

BRE Wind Engineering: Client Report.

WIND LOADING TESTS ON THE W.B. WATSON ROOFING SYSTEM.

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1.0 INTRODUCTION.

As a result of wind loading failures experienced with traditional standing seam and batten roll roofs, Mr W.B. Watson approached the Building Research Establishment to test the performance of the W.B. Watson roof cladding system under the action of simulated strong winds. It was subsequently agreed that BRE would undertake a series of wind loading tests on specimens of the W.B. Watson system and a traditional standing seam roofing system using the BRERWULF test facility.

2.0 TEST APPARATUS.

BRERWULF is an acronym for '**BRE Real-time Wind Uniform Load Follower**', which is a patented test system for reproducing realistic fluctuating wind loads as uniformly distributed pressures over plane sections of buildings or cladding components. BRERWULF is capable of reproducing any arbitrary pressure-time history in the range $-^+ 8.5 \text{ KN/m}^2$ at frequencies between 0Hz and 10Hz. This level of loading is about 1.5 times the highest wind load measured in cyclones and about twice the maximum cladding load to be expected anywhere within the UK.

The components of the system consist of a pressure box (plenum chamber), of which the test specimen forms one side. A fan to generate air pressure which is transmitted through flexible ducting hose to a patented specially designed fast-responding valve. The system response is fast enough to move the valve 'from end-to-end' (full suction to full pressure or *vice versa*) in one tenth of a second. The pressure response can be close to this figure but depends upon the total volume of the plenum chamber and the flexibility of the specimen. The valve is moved by a servo-motor under the control of a computer.

The pressure box used for these tests varied from 3x3 m to 5x3 m. The base of the box was sheeted with the roofing system complete with substructure and purlins.

3.0 TEST PROCEDURES.

Static Test: (*In this instance the test only applied to suction loads*).

This consists of a negative pressure, being applied in increments from $- 1.0 \text{ KN/m}^2$ to the maximum capacity of the BRERWULF or failure whichever occurs first. This test simulates a single gust.