



ISSN: 2350-0328

**International Journal of Advanced Research in Science,  
Engineering and Technology**

**Vol. 4, Issue 9 , September 2017**

# **Research of Thermal and Mechanical Influence on Ferro-Concrete Designs with Damping Inserts**

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**ABSTRACT:** The recent demper systems practiced on identifying the scientific difference of suggested demper systems and wide used on increasing the seismic detecting demper systems based on neoprene. In the result of tests are scientifically analyzed. Therefore wide illuminated the results of introduced thermo effects of parent and neoprene damper systems.

**KEYWORDS:** Demper, neoprene, paranit, seismic platform, seismic chemistry.

## **I.INTRODUCTION**

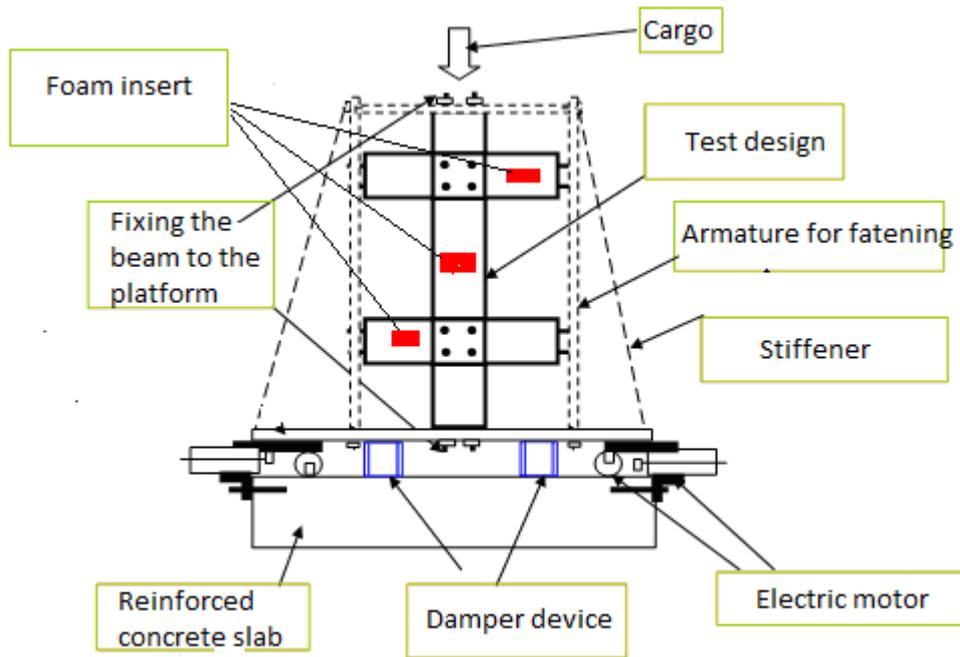
Researches and development efforts of last year's are characterized by acceptance of various systems of seism protection, including damping systems and devices which provide reliability of job objects at intensive earthquakes, dynamic influences, explosions and fires. This circumstance and for shock-proof, anti-damping damping devices is especially actual. It is known as, the seismic risk, i.e. probability and scale of seismic disaster, is defined not only danger, but also another not less important factor, namely: seismic vulnerability of various objects of city building and an industrial zone, an engineering-transport infrastructure of cities and other settlements.

At their introduction in designing and building practice there is a decrease in seismic and impulsive loadings on bearing and protecting designs, the process equipment and, as consequence, decrease in budget cost of building, material consumption and labor inputs of civil and erection works, increase of industrialization of all process of building manufacture.

Achievement of increase of stability of functioning of the process equipment and elements of designs of industrial targets in the manufactures demanding seism protection, occurs at the expense of use damping systems and anti-damping, the shock-proof devices allowing considerably to lower effect of external influence at rather small cost in comparison with other systems and devices, applied in a seismic building. Erection of the bases with basic elements in the form of shaking racks (kinematic support), support of the pendant type, seism isolating belts and on neoprene support, according to works [8,34], without metal layers besides that have reduced seism isolation cost as have allowed to lower frequency of vertical fluctuations of a building to 2,03 Hz, and horizontal – to 0,64 Hz.

At the decision of a question on seism protection application, it is necessary to consider that efficiency of application of those or other seism isolating devices depends on many factors, and demands serious theoretical and experimental researches. In this connection, properties of the materials applied for damping and shock-proof devices are investigated.

