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Maintenance instructions for Acrastyle's Liquid Neutral Earthing Resistors (LNERs)

Section one of these instructions deals with the recommended periodic inspection procedures and section two deals with the rectification action to be followed on discovery of a defect whilst the LNER is in an operational condition.

Any work to be performed on the LNER, whether detailed in these instructions or not must always be performed within the bounds of the ruling safety regulations without exception.

SECTION 1

Following a fault

A full visual inspection **must be** made. It may be necessary to isolate the earthing resistor from the high voltage system and perform a full inspection of the porcelain bushing and fixings to identify any cracks or loose or damaged connections. An inspection of the interior is also recommended. Once the inspection has been carried out, it will be necessary to recalibrate the tank to obtain the resistance value stated on the rating plate. The procedure for setting the LNER to the resistance value required is described in the Installation and Calibration Notes under the heading 'Electrolyte'.

Quarterly

Visual inspection from ground level:-

1. The electrolyte level is correct. (if not, then follow procedure for setting resistance level. See Calibration notes).
2. The high voltage insulation is undamaged.
3. The tank is not leaking.

Every five years

The LNER should be isolated from the high voltage system and adequate safety precautions taken to prevent the inadvertent reconnection of the LNER to the high voltage system.

The LNER tank interior should be inspected for:-

1. The presence of any deposits on the tank walls/bottom or on the electrode.
2. Loose fittings and connections.
3. Extraneous items.

The exterior of the LNER should be inspected for:-

1. External damage to the tank.
2. Loose or damaged high voltage connections.

On completion of this inspection, check the electrolyte level on the sight glass. If found to be low, then the LNER needs to be topped up with distilled water to the level indicated on the Liquid Level Glass and a charge of sodium carbonate added to obtain the resistance value stated on the rating plate. The procedure for setting the LNER to the resistance value required is described in the Installation and Calibration Notes under the heading 'Electrolyte'.

SECTION 2

1. DEFECT Electrolyte level is above the indicated level.

ACTION Open the drain valve and allow the electrolyte level to fall to the recommended level indicated in the sight glass.

2. DEFECT Electrolyte level is below the indicated level.

ACTION With the LNER in service, the high voltage system **must** be isolated from the LNER and adequate safety precautions taken to prevent the inadvertent reconnection of the high voltage system to the LNER, and to ensure adequate safety clearances exist between surrounding live connections to positions where personnel may be working. All ruling safety regulations & precautions must be adopted. The above having been satisfactorily completed together with any other safety precautions thought necessary, distilled water can be added to the electrolyte via the inspection hatch until the electrolyte level reaches the recommended level in the sight glass. The LNER can now be returned to service.

With the LNER out of service, distilled water can be added to the electrolyte via the inspection hatch until the electrolyte level reaches the recommended level in the sight glass.

Note: The resistance value of the LNER may be checked on completion of Item 2 as a precautionary measure by the method described in "Installation & Calibration Notes".

3. DEFECT High Voltage Bushing damaged.

ACTION With the LNER in service the procedures outlined in Item 2 for electrical isolation

& safety must be adopted.

The preferred method is to remove the resistor top peripheral fixing clamps, lift theresistor top off the tank by means of a crane & lower to ground level, unbolt the central electrode from the bushing stem, & then unbolt the bushing flange from the resistor top. The damaged bushing can now be replaced & the above procedure reversed to restore the resistor to an operational condition.

During the above procedure, care must be taken not to contaminate the electrolyte.

The resistance value of the LNER should now be checked by the method described in "Installation & Calibration Notes".

4 **DEFECT** Heaters not functioning.

ACTION Isolate the heater supply from the heaters by operating the switch (if provided) to the “OFF” position &/or withdrawing the fuses &/or links. Check the fuse & if this is open circuited check the wiring, heater elements & thermostat for a short circuit between the live & neutral connections. Any faulty item is to be discarded & replaced. The heaters can now be returned to service.

Should the heaters still be functioning incorrectly, repeat the above isolation procedure & then connect an Ohm meter between live & neutral noting the reading. Rotate the thermostat setting dial until the thermostat operates either opening or closing the heater circuit at which time an ohmic reading on the Ohm meter will return to a zero reading or vice versa. If rotation of the thermostat dial produces no effect, change the thermostat. If the ohmic values recorded are not consistent with the heater sizes & connections, each heater should be discarded & replaced. The heaters can now be returned to service.

5 **DEFECT** Loose fittings & connections.

ACTION The fittings & connections should be removed, checked for wear & distortion, & replaced if necessary by new fittings & connections.

6 **DEFECT** The discovery of deposits on the tank interior or exterior.

ACTION The deposits should be removed by a wire brush & the tank interior washed clean with water.

Items 7 & 8 refer to mild steel LNERs only

7 **DEFECT** Leaking heater or thermostat pocket.

ACTION With the LNER in service the procedures outlined in Item 2 for electrical isolation & safety must be adopted.

The tank drain valve may now be opened & the electrolyte either discarded or collected for re-use. The heater & thermostat cover should be removed, the heater & thermostat removed, & the pocket assembly detached from the tank. The pocket assembly may now be sealed & the assembly refitted, or if the flaw is not repairable a new assembly should be fitted.

8 **DEFECT** The discovery of rust on the tank interior or exterior.

ACTION The rust should be removed & the underlying metal surface exposed, thoroughly cleaned & dried, then repainted with a zinc based paint.

STORAGE

Acrastyle’s LNER’s when assembled are suitable for outdoor use. Should it be necessary to place an LNER in storage the high voltage bushing should be fitted & the drain valve closed. On removal from storage the high voltage bushing should be removed to avoid breakage during transport, & the tank washed out with water prior to installation & calibration.