GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
RESEARCH DESIGNS AND STANDARDS ORGANISATION
MANAK NAGAR LUCKNOW - 226 011

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SPECIAL MAINTENANCE INSTRUCTIONS NO. DSO/EL.RS/SMI/100

Gaskets fot cylinder heads of compressors/ exhausters and delivery joints

1. OBJECT:

A number of failures of Gaskets used in compressors/EMU have been reported by the Railways. The primary reasons for these failures can be attributed to selection of proper material for the gaskets and improper methods used for cutting/fitment of gaskets.

Mechanical Packing: Mechanical packaing is basically a non rigid member designed for inclusion in the wall of a fluid container for preventing leakage from between rigid parts of such containers. A packing may take form of 'O' ring, face seal, dynamic shaft seal or a flat gasket between flanges. The packing will stop leakage of it is exerting against confining members a compressive force which is greater than the fluid pressure in the contained vessel. Mere contact is not enough. It follows that any joint employing packing must have meant for putting it under a state of compression and keep it under compression for the expected life of the packing between re tightenings.

For proper functioning of gaskets joints, it is essential to understand the basic functions of gasket materials, tightening and joint accuracy (condition of mating surfaces). Basically the following functions are performed by these:-

i. Support forces in the container wall, caused by fluid load acting across an area equal to the inside area of the gasket.

ii. Support any additional stresses in the container walls caused by gravity,
misalignment or thermal expansion and contra-action. Although gravity and thermal expansion and inherent to the design, the misalignment should be eliminated as far as possible by suitable stripping and cleaning of the surfaces to be used for gasket seating.

iii. Permanent set or compression set is measure of permanent change in original dimensions after being compressed or stretched under compressive or tensile
loading. After the initial sealing stress is applied to a packing it is necessary to
maintain sufficient sealing stress for design life of the packing. All packing
materials exhibit, in varying degrees, reduction in applied stress as a

function of time due to stress relaxation. The reduction in stress in a packing is actually combination of two major factors namely stress relaxation and creep.

The creep is a change in strength of a speciman while under constant stress below the yield point, permanent set will also cause reduction in compressive stress. The combination of these factors results in subsequent loss if sealing pressure and there by increase the tendency of packing to leak.

iv. Development of resident gasket over all portions of gasket area equal to the fluid pressure into safety factor sufficient to take care of both the initial non conformity of the gasket and natural relaxation of the gasket during intervals between tightenings: e.g., a high grade synthetic rubber in 1.5 mm thickness will lose 60% of initial compression at 130 kg/cm^2 gasket load between smooth flanges after 20 hrs at 100^o C. Thick gasket poorly confined and subjected to high temperatures further increase the rate of relaxation and consequently a need for very high factor of safety shall be essential. The substitution of other types of gaskets such as compressed asbestos sheet reduces rate of relaxation but by no means eliminates it.

This SMI indicates the gaskets materials, to be used for compressor /exhauster and other necessary pre cautions to overcome the gasket failures.

2. <u>INSTRUCTION:</u>

i) The gasket shall be preferably cut with the help of dies and if necessary these shall be obtained directly from the equipment manufacturers with gasket materials is indicated in this SMI.

ii) While assembling the gasket joints, the tightening torous as recommended by the equipment manufacturers or RDSO from time to time should be maintained.
(The general guidelines, wherever the adequate data is not available as per SMI No. EL/3.2.104/J-II dt. 9.12.77 may be followed).

iii) All the accessible bolts for gasket/joints should be tightened during overhaul and IC inspections to be recommended limits as indicated in the above para.

iv) Once the equipment is dismantled for overhaul/repairs all old gaskets must be discarded and only new gaskets shall be provided.

<u>Work to be done:</u>

(i) <u>Application - compressor/Exhauster heads and Delivery pipe joints.</u>

Materials for gaskets shall be general type “totally jacketed copper reinforced with white asbestos mill-board as filler.

Alternative materials:

(i) Permanite metallic compressed asbestos fibre jointing with steel wire gauge insertion in graphited finish.

(ii) Probable supplier for gasket sheet material:

M/s Hindustan Forodo Ltd., Hamilton House, Block 'A', connaught Place,
New Delhi.

3. PERIDIOCITY

During AOH/IOH/POH and under special repairs whenever cylinder head/pipe joints are dismantled.

4. INSTRUCTION DRAWING: Nil

5. APPLICATION OF CLASS OF LOCOMOTIVES

Applicable to all Electric locos.

6. AGENCY OF IMPLENTATION

All Elec.Loco sheds and POH Shops.

7. DISTRIBUTION:

As per enclosed

Encl : As above.

(Kewal Kumar)

For Director
General/Elect.