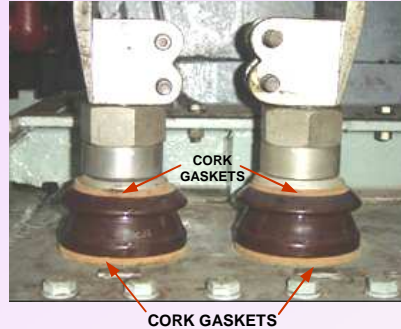


INTRODUCTION

Different types of rubberized cork gaskets/components are used in the conventional and 3 phase electric locomotives mainly in transformer tank and bushings. Bad quality & improper fitment of gaskets in the transformers is un-desirable because of various long term adverse effects on dielectric integrity such as:



- Reduction in dielectric strength of oil.
- Accelerated ageing of insulation
- Bubble generation in the solid insulation during overloads
- Ageing factor

The problem of oil leakage from the transformer bushings and covers are mainly due to use of non standard/ non specified gaskets/ 'O' rings during assembly. To prevent the problem RDSO has issued a technical circular no. ELRS/TC/0076/ Rev. '0' dtd. 17.09.2002 and its Rev.1 dtd. 22.02.2013.

As per TC 0076 (Rev.1- dtd 22.02.2013) the cork sheet gasket material shall be NBC - Nitrile bonded cork gasket as per IS:4253 (Part 2): 2008 and sources of supply are reproduced below.

1. *Cortica Mfg.(I) Pvt.Ltd.*
Plot No. 105, Sidco Inds Estate, Thirumazhisai. Madras
2. *NU-Cork Products (P) Ltd., E-370,*
Phase-I, RIICO Indl. Area, Bhiwadi - 301019.
3. *Talbro Pvt. Ltd.*
Plot No. 60, Sector 6, Faridabad
4. *Bharat Corrub Industries LLP*
749/8 GIDC Industrial Estate, Makarpur, Baroda 390010
5. *Indian Cork Industries, Khasara No. 33A, Modern Industrial Estate,*
opp, Bahadurgarh Chamber of Commerce, Delhi Rohtak Road,
Distt- Jhajjar(Haryana)

In Nitrile bonded cork gasket, the size of cork granules shall be of 'fine' category as mentioned in clause 3.2 of IS 4253 (Part 2): 2008. The NBC gasket shall be of type RC70-C (R = Rubber, C = CorK, 70 = designed hardness, C – type i.e. very good resistance to oil and petrol).

CHARACTERISTICS OF CORK GASKET RC70C

The characteristics of RC70C and their values are given below as given in TC 0076 (Rev.1- dtd 22.02.2013):

| Sr. | Characteristics | Value | Test Method |
|-----|--|---|---------------------------|
| 1. | Hardness (IRHD)/ (Shore A) | 70 ± 5 | IS 3400 (Part 2): 1995 |
| 2. | Dimensional changes, percent, Max. | 1.5 | IS 4253 (Part 2): 2008 |
| 3. | Tensile strength, kPa Min. | 1550 | |
| 4. | Compressibility (%) (at 2800 kPa) percentage | 25 - 35 | |
| 5. | Recovery, percent, Min. | 80 | |
| 6. | Compression set, percent, Max. | 85 | |
| 7. | Chemical test on water extract (a) pH, where applicable (b) Chloride content (as chloride ion) (c) Sulphate content (as sulphate ion) | 5.0 – 8.5 0.2 percent, Max. 0.2 percent, Max. | |
| 8. | Volume change in transformer oil as per IEC 60296, 70h/ 100°C | Max. 8 | |

CORK COMPOSITION SHEET AND SOME CHECKS

(Ref: IS 4253 (Part 2): 2008)

Cork composition sheets for gasket are made by the compounding of granular cork with natural or synthetic rubber.

Types of Cork sheet : Three types

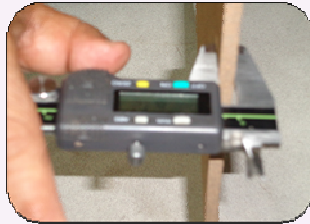
- Type 'A' - Non oil resistant
- Type 'B' - Good resistance to oil
- Type 'C' - Very good resistance to oils & petrol

- Further each type is classified in three grades, i.e. RC50, RC70, RC80 according to hardness. Hardness can be checked by hardness tester, it shall be within specified limit i.e. designed hardness ± 5 .



- The cork sheet shall be free from cracks or pinholes and shall be capable of being cut or punched without cracking or tearing.
- For **fine** grain size : Cork granules passing through 1.00 mm IS Sieve and retained on 425 micron IS Sieve.

- The permissible variation in thickness at any point of the sheet shall be ± 10 percent for thickness upto 2.50 mm and ± 0.25 mm for thickness above 2.50 mm.



- For checking flexibility: Three test specimens where possible 25 mm wide and of suitable length shall be cut from each sheet in the sample from widely separated position. The test specimens shall be bent through 180° round a mandrel of diameter 3 times the thickness of the specimens for materials upto 3 mm thickness, or 4 times the thickness of the specimen for material over 3 mm thick.

The flexing being carried out at a rate of 1minute through 180° using finger pressure at ambient temperature. There shall be no breakage through the granules of cork or separation of the granules.

- For fluid resistance test: For type 'C' required in electrical industry, immersion test may be conducted in transformer oil as per IS 335 for 70 hrs. at 90 degree C to 100 degree C, in such cases change in volume should not exceed 8 percent.

