

Dr. B. M. F. 2169

LOCALISATION OF LEAKAGES ON FLAT ROOFINGS

Univ.-Prof. Dr. Erich Cziesielski and Dr.-Ing. Bernd Maerker

Technical University Berlin

Institute for Building Construction and Material Strength

S h o r t r e p o r t

Target:

It has been observed that leakages in flat-roofs are occurring which are difficult to locate or even could be found never.

Such leakages may result from errors during roof-installation or might have been appeared later by mechanical damages.

In case of such leakages it was so far necessary to remove the possibly installed gravel layer or soil layer of roof-gardens in order to find access to the roofing and its leakages.

The thermal insulation may be sucked with water and must be replaced and repaired over the whole area.

It is the target of this report to find a method for localization of leakages in flat roofs without removal of gravel or soil layers to obtain exact results in marking leakages in the roofing felt.

Realization:

A laboratory experiment was arranged in which various tests for localisation of leakages have been carried out under similar and equal conditions.

First well-known methods for construction in laboratories and later on for practical use on damaged roofs have been arranged. New own methods have been found and tested for further development and improvement of methods for localization of roof-leakages have been executed.

Results:

Based on the above mentioned tests two methods for the localization of leakages seem to promise good results:

1. For roofing skins not fixed on the thermal insulation layer compressed air will be blown under the skin by a compressor. After having slightly lifted the felt, smoke of a cartridge will be added to the compressed air and the leakage can be seen by escaping smoke.

Now the damaged roofing skin could be repaired.

2. For fixed roofing felt on various undergrounds (such as thermal insulation layers, concrete slabs), but also for unfastened roofing skins, leakages could be discovered by means of the "Potential Difference Method".

This measuring system is shown in fig. 1 (see encl. 1). The measuring method works as follows:

A direct current of 40 Volts will be applied between a ringline and an earthline. The current will flow from the ringline via the wet roof surface through the leakage to the earth. A voltage decrease will appear which will depend from single resistances of the type of roof surface, the type of leakage and the type of roof construction. With the help of the two electrical test sticks, it will be possible to grope for the maximum potential difference on the roof surface (see fig. 2).

This type of measuring system needs experience in measuring techniques and further more experience in interpretation of the measuring results.

In 80 % of the field tests the leakages could be detected, the other 20 % of the leakages could not. The reason is that the potential difference method can be used successfully in the plain area of the roofing, but not close to chimneys, roof ventilators etc. It is difficult to locate leakages near to parapets, walls and other joinings.

Future view:

Laboratory work has shown possibilities of further development of this "Potential-difference-measuring method". Such possibilities could be followed up with the supplier of such equipment.

In respect of target-pointed repairwork on moistened flat-roof constructions, measuring systems should be developed in order to determine the moisture content within wet roof constructions.

During installation of a new roof, electrical sensors should be installed which could raise an alarm in case of penetrating water through the roof surface.

Such sensor system should be arranged according to a system of numbered grids, which makes it easy to locate the leakage by means of warning lights on an electrical switchboard.

Further development work for such system might be requested.

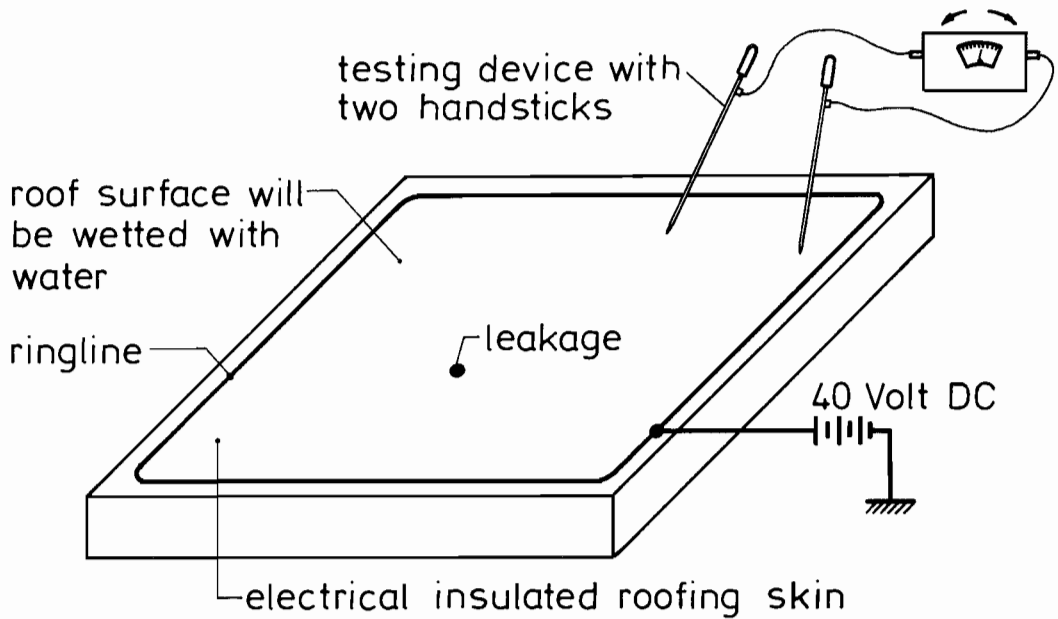


Fig. 1 : Layout for leakage determination according to the potential difference measuring system

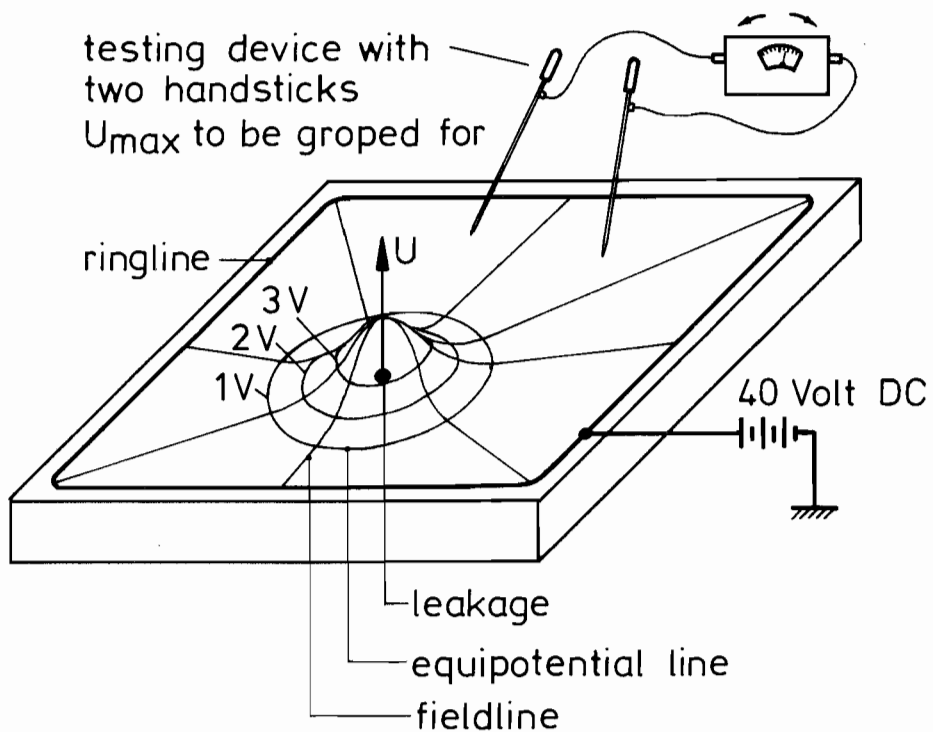


Fig. 2: Voltage distribution on a wet roof surface with one leakage