TECHNICAL NOTE 018

Tower Cranes / Hoists - Wind Load Effects on Permanent Structures

· We excel through experience and learning ·

Version 01, Sep 2018

Keywords
Temporary Buildings, Tower Cranes, Passenger Hoists, Material Hoists, Design Wind Pressures

Synopsis
In previous review of design calculations for tower cranes, passenger hoists, material hoists, etc, it was found that some designers of these temporary structures would reduce the design wind pressure, based on their interpretation of the 'Code of Practice on Wind Effects in Hong Kong 2004', leading to a 30% reduction of the wind load effects on the structural connections attaching the cranes and hoists to the permanent structures. This technical note reiterates that such reduction of design wind pressure is NOT acceptable.

1.0 Introduction

Review of the design calculations for tower cranes, passenger hoists, material hoists, etc, has been conducted as part of the RAT Mechanism. It was found that some designers of these temporary structures (usually engaged by the Suppliers) would reduce the design wind pressure, based on their interpretation of the 'Code of Practice on Wind Effects in Hong Kong 2004' (referred to as the 'Wind Code' hereinafter), leading to a 30% reduction of the wind load effects on the structural connections designed to connect the abovementioned cranes and hoists to the permanent structures. Their so-called rationale for the reduction of design wind pressure is unsound and the inherent risk is unduly high, noting the damaging scale of the recent typhoons (ie, Hato, Manghkut, etc) we are experiencing in Hong Kong.

2.0 So-Called 'Rationale'

Most of the tower cranes, hoists, etc used in Hong Kong are imported from European countries where the design wind pressures are much lower than that of Hong Kong. The wind loadings on these temporary structures must be checked according to the Wind Code in Hong Kong.

In designing the holding down devices, rail clamps, temporary connections or anchorages to connect the tower cranes, hoists, etc to the permanent structures, some designers refer to Clause 4.3 of the Wind Code for determination of the design wind pressures, with a sole view to reducing its magnitudes.
The designers claim that the tower cranes, hoists, etc are 'temporary' and will remain in position for a period of 'not more than one year'. Hence, they are entitled to use a reduced design wind pressure as allowed by the Wind Code.

4. DESIGN WIND PRESSURES

4.1 Except as provided in Clause 4.3, the design wind pressure q_z at height z shall be taken as the value given in Table 1.

4.2 Where topography is considered significant, the design wind pressure shall be multiplied by a topography factor assessed in accordance with Appendix C.

4.3 Temporary buildings or buildings which will remain in position for a period of not more than one year may be designed with wind pressures of not less than 70 per cent of the pressures given in Table 1.

4.4 No allowance shall be made for the general or specific shielding of other structures or natural features.

Extracts from 'Code of Practice on Wind Effects in Hong Kong 2004'

However, the designer's so-called rationale mentioned above is unsound as explained below.

According to the Wind Code, the term 'buildings' is defined in Section 2 of the Building Ordinance Cap 123 (https://www.elegislation.gov.hk/hk/cap123?xpid=ID_1438402641014_001), and it does not appear that tower cranes, hoists, etc are covered by this definition. Besides, the tower cranes, hoists, etc would usually remain in position for more than one year. As such, Clause 4.3 of the Wind Code simply does not apply.

3.0 Design Wind Pressure

Considering the above explanation and the consequence of 'what-if', the design wind pressure adopted for the design of holding down devices, rail clamps, temporary connections or anchorages to connect the tower cranes, hoists, etc to the permanent structures should be assessed properly and must NOT be reduced.

- End –

This technical note is for internal circulation only.
For enquiry, please contact

Gary Chou
KMS / GM (Technical)
Technical Department
Chun Wo Construction & Engineering Co Ltd
E gary.chou@chunwo.com
T 3758 8379
F 2744 6937