FOR MORE DETAILS ABOUT OTHER TESTS, PLEASE REFER IS 4253, PART 2: 2008

MARKING

Cork composition sheets shall be marked with the following:

- Manufacturer's name or trade mark
- Date of manufacture
- Grade

PACKING

Cork composition sheets/gaskets shall be suitably packed to prevent damage. Preferably shall be kept in HDPE (high density poly Ethylene) bags.



STORAGE

Cork composition sheet shall not be stored under conditions of temperature, humidity or for reasonable period of time, which are likely to cause deterioration.

Knowledge about storage conditions of rubberized cork items will be useful to avoid premature failure.

Many rubberized cork products and components are stored for a period before being put into service and thus it is important that they are stored in conditions that minimize unwanted changes in properties. Such changes may result degradation such as excessive hardening, softening, cracking, crazing and other surface effects. Other changes may be because of deformation, contamination or mechanical damage.

OPTIMAL STORAGE CONDITIONS

To optimize or reduce the deterioration to minimum possible rate following storage conditions are recommended:

i. Temperature

The rubberized cork sheet gaskets/ components should be stored in a cool, dry place and in their original packaging as far as practicable, preferably below 30°C (Conditioning temperature as per IS 4253, part 2, 2008: shall be 27 ± 2 degree C). At higher temperatures deterioration occurs more rapidly.

ii. Light

They should be kept away from **direct sunlight** preferably in a **dark place**. Direct sunlight causes much faster degradation of the rubber mixed components. They should also be kept away from strong artificial light with a high ultra-violet content.

It is also advisable to avoid windows in a storage room if possible.

iii. Humidity

The relative humidity of the storage condition should not be more than 70% so that condensation of moisture does not take place on the surface of the components. Very moist or very dry conditions should be avoided. (Conditioning relative humidity as per IS 4253, part 2: 2008 shall be 65 ± 2 percent)

iv. Deformation

Gaskets should be stored in a relaxed condition free from tension, compression or other deformation. The portions under stress undergo deformations with permanent set and leading to degradation. The material should be stacked in such a way so that any super-imposed stresses are substantially avoided.



Don't keep unpacked gaskets

Always keep gaskets in individual packing



Do not store cut gaskets on a pegboard, as they will stretch. Put them on a shelf.

It is better if you can store your sheet material flat.



v. Rotation of stocks

FIFO (First In First Out) to be followed while storage. Every moment of storing is at the cost of useful life and prolonged storage of the material may render it unserviceable due to progressive deterioration.

vi. Others

- Keep your storage area away from large receiving doors. Install a curtain around the area to avoid direct winds.
- Cover the immediate top of gaskets to avoid direct exposure to light/dust.
- Gasket should not come in contact with liquids or semi-solid materials, specially solvents, oils & greases at any time during storage.

GASKET SELECTION

- Always use a good quality gasket from a RDSO approved manufacturer/ supplier.
- Cutting of Gaskets: Use a good cutter
- Never try to cut out a gasket by hammering material against flange.
- Ensure the gasket is of the correct size.
- Cut (preferably punching) the bolt holes slightly larger than the bolt shaft diameter.
- Ensure that the inside diameter of the gasket is not less than the inside diameter of the process line.



HANDLING OF GASKETS AND GASKET MATERIALS

- Carry gaskets carefully, ideally with some form of protective cover.
- Do not bend or buckle.
- Do not damage the gasket surface.

CONCLUSION

- A gasket must create a seal and hold it over a long period of time.
- It is prudent to include gasket testing in the quality assurance programme.
- It is not only good gasket but proper installation techniques are key requirements.

REMEMBER

During any activity by the shed/ shop involving opening of the transformer tank cover or removal of bushings, the old gaskets has to be necessarily removed and replaced by a new gasket. (Ref: RDSO L.No. EL/3.2.1 dtd. 03.05.2001)

Always use a good quality rubberized cork item from a RDSO approved manufacturer to ensure long life of gasket, because the cost of a rubberized cork item is insignificant when compared to the cost of traffic block due to a loco failure on line.

Disclaimer:

It is clarified that this pamphlet does not supersede any existing provisions laid down by RDSO, Railway Board or Zonal Railways. The pamphlet is for guidance only and it is not a statutory document.

If you have any suggestion or comment, please write to:

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Ph.0751-2470740, Fax 0751-2470841

E-mail: direlcamtech@gmail.com

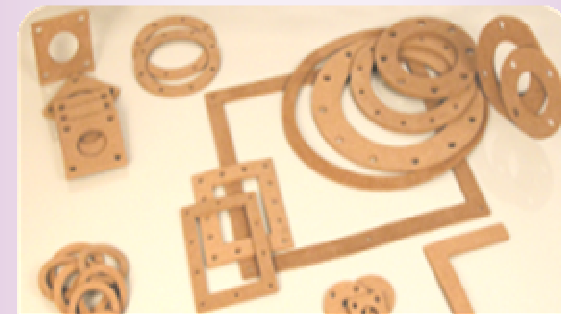
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भारत सरकार GOVERNMENT OF INDIA
रेल मंत्रालय MINISTRY OF RAILWAYS

PAMPHLET on Up-Keeping of Cork Sheet Gaskets used in Electric Locomotives

End User: Electric Loco Maintenance Staff
and TRD PSI Staff



CAMTECH/E/2014-15/Cork Gasket/1.0

June, 2014

अभियांत्रिकी RDSO
रेल अग्रदूत Transforming Railways



Indian Railways
Centre for Advanced Maintenance Technology

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