

## 1.0 OBJECTIVE:

1.1 Zonal Railways have reported a large number of failures of porcelain insulators over the last five years .The data has been analyzed by RDSO & it has been found that out of total failures reported by zonal Railways, 372 failure are on **MANUFACTURING** account. The failures on manufacturing account have been thoroughly studied & it has been found SER,CR & E.Rly have maximum failures.

1.2 To reduce the on line failures, RDSO has issued instructions from time to time for replacement /retention of insulators. However, this time failure pattern of last five years & result of tensile load test conducted at RDSO have been analyzed. This instruction stipulates the action to be taken by **RAILWAYS** for replacement/retention of certain makes and batches of 25 kV solid core porcelain insulators. This outcome of the analysis is given in following paras :

## 2.0 "FAILURE PRONE BATCHES":

2.1 Based upon the failure pattern of last 5 years & result of tensile load testing done at RDSO, on the insulators received from Railways, the insulators belonging to the following batches have been declared as "FAILURE PRONE" batches.

Make	Type of insulator	Batches
MPL	Stay arm Insulator	1966, 1968 & 1969 (For SER only)
	Bracket insulator	1960, 1968 & 1975 (For SER only)
GDR	Bracket insulator	1966
	9-tonne insulator	All batches
JSI	9-tonne insulator	5/96, 12/96, 2/97, 1/97
	Bracket insulator	2/89

	Bracket insulator	9/88
	Stay arm Insulator	9/88
	9-tonne insulator	1/89
MIL	9-tonne insulator	10/87, 12/87, 11/2000
W.G	9-tonne insulator	1982
BHEL	Bracket Insulator	6/82

**Table-I**

**2.2 ACTION TO BE TAKEN:**

The replacement of the entire batch of such insulator as given in Table-I may be done. Please note that MPL make insulators should be replaced by SER only, If no failure of the above batches is noticed on the Railways, the details of such batches should be submitted to RDSO and **specific exemption** may be obtained on case-to-case basis.

**3.0 "SUSPECTED TO BE FAILURE PRONE BATCHES":**

**3.1** Based upon the failure pattern of last 5 years, those batches of wherein at least 4 insulators have failed during the last 5 years have been declared as "suspected to be failure prone batches"., as given in Table-II.

<b>Make</b>	<b>Type of insulator</b>	<b>Batches</b>
NGK	9 Tonne	1980
JSI	9-tonne insulator	2/96

**Table-II**

**3.2 ACTION TO BE TAKEN:**

If any failure of above mentioned batch of insulator has occurred on manufacturing account, 10 healthy insulator of that batch should be removed from the vicinity of failed insulator and sent to RDSO for testing. Based upon the results of the tests conducted by RDSO the

decision for replacing or retaining that particular batch shall be taken by RDSO and advised to all concerned.

#### 4.0 “MAKES, TYPES & BATCHES TO BE RETAINED IN SERVICE

4.1 The under mentioned makes, types & batches of 25 kV solid core porcelain insulators were declared either “failure prone” or “suspect batches” earlier. Based upon the failure pattern of last five years & on the result of tests conducted at RDSO, these make, type & batches **MAY BE RETAINED** in service.

Make	Type of insulator	Batches
MPL	9-tonne	All
	Stay arm	All batches, However for S.E.Rly, all batches except 1966,1968 &1969.
	Bracket	All batches, However for S.E.Rly, all batches except 1960,1968 &1975.
JSI	9-tonne insulator	3/98
	Bracket insulator	1/90
	Stay arm insulator	1/94
GDR	Stay arm insulator	1965, 1966
WSI	Bracket insulator	8/88
MIL	9-tonne insulator	1/88

**Table -III**

#### 4.2 ACTION TO BE TAKEN:

These batches should be retained in service. However, if there is more than one failure on manufacturing account of any batch among that listed in Table -III & of batches other than those given in Table I & II, in the Railway, then the situation should be considered serious. The divisions where the failure occurred, shall be instructed to removed 10 insulators

of the same batch and make from the vicinity of the location of failures. They are to be sent to RDSO for conducting requisite tests. Based on the test results, decision will be taken by RDSO, to retain or replace the make and batch concerned and advice will be given to all concerned.

#### 5.0 Failures per 1000 insulators :

One more study has been carried out to find out those make and type of insulators, having failure of more than 1 insulator per 10,000 insulators. Apart from the make and type already covered in above study, the following make & type of insulators, given in Table IV, should be replaced with new insulators as their population is very less but per 10,000 insulator is more than 1.0

Make	Failure per 10,000 insulator	
	9 T	Stay
CGEC	2.52	
FP	9.62	
Siemen	47.06	
WG	44.64	
Japan	2.09	
BICC	5.49	
ENG		1.19
SMC		1.04

The current population of insulators of these make may be advised to RDSO by Railways.

#### 6.0 DEVIATION FROM THE INSTRUCTION

If any deviation is sought from the above procedure, complete details may be submitted to RDSO and specific exemption may be obtained on case-to-case basis.

#### 7.0 GENERAL INSTRUCTION :

Page 5 of 5	Effective from 13.12.2005	Instruction No.TI/IN/0012 Rev `0'.
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7.1 Railways are reporting failures of porcelain insulators on account of manufacturing & external reasons to RDSO. The external reasons details submitted by Railways have been studied by RDSO & it has been found that the external failures are mainly on following accounts.

- a) **Pantograph entanglement**
- b) **Short circuit by Snake, Stray wire, monkey/vulture/birds etc.**
- c) **Tree falling.**
- d) **Stone throwing by miscreant**
- e) **Mast hitting by brake block/road vehicle, open door wagon etc.**
- f) **Bad weather (Thundering & Lightning)**
- g) **Potential Difference at FP**
- h) **Pollutant deposition**
- i) **Derailment / accident etc.**
- j) **Any other external reason.**

7.2 Whenever, there is failure of 25 kV solid core porcelain insulator, then check, whether the failure is due to any one of the above external reasons. If so, then the Railways have to certify that the failures are due to external reasons & it is not on account of manufacturing. It will help in identifying the insulator failure pattern & corrective action can be taken accordingly.

8.0 *This supersedes all the instructions issued earlier regarding the replacement of insulators*

