MARLEY
BUILDING MATERIALS

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MANTHORPE SLATE VENT
WIND TUNNEL TEST
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Registered Office: London Road, Riverhead, Sevenoaks, Kent, TN13 2DS. Registered No: 486100 England

Test rig and conditions

The test rig was fitted with Eternit fibre cement slates, 600x300mm, using a batten gauge of 245mm, and hence a lap of 110mm. The vent was tested at a rafter pitch of 20°, replacing a slate in the centre of the rig. To accommodate the vent tile, sections were cut away from the underlying slates.

The resistance of the vent tile to water was tested under two sets of conditions - a deluge test with a simulated rainfall of 225mm/hour, and a driving rain test, with an uproof wind-speed of 12-13m/s, and a rainfall rate of 200mm/hour (higher than in the previous tests so as to be able to generate a fine and penetrative spray). In addition an amount of water equivalent to that falling on a further 5m of roof above the rig was added with a sparge pipe.

Each test was initiated at the maximum positive pressure attainable, and the pressure difference across the vent was then reduced in steps, and any leakage closely observed.

Deluge test

In this test the first drops of leakage between the slates were observed at a pressure difference of -30 Pa. The pressure difference was further reduced, until drops could be seen coming through the vent tile, at a pressure difference of -70 Pa. By this point there was considerable leakage through the slates.

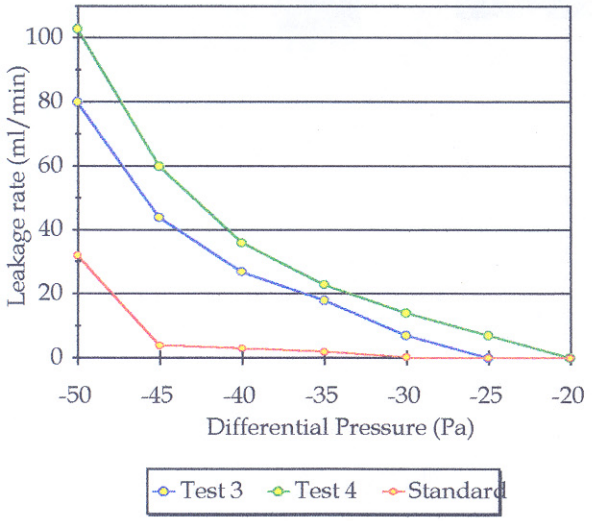
Driving rain test

This followed the same pattern as the deluge test, but with the fan on, and the water directed into the airstream. The wind produced a differential pressure of +17Pa with no pumping. The vacuum pump was applied in steps, until leakage between the slates was observed at a pressure difference of -2Pa. Leakage through the vent was observed at -33Pa, by which time the slates were leaking significantly

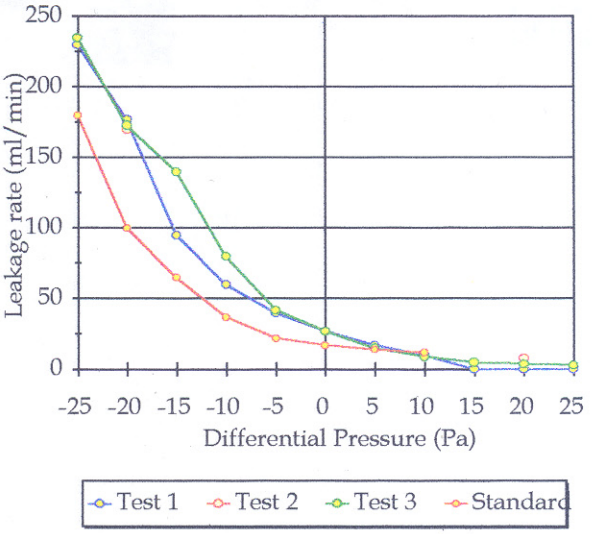
In summary, the tests were thus very promising - the critical pressure of the vent (that differential pressure at which it begins to leak) was 30-40 Pa lower than that of the slates, which themselves performed better than many roof tiles. With the presence of an impermeable underlay, the critical differential pressure of the vent will probably never be reached in anything other than truly exceptional circumstances.

For comparison, here are graphs of leakage rate against differential pressure for some normal concrete roof tiles.

Deluge



Driving Rain

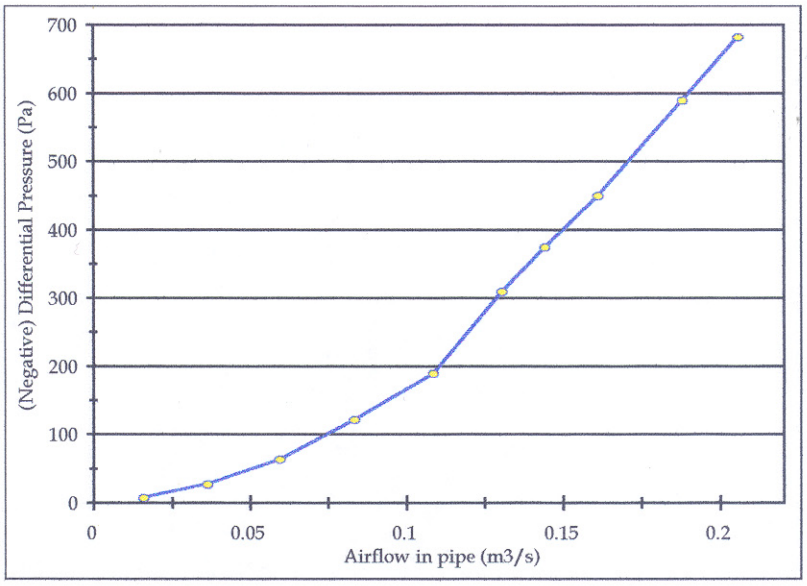


This illustrates just how well the vent tile has performed - the curve leaving the asymptote at -70Pa and -33Pa respectively. Subsequently a quick wind-driven rain test under the same conditions as the above graphs gave a leakage of 83ml/min for the vent alone at a differential pressure of -75Pa. The graphs above, however, are for a 1m² area of tiles.

To do this I sealed the slates, so that only the vent itself was open to let air in or out. I was then able to take measurements of differential pressure against the volume of air being sucked through the vent, which may prove useful to you. These differential pressures are negative in terms of the standard test (i.e. air is being sucked down through the vent).

Differential Pressure (Pa)	Airflow (m³/s)
8	0.016
28	0.037
64	0.060
122	0.083
190	0.109
310	0.130
375	0.144
450	0.161
590	0.188
683	0.206

This gives a straight line on a log-log graph.



It would seem that there is no need for any further testing, but if there is, do not hesitate to contact us.

G.R. Burton
24.10.96