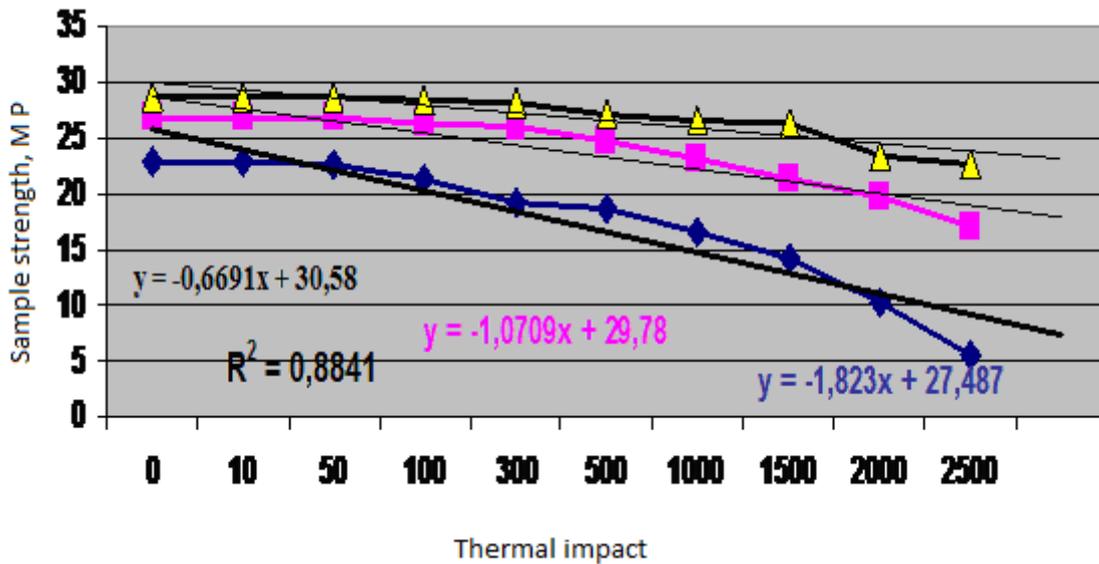
For test damping qualities of materials of seism isolating systems cubes with the sizes of an edge 10 were prepared sm. For increase fire protection, paronit was reinforced by a basalt fibre. After unitary thermal processing in the furnace at 500°C within 15 minutes samples were established in installation.



The test scheme on a seism platform of a Ferro-concrete design with special inserts from vermiculite foam.

Before test for durability, at compression samples of materials of building designs were maintained after heat treatment in the open air in a current of 30 minutes.

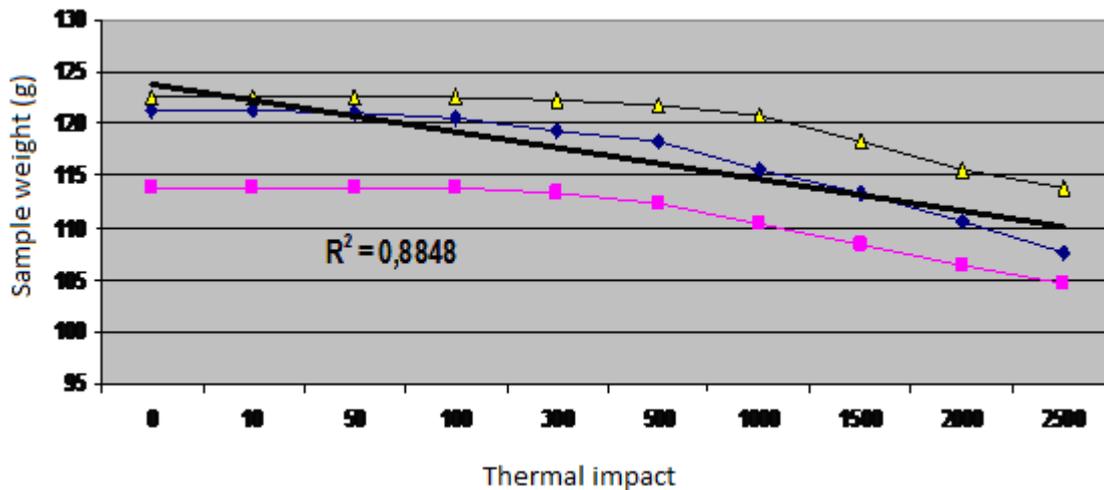
For a case when samples were exposed to thermal processing, results of tests.



Curve resistance of samples to thermal influence.

