

## Confirming that Metal Roofs, Gutters, or Cladding is not Energised

### Objective

To identify safety precautions that may need to be implemented when accessing metal roofs, metal building elements or structures.

### Method and background

The process of accessing or coming in contact with metal building elements such as roofs, gutters, fascias, downpipes, ceiling battens, metal cladding or structures can, under certain circumstances, represent a serious hazard if the metal elements come in contact with a source of electricity.

Serious electrical accidents have occurred in the past &, due to the difficulty in detecting the presence of voltage, therefore appropriate risk management is required.

**Caution:** Under no circumstances are metal ladders, scaffold or EWP's to be used for access until the roof or metal material is proven to be safe.

### Risk Assessment

A written risk assessment shall be completed before commencing any works involving the accessing of any metal building element. ie roofing, ceilings with metal battens & trusses, foil insulation, metal cladding. Consideration is to be given to the possibility of metal elements being energised or electrical cables being damaged during the works. ie concealed in wall or ceiling cavities.

The risk assessment should consider issues such as:

- The nature of the work to be conducted, ie painting, roofing, excavation, wall penetration.
- Is a "Safety Advice" from the electrical supply entity required? (Exclusion zone)
- Condition & arrangement of general electrical cabling, consumer's service & mains box.
- Identify all possible sources of electrical supply. (Normal, various tariffs, solar, genset, UPS)
- Identify available points of isolation. (May be more than 1 main switch)
- Identify possible cable locations. (Ceilings, walls, underground)
- Working at heights, climatic conditions (Heat, sun, wind, rain), vermin, sharp edges, slippery surfaces, adequate lighting & ventilation, surfaces, confined space.
- Commercial premises may present other issues requiring special consideration, such as metal construction in ceilings, grid ceilings, difficulties in isolating supply due to client operations.

### Mandatory controls

Only insulated ladders to be used for access. (fibreglass)

Visual & non-contact proximity test inspection as listed below (Testing requirements). Isolate all sources of electrical supply at main switches & isolation points in consultation with the person in control. (Normal supply, generators, UPS's, Solar systems, etc.)

**Other possible controls** (risk assessment driven: If electrical safety cannot be assessed as acceptable):

- Conduct electrical tests as detailed in the section below (Testing requirements). **This work must be performed by a licensed electrician competent in performing these tests.**
- Isolate supply to the site in association with the supply authority or authorised person. (Extract service fuses) prior to commencing the works.
- PPE (electrical safety glove set, safety boots).

## Testing requirements

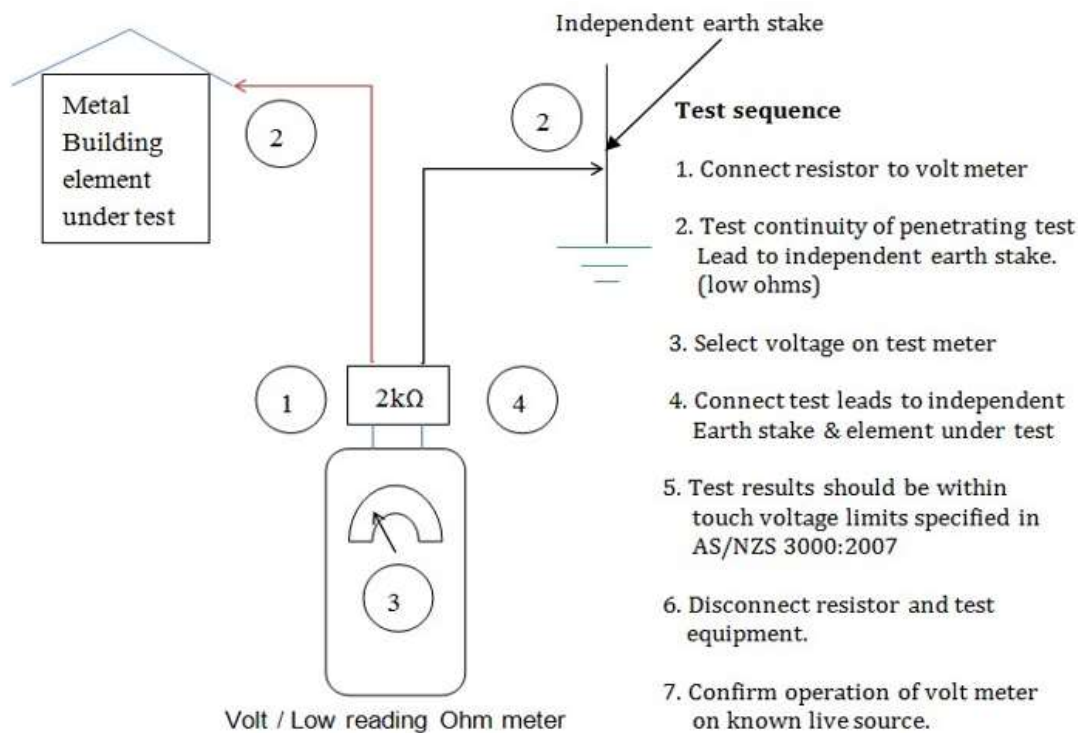
### Visual and non-contact voltage detection test

