Earth Leakage Detection

Earth Leakage Detection - was designed in Germany more than 40 years ago, specifically to test membranes beneath ballast (gravel covered areas, slab covered areas, landscaped areas), without the need to disturb the ballast (of course, necessarily, the ballast must be disturbed on finding defects). Subsequently, it is now widely accepted as a means of testing both exposed and ballasted membranes - providing that the membranes are wet (either via heavy rainfall or via hose spraying).

The test regime is, essentially, an electrical insulation test. The top surface of the membrane is enclosed within an electrical conductor (chain or wire) that is connected to the negative terminal of a battery. The battery's positive terminal is connected to the building's earth (eg via a Lightning Conductor, handrail, etc). Once charged, the top loop - a cathode - emits a matrix of currents, some "moving" in directions outwith the loop {not trackable, as they are uni-directional}, and some "moving" in directions within the loop {trackable, as they are bi-directional}, attempting to "go to earth" or to make connection with the building's structure - an anode. These latter currents are tracked, using a hand-held centre-zeroed galvanometer. Within the loop, the only place at which the currents can "go to earth" is at penetrations, eg pin holes, punctures and failed laps. Such generated signals are called Positive Test Signals (PTSs). Negative Test Signals (NTSs) are generated by other potential earth sources within the loop, eg Lightning Conductors, metal downpipes, etc; or, by dry spots - it is up to the tester's knowledge and experience to discount these non-breach sources, or NTSs, either by electrically shielding these sources or by disconnecting them mechanically, or by employing test techniques that will identify spurious NTSs (eg dry spots).

On a wetted exposed membrane (or one overlaid solely with a fleece/terram), the test regime is straightforward, requiring little in the way of interpretation of the test signals. Accuracy is pinpoint.

On a ballasted system, the tester must firstly ensure that the test area (membranes and system top surface) is fully wetted and that the loop (chain or wire) is embedded beneath the ballast at discrete points, eg at the corners and every few metres along linear lengths - to improve the electrical connectivity between the loop and the test area. Testing then continues as for an exposed system. However, the accuracy of the positive signals is reduced, not in terms of discreteness (ie achieving a PTS indicative of a breach), but in terms of "closeness" to the breach (ie locating the breach relative to the point at which the PTS has centred).

Typically:

- on gravel covered and landscaped systems, the potential breach will lie within a circle centred on the PTS where the circle's radius is equivalent to the depth of material
- on slabbed areas, the potential breach will lie within an area enclosed by the slabs adjacent to the slab on which the PTS has centred.

Of course, on ballasted systems, the accuracy of location may be improved by deeply inserting the galvanometer's probes - but at the risk of damaging the underlying membranes!