TESTING OF PANELS AS INSULATED ROOFING

FOR

Atlas Roofing

TESTING DONE BY

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ATLAS ROOFING PANELS

Structural System

The Atlas roofing panel consists of a polystyrene core with 6 mm thick magnesium oxide board, MOB, fixed to the one side and 12 mm thick orientated strand board, OSB, to the other. The MOB is used on the inner side of the building and the OSB is then exposed to the elements. The OSB is then covered with a torched-on water barrier. The panels are generally used so that they span 1,22 m over three supports

Panel Subjected to Bending Moments.

Third of span loading was applied to the panel. The panel was then loaded to an equivalent load of 0,5 kN/m^2. The load was released and no residual deflection was noted. Loading was increased to and kept at an equivalent load of 2 kN/m^2 for 10 minutes. The load was then released to ascertain the creep deflection. The panel was then loaded to failure and this occurred at a load of not much more than 4 kN.

Deflection was measured in the middle of the span and loading was applied by means of a deflection controlled hydraulic jack. Load was measured by means of 2 calibrated load cells.

The test span was 2,1 m with loading at a distance of 700 mm from the supports.

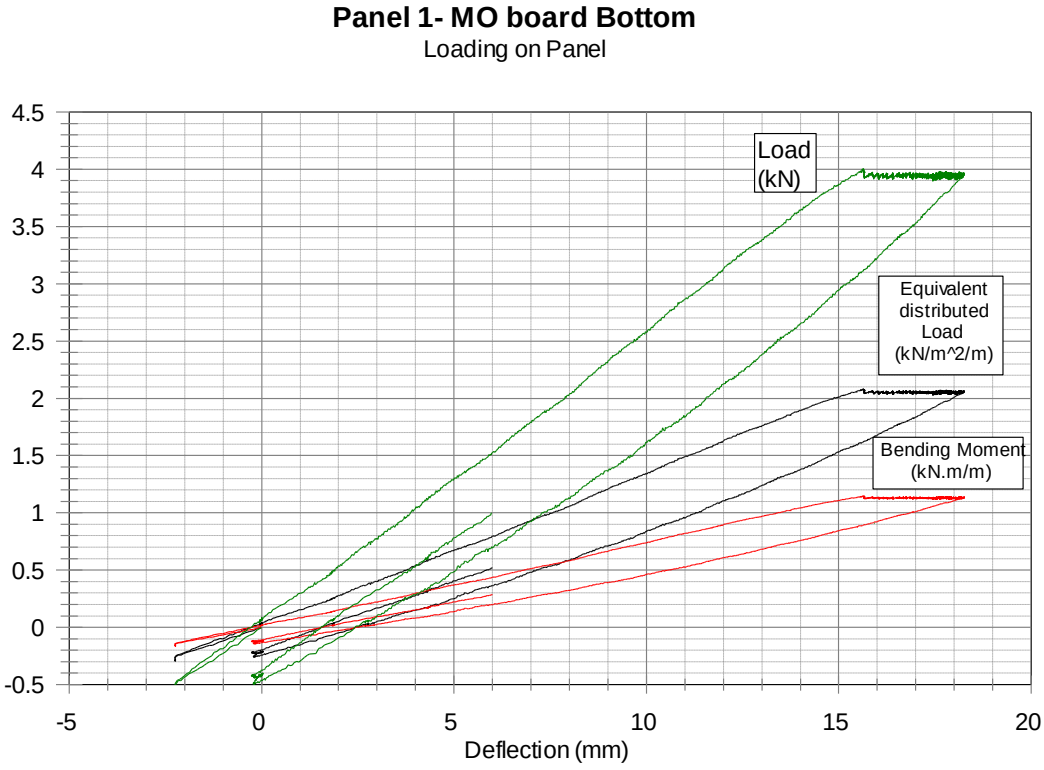

Figure 1: Panel 1, Load and deflection on full panel length of 2,1 m.

It is interesting to note that the creep deflection after 10 minutes is only about 2 mm and seems to occur in the polystyrene layer. The load on a panel that is supported on 3 supports with a span of 1,11 m that would lead to the same bending moment would be 7,3 kN/m^2. To avoid creep deflection under imposed loading the load on a 1,11 m span would have to be restricted to under 2,4 kN/m^2.

The stiffness EI of panel 1 was calculated to be 22,453 kN.m^2/m width of the board.