- Location of aerial service to premises (if applicable)
- Location & condition of concealed or underground electrical cables or gas supply if work planned involves roofing works, excavating or penetrating walls.
- Check for alternate power supplies – (Generator, Solar and UPS)
- Non-contact proximity test using testers such as Modiewark GLM model MR.

**Voltage test** (supply is required for this test & is only to be conducted by a licensed & appropriately experienced electrician)

**Before contacting the roof, touching metal building elements or entering the roof space** conduct a touch voltage test between the metal building element & the mass of earth using an independent earth electrode. This will identify if the voltage is induced or is a direct fault – active to earth.

Before commencing tests confirm that all isolators, circuit breakers and fuses are on.



### Notes:

1. A 2kΩ resistor is used to simulate the body resistance of a typical person.
2. The severity of an electric shock is dependent on the magnitude of voltage across the body, or part thereof, and time it is present.
3. The touch voltage shall not exceed 50 V a.c. or 120 V ripple feed d.c. as specified in AS/NZS 3000 Clause 1.5.5.3 (b).

**Examples of issues that may be encountered**



Service riser collapsed due to rotted fascia.  
Supply still connected energised



Metal staple pierced cable  
Foil insulation may be



Unterminated live cable shorted to frame  
of HWS bushed. Possibility of complete roof  
being energised energised



Cable penetration not  
Metal building elements may be



Example of a proprietary "independent  
earth" test unit

Modiewark GLM –MR non-contact voltage  
with Fluke SS225 "stray voltage eliminator"  
detector in use



### Test Equipment for Possibly Energised Roofs or Metal Building Elements

This following test procedures and equipment have been developed as a guide to assist workers in identifying if metal building elements, such as roofs, guttering or cladding, are energised.

These devices are offered as examples of equipment that may assist in the identification of the potentially fatal hazard of a roof or metal building element being energised. The purpose of this document is to offers written & pictorial examples of equipment & tests that may identify electrical hazards.

#### DEVICE 1 - REMOTE PROXIMITY TESTER

This device is simply a length of electric conduit with an adaptor to snugly hold a proximity voltage detector.



This device, shown operating in Photo 001, will detect voltage on a metal roof, gutter, downpipe, cladding, flashing, batten, etc without a requirement to access the roof. This utilises a readily available “proximity tester” & close fitting PVC conduit. A good quality proximity tester is recommended featuring both visual & audible indication. The device shown is a Modiewark GLM model MR. Note: Other testers may not indicate voltages below 90v ac depending on the specifications of the unit. Proximity testers do not detect DC voltages, ie solar panel output.

#### Process:

- Complete a written risk assessment. (consider statutory exclusion zones)
- Conduct a visual inspection.
- Assemble proximity tester into extension conduit if required.
- Ensure all main switches are ON.
- Switch on proximity tester & ensure functioning correctly
- Test on a known live source to confirm operation.
- Test multiple points of the roof or metal material to be accessed or contacted.
- Repeat test on a known live source to confirm correct operation of the tester.

If the presence of voltage is detected or suspected a further test will be required as described below. **Advise the person in control, secure the site & contact your supervisor & electrician.** Further tests are required to determine if in fact dangerous voltage is present.

This involves direct contact with suspected live parts & utilises electrical test equipment & is therefore to be performed by a **qualified electrician.**

#### DEVICE 2 – DIRECT CONTACT TEST (to be performed by a qualified electrician)

The suggested device consists of an electrical test probe with “penetration tip” and adaptor, insulated stick set, trailing earth lead, voltage test meter & 2k ohm resistor.

