

## ARCHITECTURAL SOLUTIONS TO INCREASE THE SEISMIC RESISTANCE OF BUILDINGS AND STRUCTURES.

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***Annotatsion:** In this article, the seismic resistance of buildings and structures is a factor that must be taken into account during construction, especially in seismically active regions. One of the main ways to improve seismic resistance today is the use of various seismic protection systems.*

***Keywords:** seismic resistance of buildings and structures, methods of seismic protection, traditional method, special method.*

**Introduction.** As a result of studying the properties and patterns of seismic effects, the basic principles of ensuring the seismic resistance of buildings and structures, developed in past centuries, were supplemented and developed through the development of seismic resistance theories, computational methods and computer technologies for more advanced structures and special tools, some of which have found application in construction practice. [1]

**Main part.** We all know that the problem of ensuring the seismic resistance of structures has not been fully resolved, which is a reliable evidence of the consequences of many earthquakes that have occurred to one degree or another in recent history. [3]

In modern design solutions, it is impossible to increase seismic resistance simply by increasing the cross-sectional dimensions, strength and weight. The design can be more robust, but not necessarily cost effective due to its weight and inertial seismic protection. These methods involve changing the mass or roughness

or weakening of the system depending on its movement and speed. More than a hundred patented seismic protection models are currently known[4]. In many countries with seismic effects, traditional methods predominate and are generally accepted. However, special seismic protection allows in many cases to reduce the cost of reinforcement and increase the reliability of the structures being erected. Over the past decade, dozens of different technical solutions have been proposed for special seismic protection of buildings and engineering structures in Japan, the USA, New Zealand and the CIS countries. Many of these proposals are being implemented. Classification of seismic protection methods by the traditional method at present, methods of increasing the seismic resistance of foundations and structures of building structures are usually divided into traditional and special ones. Traditional methods are based on the fulfillment of a number of conditions, some of which were used in antiquity and are formulated in the form of the following recommendations: - the structure should not be too long or too high; - the distribution of masses of building structures must be uniform; - the structure in the plan must be centrally symmetrical; - replacement of the rigid connection of the foundation and structure with a plastic bond (in Central Asia and the Middle East, such a material is a solution in gypsum - a type of gypsum); The meaning of these recommendations is as follows. The central symmetry of the structure ensures that the structural strength of the building is the same regardless of direction.[5]

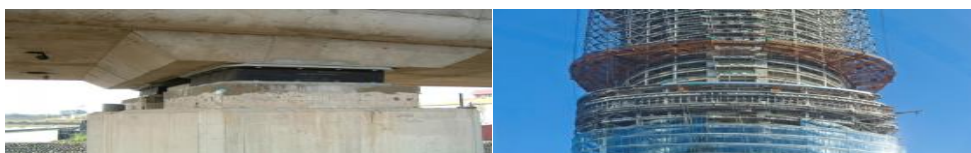
Unfortunately, to date, all the available positive reserves of traditional seismic protection have already been identified and used, so there is no reason to expect a significant increase in the efficiency and reliability of seismic protection. In addition, traditional methods of seismic protection during catastrophic earthquakes are insufficient and very expensive. It is known that the nature of the behavior of buildings and structures during an earthquake is very difficult to predict, therefore, in addition to traditional methods of seismic protection, such

special methods as active and passive seismic protection were developed. [6]



**Figure 1. Examples of buildings with central symmetric seismic resistance.**

In connection with the construction of multi-storey buildings in seismically active areas, the use of special active methods of seismic protection is more relevant than ever. Active methods include the use of additional energy sources and elements that regulate the operation of these sources. The advantage of this system is that the vibration process can be controlled not only by seismic, but also by wind. [7]



**Figure 2. Earthquake resistance systems for multi-storey buildings**

### **Conclusion**

Based on the foregoing, the following conclusions can be drawn. At this stage, the problem of seismic protection of buildings and structures is extremely urgent. Correct application of seismic protection in the design and construction of buildings and structures can significantly increase the following characteristics:

- building reliability
- equipment safety and reliability.
- the profitability of buildings.
- no need to repair after devastating earthquakes.
- Convenience and convenience for the population.

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