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GOVERNMENT OF INDIA
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डीज़ल-विद्युत रेल इन्जन में प्रयुक्त एक्सप्रेसर/कम्प्रेसर के रिक्लेम्ड लो प्रेशर/एक्जास्टर सिलिन्डर लाइनर की आपूर्ति हेतु तकनीकी आवश्यकताएँ

Technical Requirement for procurement of reclaimed L.P./ exh. Cylinder liners of expressor/compressor used on diesel electric locomotives

एम.पी.विविध- चालन शक्ति-०.०७.००.१२
नवम्बर-२००२

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अनुसंधान अभिकल्प एवं मानक संगठन
लखनऊ - 226 011

RESEARCH DESIGNS & STANDARDS ORGANISATION
MANAK NAGAR, LUCKNOW-226011.

1. Scope

This specification covers technical requirements related to procurement of LP/exhauster cylinder liners provided in expresser and compressors reclaimed by chrome plating process for trial purpose on diesel electric locomotives.

2. Introduction

At present cast iron cylinder liners are used on expresser and compressor. After use, these liners are discarded generally and replaced by existing new cylinder liner. Discarded liners reclaimed by chrome plating process were tried out on diesel locomotives at diesel shed MLDT and performance reported by shed indicated better life than existing one. Based on this report, RDSO was advised by Railway Board vide letter no.2001/M(L) 466/2702 dated 21.05.02 to carry out cost benefit analysis of reclaimed liner and a report on cost benefit analysis was prepared by RDSO & sent to Railway Board vide this office letter no. SDWDM2.3.2 dated 8/9.8.2002. Railway Board further advised to carry out field trials on 10 locomotive, each at diesel shed Alambagh & Vatva with reclaimed chrome plated cylinder liners on expresser and compressor to assess the actual life.

3. Terminology

1. **Existing cylinders-** These are alloy cast iron cylinders as per RDSO drg. No. SKDP-2605 and used on compressor and expresser as low pressure and exhauster cylinders.
2. **Discarded cylinders-** These cylinders are the condemned/used cylinders which are generally scrapped by the sheds after use of 18 months during M-18 maintenance schedule.
3. **Reclaimed cylinder-** These cylinders are the discarded cylinders on which chrome plating has been carried out.

4. Requirement

1. Chrome plating should be carried out only on discarded LP/exhauster cylinder liners of expresser/compressor.
2. Reclaimed cylinder liner should have no adverse effect on other related components such as pistons, piston rings and gudgeon pins etc.
3. Reclaimed cylinder should have adverse on effect the lube oil consumption.
4. There should not be any adverse effect on the overall performance of the compressor & expressor.
5. Reclaimed cylinders liners should not cause oil throw through valves or other related parts.
6. After giving a life of 36 months in single chrome plating, the condition of the cylinder shall be checked and if found suitable, it shall be chrome plated again to get a further life of 36 month.

7. Life of reclaimed cylinders should match with maintenance schedule to avoid detention of loco especially for replacement of liner in between the schedules.
8. Chrome plating should have adequate bonding strength between chrome plated surface and base material to ensure that plating does not peel or chip off.

5. Condition of discarded cylinder liner before chrome plating

Cylinder liners which are to be subjected for chromium plating should meet out the following requirement.

1. Discarded cylinders should conform in all respect to RDSO drawing No. SK.DP-2605 except bore diameter.
2. Bore surface shall be free from defects such as rough or spongy spots, sharp edges injurious pits, inclusions, rust, tool marks etc.
3. Cylinder should be free from cracks.
4. Length of discarded cylinder should be $312.74 \pm (0.050 / 0.000)$

6. Surface treatment before chrome plating

Before chrome plating the bore of discarded cylinder liner, the surface to be treated should meet the following.

1. Degreasing and cleaning of the surface of the cylinders.
2. Machining of the cylinder bore to clear the ovality, sharp edges and marks left by piston travel and other dents.
3. Ensure the perpendicularity with respect to face of the flange which should not be more than .008”.
4. Surface should be free from defects such as pits, porosity, cracks or any defects detrimental to final finish.

7. Chrome plating

1. The chromium plating on the significant surfaces shall be smooth and free of visual defects such as blisters, pits, roughness, cracks and burned deposits.
2. Ensure that flange area of cylinder liner does not get affected during chrome plating.
3. Ensure that plating defects observed during above operations are removed by the suitable process to obtain the surface finish.
4. Ensure that thickness of the plating does not affect the bonding strength of the plating.
5. Ensure that hardness of the chrome plating conform to RDSO drgs. no. SKDP-2605.
6. Ensure that microstructure of the cylinder confirms to RDSO drgs. no. SKDP - 2605.
7. Ensure that chromium plating does not affect the performance of the related components piston, piston ring, gudgeon pin etc.

8. Chromium plating should be applied by precision process with accurate temperature control so as to ensure satisfactory bonding of chromium with the base metal of discarded cylinder liner.
9. Plating should be free from pitting and non-adherent deposit.
10. Surface finish of chrome-plated liner should conform to RDSO drgs. no. SKDP - 2605.

8. Post treatment of chrome plated surface

1. After chrome plating of the liners ensure that cylinder liners are honed and etched.

9. Inspection and testing

1. Visual examination of the reclaimed cylinder for cracks, cavity etc.
2. Dimension check up of cylinder on sample basis as per inspection plan no. IS-2500
3. Sample check for properties like as hardness conforming to RDSO drg. no. SKDP - 2605
4. Surface cracks- Each reclaimed cylinder should be checked for surface cracks. These checks should be performed by die penetration/Zyglo test and using magnifying glass over the entire bore surface of reclaimed cylinder.
5. Hydraulic test-Reclaimed cylinder should be subjected to hydraulic test at 5 kg/cm² as specified in drawings nos. SKDP - 2605.

Workmanship

1. Presence of any sign of chrome plating other than the desired area shall be liable for rejection.
2. Surface of each reclaimed cylinder should be bright.
3. Chrome plated surface liner will be tested in field for performance and life.
4. Chemical composition and microstructure should conform to RDSO drawing No. SKDP - 2605.
5. Chrome plated area not show any sign of exfoliation, blistering and uncoated area.
6. Plating must not peel or chip off.

10. Marking and packing

1. Each and every reclaimed cylinder should punch with mark "RECLAIMED" on flange surface to avoid intermixing of reclaimed and existing cylinders.
2. Reclaimed cylinders should be packed in proper carton.
3. Each carton should indicate with reclaimed LP/exh cylinder, size, nos. of cylinders, month and year of chrome plating, plater's name and trade mark.