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लखनऊ - 226 011
Government of India-Ministry of Railways
Research Designs & Standards Organisation
LUCKNOW - 226 011



TECHNICAL CIRCULAR No.36

No. EL/3.2.21

Dated 29.01.99

CHIEF ELECTRICAL ENGINEER,

- Northern Railway, Baroda House, New Delhi-110 001
- Central Railway, Mumbai CST-400 001
- Eastern Railway, Fairlie Place, Calcutta-700 001
- South-Eastern Railway, Garden Reach, Calcutta-700 043
- Southern Railway, Park Town, Chennai-600 003
- South Central Railway, Rail Nilayam, Secunderabad-500 071
- Western Railway, Churchgate, Mumbai-400 020
- Chittaranjan Locomotive Works, Chittaranjan (WB)-713 331
- Integral Coach Factory, Perambur, Chennai-600038

Sub. : Technical Circular No.36 Maintenance & Condition Monitoring of
Condenser Bushing Fitted in transformers of locomotives, EMUs & MEMUs.

RDSO's Technical Circular No.36 regarding maintenance and condition monitoring of condenser bushings fitted in the transformers of locomotives, EMUs and MEMUs is enclosed. This circular lays down guidelines for improving the reliability of the condenser bushing in service.

Railways are advised to ensure compliance of the above technical circular.

(Siya Ram)

for Director General (Elec)

Encl.: As above.

Copy to :- The Secretary (Elect.) Railway Board, Rail Bhawan, Railway Board,
Rail Bhawan, New Delhi-110001 (kind Attn : Shri I.C. Sharma, EDEE/RS)

- for kind information.

(Siya Ram)

for Director General (Elec)

Encl.: As above.

TECHNICAL CIRCULAR NO. 36

SUB. : MAINTENANCE & CONDITION MONITORING OF CONDENSER BUSHING FITTED IN TRANSFORMERS OF LOCOMOTIVES, EMUs & MEMUs.

1.0 INTRODUCTION :

25 KV AC single phase supply is fed to Loco/EMU transformer through condenser bushing. This population of these bushings is around 3000 nos in Indian Railways. This circular lays down guidelines for the maintenance and conditioning monitoring in service of these busings.

2.0 EQUIPMENTS

The bushing is made of resin bonded paper insulating material with metallic conduction (aluminium foils) layers provided in between insulating layers. This arrangement consists of 3 parts :

- a) Roof bushing - It is same in loco and EMU but different in MEMU. For the purpose of identification the flange in MEMU is painted with dark green colour.
- b) Condenser sleeve - The lengths of condenser sleeve are different for Loco and EMU/MEMU which are given as under :-
 - i) LOCO - 1030mm
 - ii) EMU - 1190mm
 - iii) MEMU - 1190mmFor identification, yellow band mark has been provided on sleeves in EMU/MEMU.
- c) Transformer bushing - The length of Transformer bushing are same for LOCO, EMU and MEMU.

3.0 MAINTENANCE OF BUSHINGS :

For maintenance of condenser bushings in service, the following instructions exist :

- i) Detailed instructions for maintenance as per CLW maintenance manual.
- ii) Removal of oil from the condenser sleeve - RDSO/WAU/01 dtd.20.05.98 & RDSO/ELRS/SMI/204 dtd.19.05.98
- iii) Limiting the over all height of the bushing in EMUs
 - (i) RDSO/WAU/3 dtd. 24.7.81
 - (ii) RDSO/WAU/01 dtd. 20.05.98

- iv) Under no circumstances sleeve should be interchange between loco and EMU/MEMU bushing as the sleeve fail to change in pattern of electrostatic fields.
- v) Under no circumstances roof bushing should be interchanged between LOCO/EMU and MEMU bushings as this will result in failure due to change in pattern of electrostatic fields.

4.0 CONDITION MONITORING OF BUSHING

For the condition monitoring of condenser bushings in service, tan delta monitoring is recommened.

At manufacturing stage BHEL is measuring tan delta for individual parts at potential varying from 10 kv to 35 kv and accepted value is 1.5% as per IS:2099-1986. Sheds/Shops can measure tan delta by applying voltage upto 5.0 kv only. Sheds/shops have already procured the required instruments. However different procedures are being followed for measurements of tan delta. In order to have uniformity over Indian Railways, the following procedure should be followed for measurement of tan delta using SCHERING bridge.

- (i) Bushing to be dismantled from LOCO/EMU/MEMU and taken to test room.
- (ii) Values to be measured for roof bushing and condenser sleeve separately.
- (iii) Place the roof bushing on test stand & apply a voltage of 5.0 kv* Record the value of tan delta. If the tan delta value measured is more than 3.0%, reject the bushing.
- (iv) Place condenser sleeve on test stand, apply voltage of 5.0 kv* between flower contact point and flange as per sketch enclosed. If the value of tan delta is more than 3.0%, reject the sleeve.
- (v) Tan delta for transformer bushing can also be measured as and when the transformer core is lifted for repair/POH. For this purpose procedure as in item (3) above may be followed.

* NOTE : In case the test voltage of the measuring instrument is lower than 5.0 KV, the measurement may be carried out at the Maximum voltage of the instrument.

Encl:- RDSO/MS/WAU/3 dated 24.7.81
RDSO/SMI/WAU/01 dated 20.05.98
RDSO/ELRS/SMI/204 dated 19.05.98
Test schematic



(SIYA RAM)
FOR DIRECTOR GENERAL/ELECTRICAL