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SEISMIC INSULATION OF THE FOUNDATION

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ABSTRACT

The article presents the problems of seismic isolation of buildings and structures, as well as materials on existing methods and devices.

KEYWORDS: ***seismic isolation, building, material, existing methods, earthquake.***

DISCUSSION

Earthquake – this is the process of splitting energy from the lithospheric layer of the earth and the formation of seismic waves on the surface of the earth. An earthquake can be viewed as a natural phenomenon that has no strength to which people do not notice and has the power to destroy an entire territory. The earthquake is formed mainly as a result of the opening of geological cracks, as well as from the activation of volcanoes, landslides, the eruption of deposits and the testing of nuclear weapons. When it is said that its focus or hypocenter is the place where the earthquake begins, its point on the earth's surface is called the epicenter.

In the coming years, new systems have been introduced and developed to reduce the impact of seismic forces. One of the most widely used and effective methods in the world is seismic isolation of the foundation. It reduces the impact of an earthquake and protects the structure from the dangerous action of the grunt during an earthquake. The main essence of the insulation is to reduce the mutual movement between the construction and the grunt. Another purpose of protecting the foundation is to provide additional means of energy dissipation and at the same time reduce the accelerations transmitted to the structure. The concept of foundation insulation can be based on the example of a building standing on moving balloons. When the earth shakes, the balloons move freely, but the building does not move. So no forces are transmitted through the floor to the building.

Insulation of the foundation has recently developed. Its main principle is to create a break between the building and the foundation and reduce the displacement. Seismic power is transmitted from the ground upwards, on account of the formation of a disruption in the foundation, the natural vibrations of the structure increase, and energy is absorbed by the displacement deformation. In general, this helps to reduce the impact of the structure on its vibration as a result of seismic forces, especially if the structure is located on a rocky ground. Although, by insulating the foundation, horizontal vibrations are reduced, there is no possibility of insulation in vertical vibration, so that the vertical stigma of the construction resists on the specific weight.

The method of insulation of the foundation is the introduction of a flexible layer between the foundation and the upper floors, and the initial frequency of the system is reduced to a value lower than the energy that includes the frequency of the grunt movement. In addition, the ability to assimilate the vibration provided by the isolating system contributes to the release of energy during seismic activity. The foundation, now recognized as a mature and efficient technology, seismic insulation is being used to improve the seismic performance of schools, hospitals, industrial facilities, multi-storey buildings and other similar strategically important buildings. It performs the function of reducing the acceleration of floors in an additional way, minimizing the migration of floors. Isolation of the basis is also referred to as passive control. There are two important factors of seismic protection. First, it protects the structure and can build a sufficiently solid structure, but its cost is a bit expensive. Second, reduce the impact of forces that pass through the building during an earthquake.

1. There are the following types of seismic protection of structures.

2. The lead rubber base is the lead core for the scraper forces, which consists of one or more rubber and steel lists (Figure 1). The lead in the base is deformed at the current of 10 MPa voltages and

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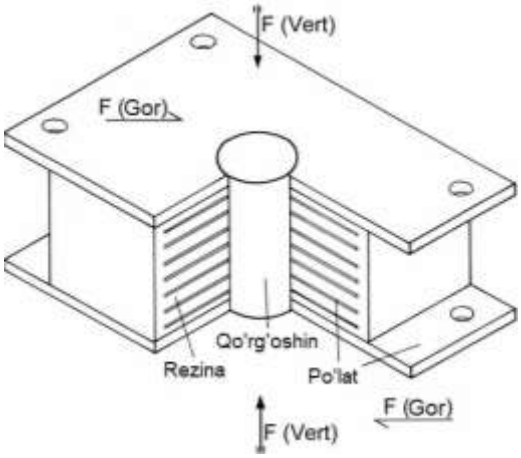
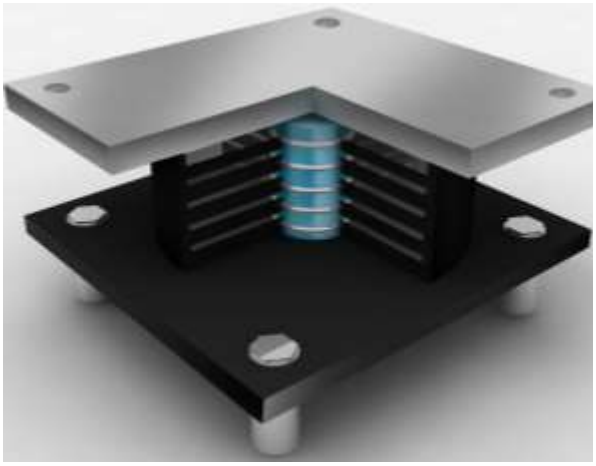
provides two-axis movement of the technology. For this reason, the lead must be firmly fixed to the elastic base, and the lead is achieved by making the core slightly larger than the hole and using force during its installation into the hole.