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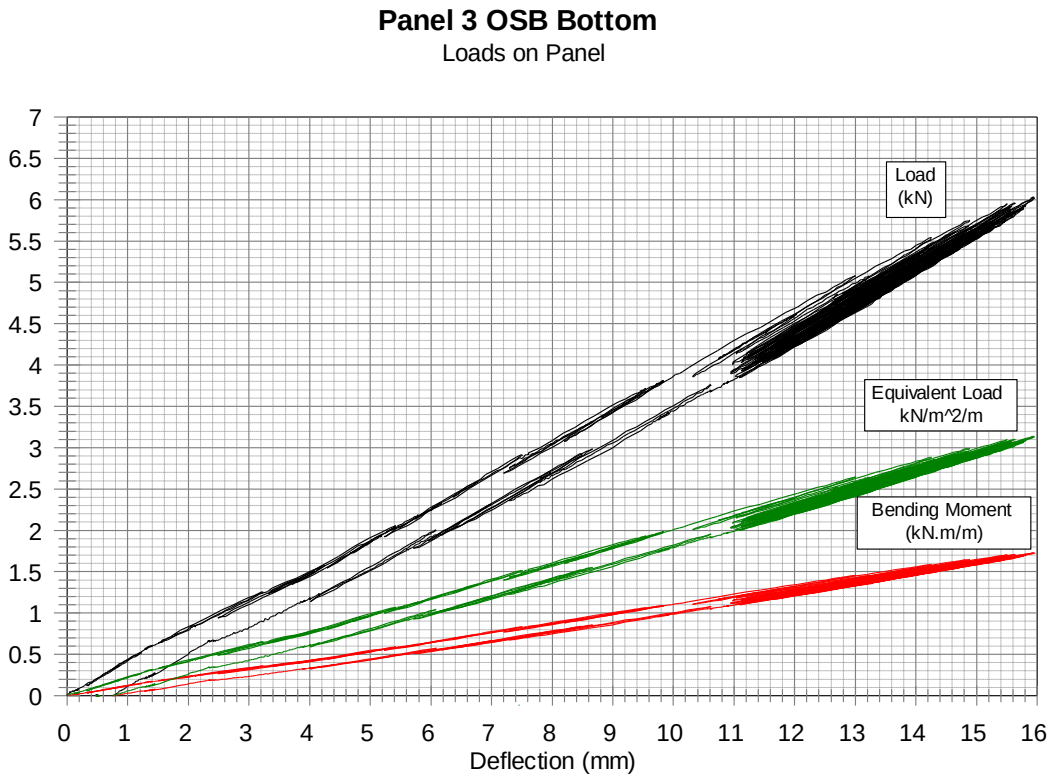

Figure 2: Panel 3, Load and deflection on full panel length of 2,1 m

The panel with the 12 mm OSB at the bottom behaved differently to the panel with the MO board at the bottom.

The creep under loading appears to be less with the OSB board at the bottom. The equivalent load was higher at just over 3 kN/m^2 and failure also occurred at that higher load.

Punching Load

A punching load was applied on an area of 100 mm x 100 mm. The load was increased until the loaded area punched through the board.