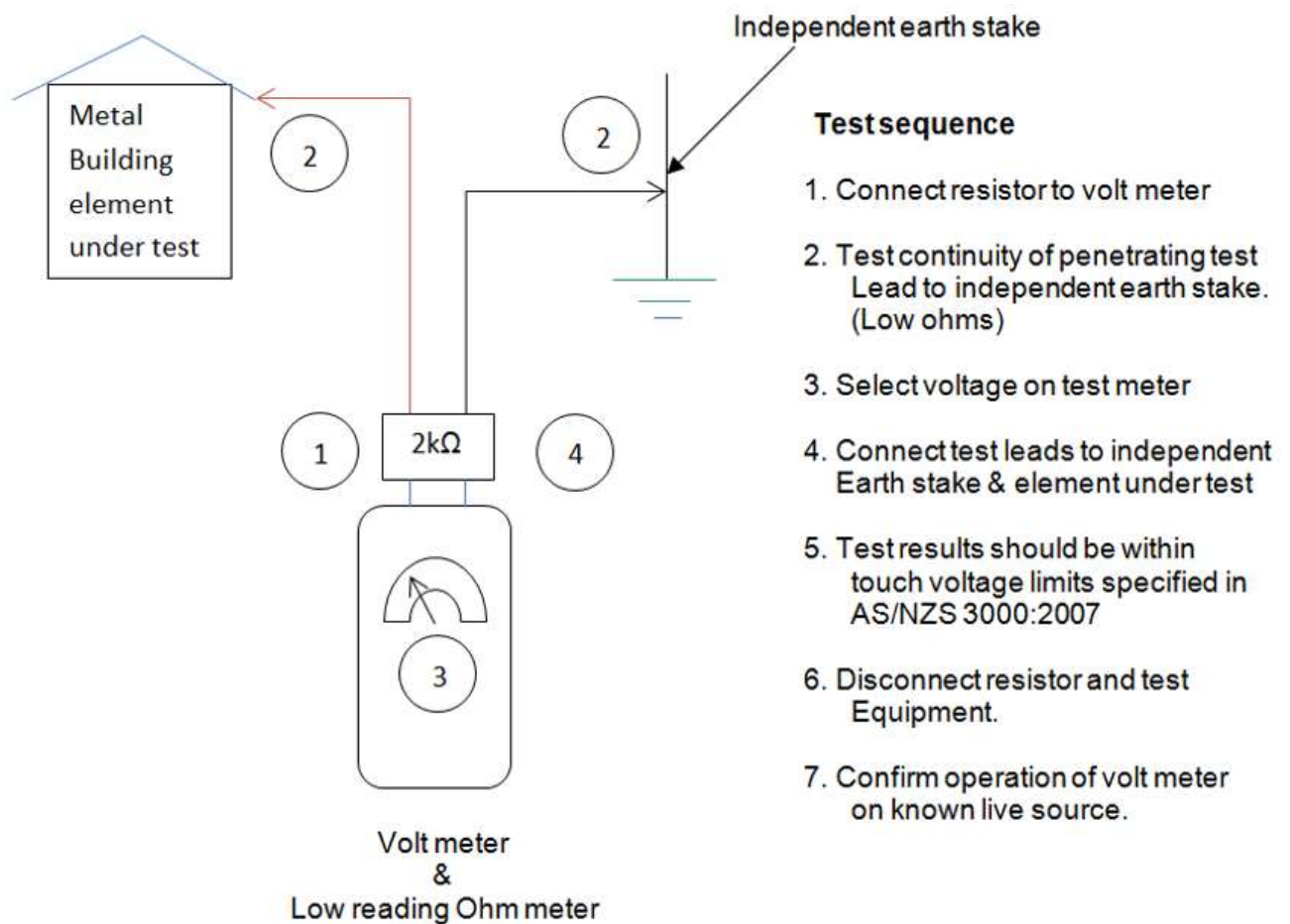
(The penetration tip is required to contact metal to be tested but may require a small amount of pressure and twisting to penetrate coated metal surfaces.)



### Process:

- Complete a written risk assessment. (consider if PPE is required, ie electrical glove set)
- Conduct a visual inspection.
- Repeat proximity test to confirm presence of voltage.
- Select “voltage” on test meter & confirm operation on known live source.
- Ensure all main switches are **ON**.
- Drive independent earth stake in a suitable location exposed to the weather.
- Connect probe, trailing lead and 2K ohm resistor to test meter.
- Select “low ohms” & confirm continuity from probe to independent earth stake.
- Select “voltage” on test meter.
- Contact metal to be tested with test probe, ensuring any coating or corrosion has been pierced. Test at multiple locations as required. Observe reading.
- If no voltage is detected confirm the operation of the voltage meter on a known live source. If voltage (above 50Vac or 120V ripple free DC) is observed inform the person in control & take the appropriate steps to isolate the source of supply and make safe.



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2. The severity of an electric shock is dependent on the magnitude of voltage across the body, or part thereof, and time it is present.
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