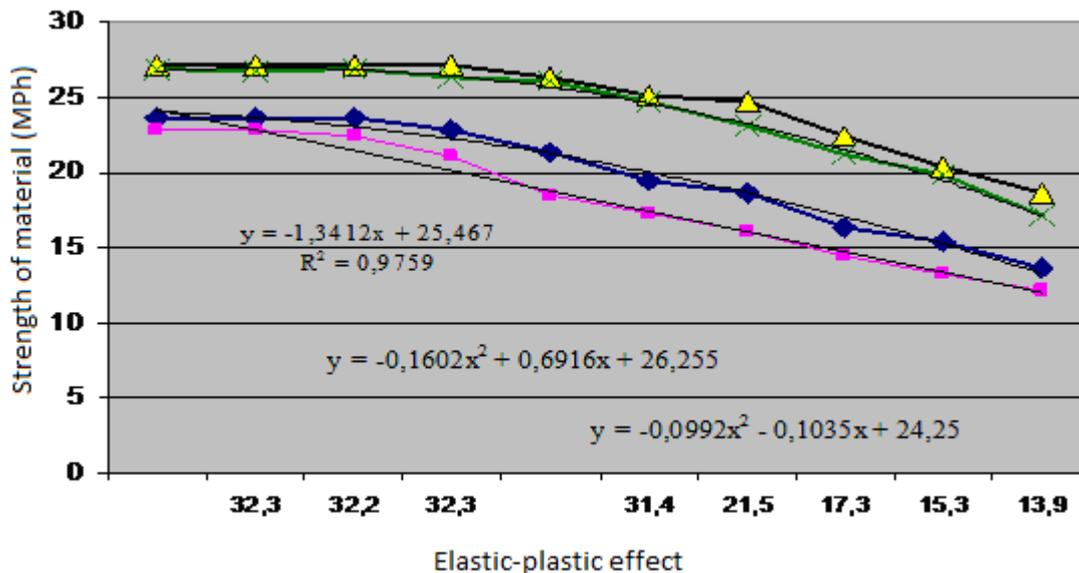
The analysis of the results resulted in schedules fig. 4 and 5 shows that the building design on a basis neoprene loses the durability faster. Decreases in 2-2,3 times whereas the building design on a basis paronite with additives of liquid glass, loses the durability on 11,3 %.

Besides, durability of an offered material remains above, than «an initial position» to a composition with neoprena (25,6 % against 23,6 %). Thermal influence on samples leads to that the building design with neorenyaly a composition loses the durability almost in 4 times whereas at paronitic bases durability is lost on 21,2 %.



The schedule of loss of weight of tested samples of building designs depending on thermal influence.

The results of tests on identifying the resistance of influence to samples structural constructions of thermal. The durability of building materials designs falls down at influence of the high temperature, created in the thermo furnace. The results of tests on gauging the loss of weight the tested samples of building designs.



The schedule of change, depending on elastic-plastic materials for damping devices of buildings and constructions.

For check of degree of influence on weight of samples of building designs, the same cube was checked. It is necessary to notice that this schedule as confirms that neoprene starts to lose faster the прочностные characteristics. Tests have shown that if neoprene loses more than 10 % of weight after thermal loading the offered material on a basis paronit loses weight hardly more than 7 %. This circumstance as tells about mostly durabilities of an offered material.



ISSN: 2350-0328

# International Journal of Advanced Research in Science, Engineering and Technology

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Thus, researches show that offered damper devices for seism protection with use of composite materials is admissible to apply to increase of seism security of buildings and constructions at influence of destroying factors of emergency situations (at the expense of their ability to extinguish oscillatory processes), in particular, and earthquakes;

Use damping devices for buildings and constructions on paronite to a basis with loading - a basalt fiber, expands use of materials on local raw materials;

Use of elastic-plastic properties special paronite for damping devices, gives the chance not only to replace for these details of steel, but in view of corrosion firmness paronite in comparison with steel, allows increasing operation term of damper for design protection. In comparison with neoprene the compositions, offered compositions for building designs are capable to sustain the big loadings, as separately, and at joint mechanical and thermal influence;

In theoretical aspect, practical use is elastic plastic qualities of tested building designs and materials, for revealing of degree of destruction of buildings and constructions, it is possible to consider as one more mechanism of safety of objects of the national economy, the offered author for development protectorate.

Fatigue tests as have revealed that a limit of endurance of skilled images of building designs of an offered variant, dump devices, above an initial position, at use neoprene a material.

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