

# RED

Wind Tunnel Testing & Consultant

## WIND TUNNEL TESTING LABORATORY IN RED FOR BUILDING CONSTRUCTION

### BACKGROUND

Research Engineering Development Facade Consultants Limited (RED) was established in Hong Kong since 1996 and it is the first laboratory HOKLAS accredited for carrying out testing for facade and curtain wall systems as well as the only one at time of this pamphlet for fire testing of non-load bearing building elements. Recently, the company has established a subsistent company **RED Consultants Limited** to provide wind tunnel testing to assess wind-induced loadings, pressure and movements on the buildings accurately.

RED Consultant Limited owns its **atmospheric boundary layer type wind tunnel** (Photo 1) in **Fanling, Hong Kong** and is currently the sole commercial laboratory in Hong Kong providing wind tunnel testing services for buildings. We are HOKLAS accredited for carrying out testing for façade and curtain wall systems as well as non-load bearing building elements in fire. With the accredited status, our testing and assessment reports are fully recognised by the statutory and regulatory authorities in Hong Kong, and other advanced countries including Australia, China, New Zealand, Singapore, the United Kingdom and USA.

Recently, RED has collaborated with Department of Civil & Structural Engineering of the Hong Kong Polytechnic University in establishing **THE POLYU-RED FIRE RESEARCH AND TESTING LABORATORY**, which aims to promote the research and development of structural fire engineering. We have two laboratories: one is located in Sheung Shui, Hong Kong and the other one in Nanhai City, Guangdong, China. Our Laboratories are operated by delicate specialists who possess doctorates in civil engineering in the field and have years of experience in advanced testing in wide spectrum of building systems and products.



Photo 1

The wind tunnel is 26 m long, with test section of 17.5 m long, 3.3 m wide and 2.2 m-2.8m high.



Photo 2

The roof of the test section is adjustable to keep the pressure constant in longitudinal direction. The maximum wind speed in the test section is about 15 m/s.

The key staff of the RED Consultants Limited have doctorate in civil engineering and have considerable experience in undertaking wind tunnel test projects, which include wind tunnel tests of Cyberport Residential Development Stage 12 (RV), Lai Sing Court Redevelopment, Residential/Commercial Development on N.K.I.L. No. 6433 at Po On Road, MGM Grand Hotel, TVB city, and many others.

### ADVANTAGES OF CONDUCTING WIND TUNNEL TESTS

For a safe, effective and economical design of tall buildings, an accurate determination of wind loadings on the buildings is essential. Even though design wind loads can be found in the wind code issued by Buildings Department, they are generally conservative.

By conducting wind tunnel tests, the effects of topography, surrounding buildings, building shape and dynamic response of the building on wind flow characteristics can be investigated. As nearly all the factors affecting the wind loads on buildings will be taken account in the wind tunnel tests, it is not essential to use the conservative design wind loads specified in the wind code. The use of more accurate design wind loads based on the information obtained in wind tunnel tests is desirable.

## TESTING METHODOLOGY

Two models will be constructed to investigate wind loads on the study building. The scale wind speed will then be applied onto the structure being studied and relevant data is then measured.



Photo 3

The Topographic model (Photo 3) will be constructed to a scale of 1:3,000 to 1:5,000, covering the area within a several km radius of the building site, to study the topographic effects on the wind approaching to the building.



Photo 4

The Proximity model (Photo 4) will be constructed at a scale of 1:300 to 1:500, including all existing buildings and geographical features located within a 500m radius of the building site, to study the wind loads acted on the building under the approaching wind profiles investigated by the Topographic model study.

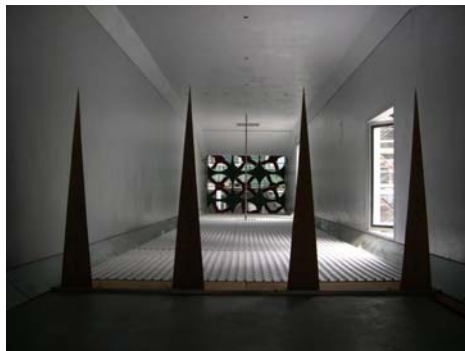


Photo 5

In the studies, the wind profiles will be simulated by placing different spires and roughness elements on the wind tunnel floor (Photo 5). The velocity profile and turbulence of the wind generated will be measured by a hot-wire anemometer and the wind loads on the building model will be measured by a High Frequency Single Force Balance (SFB). The corresponding wind loads on the prototype building and the induced building movements can then be calculated by using the measured data, the historical wind climate of the city at where the building site is located, and appropriate mathematical formula.

## CONTACT US

### Key Staff in RED Consultants Limited

Ir Dr Andrew So      Tel: 852 – 9041 7821  
Ir Dr Johnny Yu      Tel: 852 – 9625 5828  
Office                    Tel: 852 – 2807 0930

Email: kwso@red.com.hk  
Email: johnnyu@red.com.hk  
Fax: 852 – 2662 6105

### Advisors :

Dr. John Holmes

Email: jdholmes@bigpond.net.au