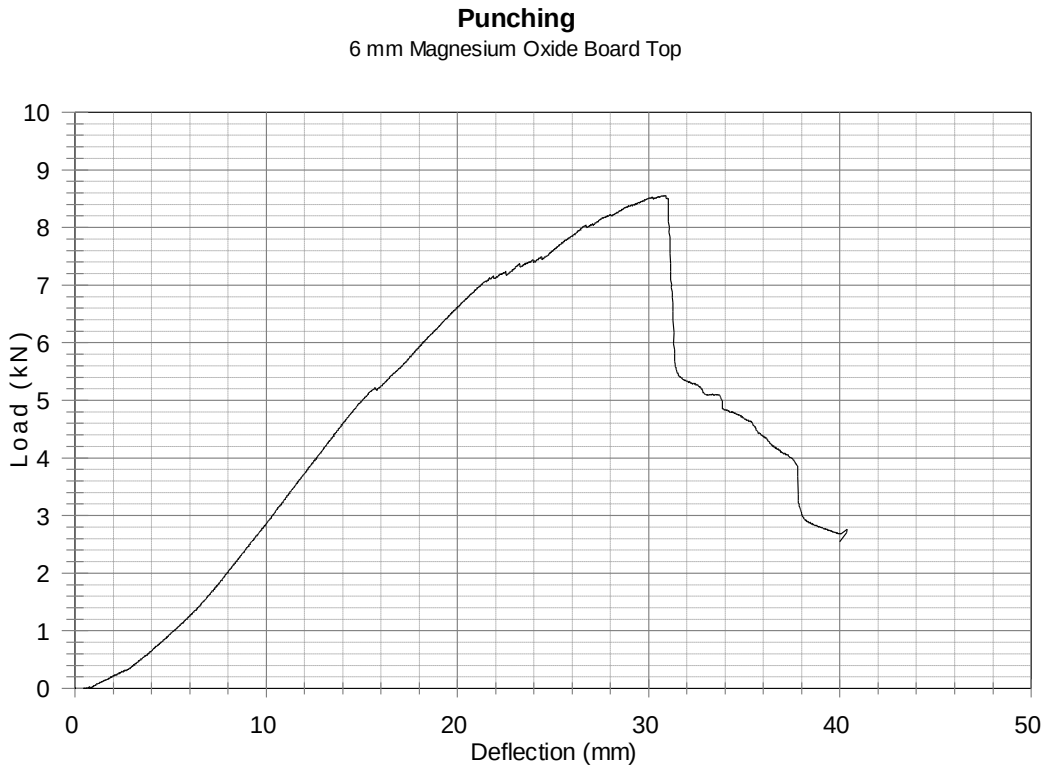

Figure 3: Punching load on the magnesium oxide board

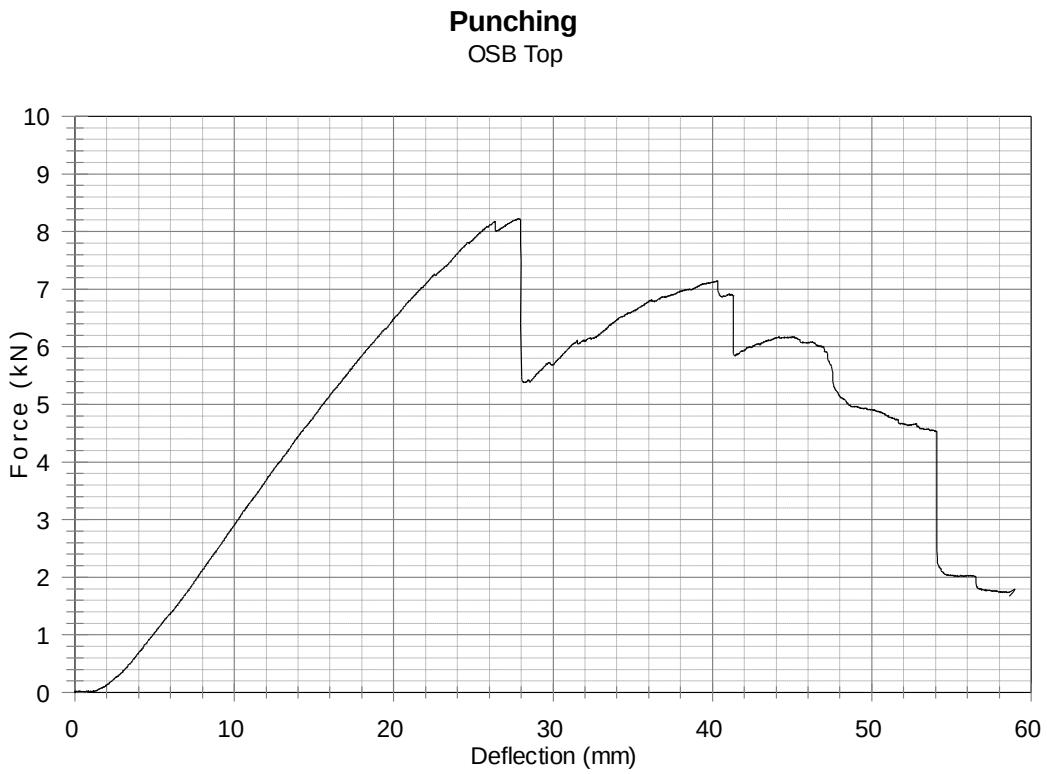

Figure 4: Punching load on the OSB board

The punching strength of the magnesium oxide board is very similar to the punching strength of the OSB board with a maximum value in the region of 8 kN. A safe load on the on the board would be about 2,5 kN

Summary

The following characteristic strengths can be used to design the load capacity and deflection of the board with 100 mm polystyrene core, 6 mm magnesium oxide board on one side and orientated strand board on the other.

Property	Characteristic Value	Units
Bending Moment MO board bottom	0,57	kN.m/(m width)
Bending Moment OSB bottom	0,85	kN.m/(m width)
Stiffness	22,453	$kN.m^2/m$
Punching OSB	4,0	kN
Punching MO	4,0	kN
Shear Force	1,1	kN/(m width)