1-picture. Lead rubber base

3. High-density rubber supports are another type of elastic supports, which are formed from the installation of high-strength thin-layer rubber and steel sheets (Figure 2). The difference of the lead from rubber supports is that in the center of these supports there is no core. Used natural or synthetic rubber performs the function of shock absorber.

2-picture. Rubber base with high density

4. The frictional fluid system is a slip-insulating system, the surface of which is composed of stainless spherical steel and teflon-based composite material coated moving fluid. The principle of its operation is like a mathematical pendulum (Figure 3). The frictional pendulum system is a seismic protection that is installed in the middle of the structure and its foundation to protect the structure they rely on from earthquakes.

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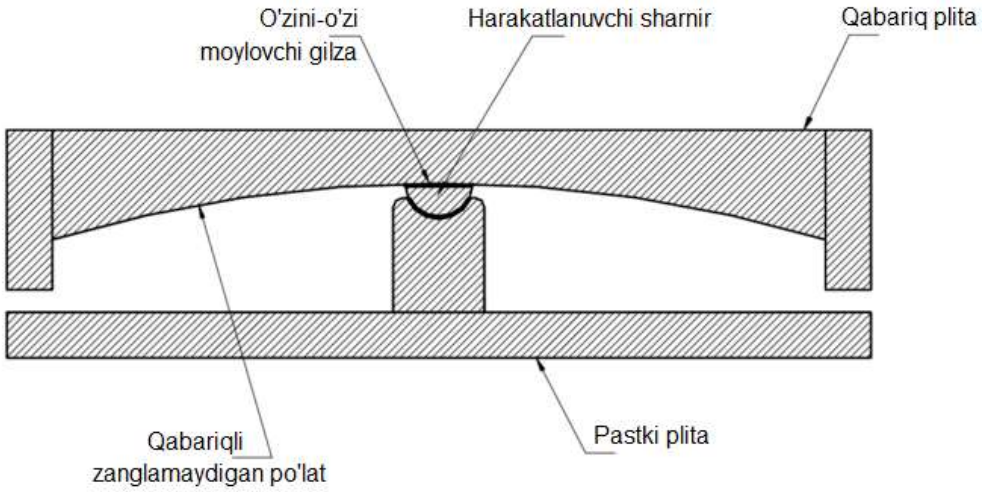

3-picture. Friction fluid system

Lead rubber supports were created for the first time in the 1970 years. They consist of the following 3 materials, namely lead core and folding-mounted rubber and steel.

The rubber provides anti-slip and light movement, but it returns to its original position. If the construction does not return to its true state after the earthquake is over, the rubber base will gradually return it to its place. This process can also take several months, but it will be able to restore the initial state of the facility again.

The lead is used because of its plasticity property, but it can also be deformed under the influence of an earthquake, nevertheless it can also exceed its previous shape and be deformed many times without losing its consistency property. During an earthquake, the kinetic energy of an earthquake is absorbed as heat energy when the lead is deformed.

In combination with steel rubber, move the base in a horizontal direction.

The following advantages of seismic insulation of the foundation:

1. When proper seismic protection is installed on the structure, the damage to the structure is limited.

2. Insulation of the foundation prevents elastic deformation of the elements of the structure, since during the initial and subsequent excitation of the foundation, the upper part of the structure demonstrates its elastic property.

3. As a result of the collapse of furniture and fixtures, secondary damages are received. In other words, when seismic insulation is applied, the degree of solidity of the construction increases significantly compared to the usual construction.

4. Even provides the functional function of the structure even after a major earthquake.

5. The fact that the billet can also be installed on buildings, but it has a significant impact on the cost of the building.

6. The building is completely separated from the ground.

7. Since the effect of seismic load is low, the damage to the structure will also be minimal.

Disadvantages of seismic insulation of the foundation:

1. There will be no support for a part of the structure.

2. It is difficult to implement effectively.

3. Ineffective for skyscrapers.

4. The effect of application of grunt layer on grunt is low, which is crumbly and has a low durability.

Lead rubber supports are an effective method according to the two remaining methods of insulating the foundation. It can be used in medium and multi-storey buildings, and it protects the building from the effects of seismic loads. This gives enough elasticity to the structure and is able to resist high-frequency grunt movement using these supports.

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