

Assessment of Building Resistance to Accidental Actions in the Social Aspect of Sustainable Construction

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1 Introduction

In the article is considered one of the categories of social aspect of sustainable construction as specified in the standard EN 16309:2014 - namely: safety and security (K_6). The authors analyzed the component of the above-mentioned category with a subcategory called: resistance of buildings for accidental actions (K_{62}). A model of building's assessment of random interactions is presented, which will allow to make comparisons of the object's safety in the investigated ranges with other residential buildings, as well as with a reference building.

2 Subcategory K_{62} Safety and Security Against Accidental Actions

The subgroup K_{62} that the authors presents consists of four criteria that will be included in the proposed assessment: K_{621} *Earthquake (rockburst mining)*, K_{622} *Explosions*, K_{623} *Fire resistance* and K_{624} *Resistance to dynamic external actions*.

3 Determining the Method of Evaluation of the Criteria

3.1 Determining the Scale of Parameter Values Characterizing the Criterion K_{621}

Criterion K_{621} *Earthquake resistance; rockburst mining* should be assessed through the use of protective measures in the building, which can be implemented by increasing structural stability, assembly of elements ensuring flexibility and shock resistance, resistant to breaking glass or alarm systems and gas and water shut-off valves.

3.2 Determining the Scale of Parameter Values Characterizing the Criterion K_{622}

Criterion K_{622} *Explosions*, similarly to the previous one should be assessed by the applied protective measures or avoiding the use of explosive gases in buildings, installation of break-proof glass and separation of shelters inside.

3.3 Determining the Scale of Parameter Values Characterizing the Criterion K_{623}

The next criterion for the assessed subcategory is K_{623} *Explosions*. In order to improve fire resistance, fire resistance of materials of higher classes than recommended can be used, which

will improve the load-bearing capacity, integrity and / or insulation performance of building elements, improve access for fire brigades, etc..

3.4 Determining the Scale of Parameter Values Characterizing the Criterion K_{624}

The last criterion in this subcategory is K_{624} *Resistance to dynamic external actions*, which can be implemented by applying measures for increased resistance to traffic influences, among which solutions such as: constructing barriers or strengthening the construction of building facilities located in areas at risk.

4 A Method Proposal for Assessing Building Resistance to Random Influences

The authors while developing the classes of standards in the assessed criteria for selected categories used, among others: national standards and regulations, expert research, direct surveys conducted among users and in situ research. In the presented assessment it is proposed to use a corrected summation index (3).

$$O_i^k = \sum_{j=1}^{n_i} o_{ij}^k \cdot \lambda_{ij}^k = o_{i1}^k \cdot \lambda_{i1}^k + \dots + o_{in_i}^k \cdot \lambda_{in_i}^k \quad (3)$$

where:

$o_{ij}^k = [o_{i1}^k, \dots, o_{in_i}^k]$ - vector of the assessed features of the subgroup and

$\lambda_{ij}^k = [\lambda_{i1}^k, \dots, \lambda_{in_i}^k]$ - weight vector for features included in the assessment.

The obtained values should be compared with the assessment obtained by the reference object, which will allow to assess how well the examined object is assessed in the scope of this subcategory. The information obtained from the calculations will indicate the weakest features that the analyzed building has, which will allow it to take appropriate action in the refurbishment policy in the future (Radziejowska, 2018).

5 Conclusions

The presented method of assessing the social aspect of sustainable construction based on the example of subcategory K_{62} allows to make a comparison regarding the building's resistance to random events between the tested building and the reference object, as well as between buildings made in different technologies.

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