountings or Try-Cocks - The vertical location for the water glass mounting extensions is to be measured from the centre line of crown indicator stud position and is to be in accordance with the latest issue of drawing B-24-L-703. The transverse location of extensions will be made in accordance with drawing requirements or to specific instructions which may be issued by the office of Chief of Motive Power and Rolling Stock.

4. Application of Mounting Extensions - Holes in back head for all extensions must be drilled parallel to the longitudinal centre line of boiler.

5. Holes for Extensions or Mountings in Boiler must be 11 Whitworth threads per inch.

6. The above method of locating and proving water glasses and try-cocks is to be followed whenever:

(a) New boilers are applied at construction of new locomotives.

(b) A replacement boiler is applied.

(c) A boiler is removed and re-applied to the same or another set of frames.

(d) A firebox is removed and re-applied or crown sheet renewed.

CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

(38)

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: BOILER REPAIRS.

REGULATION NO. SL-13-7
PAGE 1 of 2
DATE January 1952
SUPERSEDES 13-MR-7 July 1932

ISSUE: ROAD AND SHOP.

1. BOILER BARREL. No repairs to boiler barrel courses must be made until method of repair has been approved by the Chief of Motive Power and Rolling Stock. Drilling of extra holes in barrel courses, also welding and burning, is prohibited unless approval is also obtained.

2. PATCHES ON INSIDE OF FIREBOXES must be of the same thickness as firebox sheet and must be firebox steel of the same quality, secured by welding, or with countersunk head patch bolts 7/8" diameter spaced 1 7/8" centres minimum and 2 1/8" maximum; if larger diameter bolts are used spacing will be governed by diameter of bolt. Copper gaskets, thickness 26 I.W.G., must be used between patch and sheet, see drawing B-13-L-154, when patch is applied with bolts.

3. PATCHES ON OUTSIDE OF FIREBOXES, throat sheets below the centre line of boiler and back heads, to be of shell steel, same thickness and quality as original sheet. They are to be secured by rivets whenever possible; if not, by patch bolts or screwed plugs, their edges caulked and welded.

4. PATCHES ON BOILER BARREL COURSES, must be of sheet steel of the same quality as the original sheet, such as carbon or nickel steel to specification No. 5 or 121.

   Serial No., maker of steel, and tensile strength, must be stamped on each plate applied to boiler. The thickness of outside and inside welts, also design of patch, must be approved by the Chief of Motive Power and Rolling Stock.

5. INSIDE FIREBOX CRACKS over 8" long or which extend further than between three rows of staybolts must be patched or welded, but not stitched. In emergency, shorter cracks may be stitched, using 1/2" screwed iron plugs.

6. CRACKED TUBE SHEETS may be welded or repaired temporarily using one threaded iron plug in each bridge for cracks extending between two tubes; if crack extends further, tubes must be removed, holes screwed and plugged and stays applied as per drawing B-15-L-165. Patches on tube sheet flanges necessitating the removal of tubes must also be stayed as per drawing B-15-L-165. Patches on flanges of back tube sheet having a large radius to be secured with rivets and one row of 7/8" staybolts with ends riveted over on patch and sheet as per drawing B-15-L-394, this repair is for emergency cases only.

7. RIVETS used for boiler repairs must be of carbon steel to specification No. 108, or of nickel steel to specification No. 36 when authorized.

8. PATCH BOLT DIAMETER at root of thread must be the same as the diameter of rivets for which they are substituted.

9. HYDROSTATIC AND STEAM TEST must be made as covered by SL-13-1 after any patches have been applied, or other repairs which affect the strength of the boiler.

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Approved as System Standard by Chief of Motive Power & Rolling Stock.

(34) (34)

CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: BOILER REPAIRS

REGULATION NO. SL-13-7
PAGE 2 of 2
DATE January 1952
SUPERSEDES 13-MR-7 July 1932

ISSUE: ROAD AND SHOP.

10. REPORT all defects occurring and repairs made on form M.P. 18. When reporting defect, a sketch must be submitted showing length of crack and its location, also the number of holes and their diameters for the full length of the course and for 18 inches beyond end of crack at both ends.

NOTE: Pending revision, this Maintenance Regulation supersedes immediately MR Card 13-MR-7 (dated July 1932), which should be destroyed.

Approved as System Standard by Chief of Motive Power & Rolling Stock.

CANADIAN PACIFIC RAILWAY COMPANY

MECHANICAL DEPARTMENT

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MAINTENANCE REGULATION - STEAM LOCOMOTIVES

SUBJECT: INSTALLATION AND MAINTENANCE OF LOCOMOTIVE BRICK ARCHES.

REGULATION NO. SL-13-8
PAGE 1 of 2
DATE January 1952
SUPERSEDES 13-MR-8 October 1932

ISSUE: ROAD AND SHOP.

INSTALLATION:

1. HOLES IN FIREBOX SHEETS. All arch tube holes must be carefully located in accordance with application drawings. In no case must the bridges between the edges of the tube and the staybolt holes be less than 1" in width. All sharp edges on holes in inside sheets must be removed by rounding slightly with reamer or file. Tube holes in back tube and door sheets should be drilled 3 1/32" for 3" arch tubes and 3 17/32" for 3 1/2" tubes. Plug holes in throat and backhead sheets must be drilled 3 1/8" for 3" and 3 1/2" tubes. Tap out holes in throat and backhead sheets with a 1 in 8 taper tap, 11 Whitworth threads per inch, to suit 3 1/8" bronze washout plugs, pattern number 77-L-53 shown on drawing B-77-L-153. Fireboxes equipped with sleeves to drawing B-39-L-500 use a plug with square threads as shown on drawing B-77-L-156.

2. TUBES. Only tubes that conform to Canadian Pacific Railway specification No. 14 should be used as arch tubes. These are seamless steel, 3" or 3 1/2" O.D., and .165" or No. 8 B.W.G. thick. Tubes should first be bent to templets which conform to dimensions on application drawings, care being taken to avoid flattening at the bends as this prevents proper maintenance and may obstruct rotary cleaner. To allow for variations in individual fireboxes, the correct length to which tubes must be cut should be measured by putting the tubes in place in the firebox. The allowance for beading should be 1/2" at both ends measured from the water side of the sheets. After cutting, the ends should be annealed and the tubes inserted in position in firebox. The templet for correct spacing, as illustrated on application drawing, should then be put in place as shown and the tubes rolled, flared and beaded. The bead when turned over should not bear against the sheet but should stand clear 1/16" as shown on page 2 of this regulation.

3. BRICKS. Proper service cannot be obtained from brick arches unless bricks of the right quality and size are used. Only such bricks as are shown on application drawings should be used, care being taken to ensure that they are correctly located.

MAINTENANCE:

4. TUBES. All arch tubes should be inspected every trip. Leaky tubes must be tightened by rolling, the ends of the tubes being first cleaned of scale. At each washout they must be well cleaned, using a standard rotary cleaner, care being taken not to push cleaner beyond the end of the tube or damage to the cleaner may result. After cleaning, the tubes must be thoroughly inspected and their alignment checked by placing over the tubes a wooden templet made in accordance with dimensions shown on application drawing. The mechanical officer in charge at point where tests are made will be held responsible for the safe condition of tubes which are returned to service with any defects. Whenever making any tests as covered by card SL-13-1, firebricks must be removed from arch tubes and tubes carefully inspected for defects, such as blisters, pitting, warping, cracks or any other defect which may weaken the tube. Tubes badly