



**AUSTRALIAN RAIL TRACK CORPORATION LTD**

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**Engineering Standard - NSW**

**Category**

**Electrical**

**Title**

**Substations - Base Safety & Operating Standards**

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**Document Control**

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The technical content of this document has been approved by the relevant ARTC engineering authority and has also been endorsed by the ARTC Safety Committee.

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## **About This Standard**

Equipment must be taken out of service when the limits set in this document are exceeded.

## Document History

**Primary Source** – RIC Standard EP 99 00 00 04 SP Version 2.0

### List of Amendments –

ISSUE	DATE	CLAUSE	DESCRIPTION
1.1	11/03/2005	Disclaimer	Minor editorial change

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## Contents

<b>1 General</b>	<b>6</b>
<b>2 Waivers</b>	<b>6</b>
<b>3 Protection Equipment</b>	<b>6</b>
3.1 Fault Levels	6
3.2 DC Circuit Protection	6
3.3 AC Protection	6
<b>4 Earthing</b>	<b>6</b>
<b>5 Fencing</b>	<b>6</b>
<b>6 Substation Equipment</b>	<b>7</b>
6.1 Negative Reactor	7
6.2 Rail-Earth Contactor	7
6.3 Harmonic Filter	7
6.4 Transformer Automatic Tap Changers	7
6.5 Surge Arresters	7
6.6 Rectifiers	7
6.7 Oil filled Equipment	7
6.8 SCADA Equipment	7
<b>7 Negative Connections to Track</b>	<b>8</b>
7.1 Substations	8
7.2 Sectioning Huts	8

## **1 General**

Equipment must be taken out of service if it is dangerous to staff or the public, or if it is likely to be damaged if it remains in service.

Equipment is not to be operated unless the labelling is clear and unambiguous.

## **2 Waivers**

In general, the System Control Engineer (and in cases concerning protection equipment, the Protection Engineer) can Approve the continued operation of any substation equipment, in contravention of limits set out in this document.

## **3 Protection Equipment**

### **3.1 Fault Levels**

Equipment must not be able to attempt to clear a fault if the fault level exceeds the rated breaking capacity of the equipment. In emergencies, the System Control Engineer may approve altered feeding or protection arrangements to limit fault levels.

### **3.2 DC Circuit Protection**

If dc circuit breaker settings cannot be confirmed by tests to be within 5% of the value specified in the Local Instruction, then the dccb must be taken out of service. Delta I protection may be taken out of service, when Approved by the Protection Engineer or the System Control Engineer.

### **3.3 AC Protection**

All AC and frame leakage protection must be operational or the protected equipment is to be taken out of service. The Protection Engineer or System Control Engineer may approve operation with some AC protection out of service.

## **4 Earthing**

Touch Potentials must be in accordance with "Guide to Protective Earthing " (Electricity Council of NSW) or equipment is to be taken out of service.

## **5 Fencing**

Must prevent Unauthorised entry to High Voltage areas or equipment must be taken out of service.

## **6 Substation Equipment 6.1 Negative Reactor**

A substation can operate without reactor, in emergencies, when Approved by System Control Engineer. (ie with the reactor bypassed). It must be replaced as soon as possible.

### **6.2 Rail-Earth Contactor**

A substation may operate with the REC operated (closed) but the REC must be reset as soon as possible to reduce electrolysis.

### **6.3 Harmonic Filter**

A substation can operate without the Harmonic Filter when approved by System Control Engineer.

### **6.4 Transformer Automatic Tap Changers**

A substation can operate without the automatic operation of tap changers. The tap changer should be set to nominal voltage or the voltage tap as advised by the System Control Engineer.

### **6.5 Surge Arresters**

A substation can continue to operate without surge arresters. They should be replaced as soon as possible.

### **6.6 Rectifiers**

A substation can continue to operate without any rectifier in service, if the system loading allows this without overloading any other equipment. The System Control Engineer may approve this operation if the loading conditions permit.

### **6.7 Oil filled Equipment**

Circuit breakers and transformers must not remain in service if the oil breakdown voltage is less than 20 kV across a 2.5 mm gap, measured in accordance with AS 1767-1975. ( For 2kV equipment the limit is 15 kV.)

### **6.8 SCADA Equipment**

Substations and Sectioning Huts will usually be allowed to remain alive without SCADA control for periods up to a few hours. It is desirable that while any substation/sectioning hut is not under SCADA control, that staff regularly visit the location. The System Control Engineer will determine whether staff need to be stationed at the substation/sectioning hut or the revisiting periods, depending on the risk associated with possibly circuit breaker operations. The System Control Engineer may authorise changed feeding conditions to reduce the consequences of any circuit breaker trips.

## **7 Negative Connections to Track**

### **7.1 Substations**

If all negatives are cut such that there is NO connection between the substation and the running rails, then ALL the feeder dc circuit breakers must be isolated.

( Where fitted, all the feeder links, must also be opened.)

It is preferred that the rectifiers be isolated, and in this case the REC must remain open.

The System Control Engineer may Authorise, that a rectifier remains in service, and in this case the REC must be closed.

### **7.2 Sectioning Huts**

If all negatives are cut such that there is NO connection between the sectioning hut and the running rails, then ALL the feeder dc circuit breakers must be isolated.

(Where fitted, all the feeder links, must also be opened.) The REC must remain open.