

**FACT SHEET Number 01/2007**

**March 2007**

## **SAFETY SWITCHES AND RESIDUAL CURRENT DEVICES**

### **General Safety Requirements in Depots, Terminals and Onboard Vessels**

#### **INFORMATION FOR REEFER CONTAINER OPERATORS**

All States and Territories in Australia and many overseas countries have general electrical safety requires, laws and regulations. Owners and operators of all types of electrical equipment have the obligations and responsibilities to ensure that the equipment is constructed, maintained and operated in a manner which ensures the health and safety of all persons associated with that equipment, is protected and free from risks as far as practically possible. Reefer service providers as well as terminal and depot operators are not exempt from these responsibilities and ignorance is not an excuse.

All personnel operating or placing on power seagoing refrigerated containers fall into this category irrespective of where the operations are taking place (shore-side or onboard vessels).

This paper is not designed to detail all appropriate standards Rules and Regulations but it focuses on a particular safety isolation aspect of electrical safety [Residual Current Devices (RCDs)], which affect all reefer container operators at some time or other. It provides some basic and helpful information. Interesting websites and links, which provide more detailed and relevant information is shown overleaf.

How frequently are reefer operators advised that their containers have low insulation readings (usually heaters or motors)?

How frequently have reefer operators received expensive or annoying calls from carriers, client's, depots or terminals indicating that Refrigerated containers have developed problems in operating, they will not start or they are tripping power supplies?

How often does it happen that a reefer may operate soundly in one location but may trip supply in another location? Many of these problems arise due to RCDs or different levels of protection to the power supply.

#### **Electrical Supply Tripping Devices and Safety Switches**

(Commonly known as Earth Leakage Detectors or Residual Current Devices (RCDs))

An RCD is a device which is so designed to make, carry and break currents under ideal conditions and to open contacts when the residual current reaches a specified value. These devices are similar to safety devices now becoming mandatory in homes, offices etc. RCDs in shipping and transport industry are becoming more effective, more sensitive and more common. All new installations are so equipped and overall, the maintenance, testing and operation of these devices everywhere is becoming more stringent and more tamperproof.

It is becoming more difficult for refrigerated containers with defects or deteriorated electrics to operate without being deprived or isolated from the power source. (In some cases one faulty reefer can also isolate all of those on the same power source). As very few industrial electrical devices have perfect electrical insulation and as some situations vary, small amounts of electrical leakage or stray currents are permitted so that operation can continue and personal safety is maintained. In medical or hospital situations allowable levels are very low; in mining and heavy industry they are more tolerant and in the wharf and terminal/depot areas maximum levels of leakage before tripping are about 30 milliamps.

### **Reasons for Reefers being Electrically Isolated**

- + Overload or current or voltage tripping devices set too low or not compatible with the reefer on power (supply situation).
- + Earth leakages in reefer equipment or in the cable, outlet or distribution supply to reefer equipment, short circuits in to the reefer or reefer supply.

### **Construction of Electrical Equipment**

In the case of reefer machinery electrical components, these must be prevented from becoming alive in the event of an insulation failure or the bypassing of the insulation. This is achieved through insulation between earth parts and the live parts. In some cases reinforced insulation is used.

### **Protective Earthing**

This is the resistance to earth from protected earth components. This must be low enough to let fault current flow to earth, enabling the RCD to open quickly in the event of insulation failure.

### **Insulation Resistance**

This must be tested at regular intervals to verify that no deterioration has occurred since the last test.

### **Effects of Isolation**

- + The power supply to the reefer is stopped
- + If the problem is not fixed it will trip again after resetting
- + Usually results in a call out to the defective reefer
- + Sometimes results in a lengthy restoration of power process.

### **What can be done to minimise operational problems?**

- + Main problem is heaters with low resistances, but can also occur with some motors electrics and cables etc.
- + Ensure that insulation or megger test is part of pre tripping process
- + A good idea is to ensure that the reefer service bays have tripping devices, which will result in discovering leakages at that stage.
- + Automatic Pre-trips of reefers will not always show defective insulation or low resistance.
- + Components of reefer machinery should all be subject to routine inspection and testing to ascertain any damage, wear and tear or any other condition that could result in the component being unsafe.
- + Any parts that are found to be faulty at PTI or at a breakdown should be immediately repaired or replaced.

- + If loaded reefer containers are tripping on the terminal or vessel and if heaters they should be changed or isolated bearing in mind defrost capacity will be affected and some units will alarm.

## Future Trends

- + External tripping devices will become more common and all new installations in Australia will be suitably protected.
- + Refrigerated container trends are unknown. Information should be sought from manufacturers.
- + It is anticipated that reefers would have improved resistance but the effects of poor maintenance or damaged supply to reefer problems cannot be overcome.

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