TECHNICAL ALERT No. 07/1

Cyclone Testing Station
School of Engineering
James Cook University
Townsville Qld 4811

Telephone (07) 4781 4754
Facsimile (07) 4781 6788
Email jcu.cts@jcu.edu.au
Web www.eng.jcu.edu.au/cts

Light Gauge Metal Roof Battens in Cyclonic Areas Must be Tested for Cyclic Loading

25 May 2007

Background

Roof cladding and their supporting members (e.g. battens) are subjected to fluctuating wind loading during sustained high wind events, such as tropical cyclones. Clause 2.5.5 of AS/NZS 1170.2:2002 "*Wind Actions*" requires that the envelope of buildings located in cyclone regions of Australia shall demonstrate performance when subjected to a cyclic fatigue loading test, as specified in AS4040.3. Light gauge metal top hat battens are often used to support roof cladding and so this requirement applies to these battens (including the batten to rafter connections).

There are a range of light gauge metal roof battens on the market. Two of the more popular classes of battens appear to be identical with an overall height of 40 mm and virtually the same cross-sectional shape. However, one group is manufactured from 0.55 mm BMT steel while the other uses thicker 0.75 mm BMT material.

Suitability for Cyclonic Regions

From on site investigations of wind damage by the Cyclone Testing Station (CTS), 0.55 mm battens are not considered suitable for direct substitution of 0.75 mm battens that have been specified for use in cyclonic regions of Australia. In order to add experimental verification, CTS undertook a comparative testing program on a range of battens from different manufacturers, using both batten thicknesses.

Comparative Cyclic Test Program

This comparative test program involved cyclic testing of a typical batten to rafter joint, using 0.75 mm battens from two different manufacturers and 0.55 mm battens from three different manufacturers, all stated to be rolled from Grade G550 steel. The cyclic test loads for all tests used a design reaction force of 3.7 kN at the batten to rafter joint, based on typical batten and rafter spacings specified for 0.75mm battens used in high local pressure zones, in cyclonic regions (based on the 0.75 mm manufacturer's design literature). The cyclic fatigue loading test procedure used was that specified by *AS 4040.3-1992 "Methods of Testing Sheet Roof and Wall Cladding, Method 3: Resistance to Wind Pressures for Cyclone Regions*".

Test Results

The 0.75 mm battens from both manufacturers passed the cyclic load testing.

The 0.55 mm battens from the three manufacturers failed the cyclic load testing.

Conclusions

The test results showed that the 0.55mm battens are not able to be directly substituted for 0.75 mm battens without appropriate reduction of batten span and/or spacing. Of particular concern is the advice included in design literature from a manufacturer of one of the 0.55 mm battens tested, where the advice recommends that their battens can be used in cyclonic areas, in the same design situation, using similar batten spacing and spans to those specified for heavier 0.75 mm battens from other manufacturers. Based on this test program, this is not the case.

Recommendations

All metal top hat battens that are specified as being suitable for use in cyclonic regions of Australia must have their nominated design capacities verified by a cyclic load testing regime, as per the Building Code of Australia.

Building designers and certifiers need to be vigilant to ensure that all battens specified for use in cyclonic areas do meet the relevant cyclic fatigue loading test criteria, as required by the BCA.