

Measures against Strong Wind on Roofs of Existing Buildings - Research on Wind Resistance Diagnosis and Reinforcement Method Evaluation of Roofing Materials

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1. Introduction

This research, on the basis of the actual situation of damage by strong wind in recent years, proposes a method for the evaluation of wind-resistant reinforcing technology adopted at the time of the development, correction, and/or modification of the method for examining the wind-resistant performance of existing roofing materials. Further, our purpose is to organize the manuals related to the diagnosis of wind-resistant performance and/or the reinforcement of existing buildings and to spread them to contribute to the guidance of the appropriate diagnosis of wind-resistant performance and reinforcement, the promotion of renovation of existing buildings.

2. Overview of Our Technological Development

(1) Development of a Wind-resistant Performance Diagnosis to Specify the Risk of Damage to Roofing Materials

We have examined the framework to specify the locations that are supposed to be a trigger of damage from strong wind and specified the factors for each type of roofing material and a method for examining wind-resistant performance that can lead to the secure reinforcement of vulnerable roofing materials. During the examination, as a relevant existing method of analysis, we investigated the guideline for the diagnosis of the earthquake resistance

performance of non-structural members in existing buildings, the framework of the guidelines for the repair of roofs contributing to measures against typhoons.

(2) Examining the Method of Evaluation of Wind-resistant Reinforcement Technology to Realize Strong Roofing Materials

We examined the ideas for the level of wind-resistant performance and the evaluation of wind-resistant performance reinforcing technology that should be a base for cases in which the reinforcement of roofing materials is required to be resistant to strong wind.

① Level of Wind-resistant Performance

In order to correspond to the needs for performance that is much higher than the requirements in the Building Standard Law (disaster-recovery base buildings etc.), we have examined several levels of wind-resistant performance corresponding to the assumed wind force levels.

② Method of Evaluating the Technology to Reinforce Wind-resistant Performance Based on the Load Tests

Three methods are applied as general methods of repair and/or modification: partial repair, overall correction with layered thatching, and comprehensive thatching correction. We interviewed the relevant associations to understand the actual situation of what is mentioned above for each of the

repair or correction methods, including metal sheet thatching, bent board thatching, covering slate thatching, and roof tile thatching. In addition, as a case study of layered roof thatching modification (covering construction method), we compared and verified the difference in the resistance force before and after modification by conducting a wind-resistant pressure performance test of the metal board thatching (Photo-1) and a tensile loading test of the joining section of bent board thatching (Photo-2).



Photo-1. An example of conducting a wind-proof pressure performance test on metal board thatching



Photo-2. An example of conducting a tensile load test on the joining part of bent board thatching.

3. Plans for Our Next steps

We will continue to collaborate with the relevant departments and bureaus of the Ministry of Land, Infrastructure, Transport and Tourism, the Building Research Institute, each of the relevant associations concerning roofing materials, and so forth, and are planning to advance the technological development to contribute to the wind-resistant measures for existing buildings.