

Seismic Structural Response using Anti Seismic Bricks

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ABSTRACT: Earthquakes constitute one of the greatest hazards of life and property on earth. Due to suddenness of their occurrence, they are least understood and most dreaded. The earthquake resistant construction is considered to be very important to its effects. In this paper Seismic isolation and energy dissipating systems present an effective way to common seismic design for improving the seismic performance of structures. These techniques reduce the seismic forces by changing the stiffness and/or damping in the structures, whereas conventional seismic design is required for an additional strength and ductility to resist seismic forces, to the building structures having existed for a relatively long period of time.

In This paper presents a brief history of A new form of anti-seismic brick promises to improve the earthquake resistance of buildings, by designing a partition wall for the buildings by anti-seismic brick's ,Because of the unique combination of the materials it enhance the way to behave in response to seismic force. Anti-Seismic brick's also absorbs horizontal seismic motion, in addition to supporting the vertical loads in the form of partition walls.

During the earthquake, the brick's ability to absorb the horizontal movements enables it to act as a form of seismic insulation in the event of earthquakes by isolating the primary structure from the horizontal force affecting the partition walls , so impact on overall structural integrity in the face of an earthquakes is greatly reduced, without requiring expensive structural interventions.

This technique is not yet very common, but a number of research activities is going on in order to investigate the behavior of the anti-seismic brick buildings. Civil engineers, architects, constructors and owners have great responsibilities concerning applications of these systems, but especially the users have sanction, therefore widely use of the earthquake protective systems will be provided by the users' awareness.

KEYWORDS: ceramic powder, superplastizer, 6mm of steel rods.

I. INTRODUCTION

The purpose of earthquake prevention of buildings is to provide the structural safety and comfort by controlling the internal forces and displacement within the particular limits. The common method for protecting the structures against the destructive effects of earthquakes is to damp the seismic energy for limiting the seismic energy by the structural elements, thus providing the resistance against the earthquake. In spite of using this method for a certain level of protection, the structure could be damaged for real sometimes. Another method for protection of the structures against the earthquake is to isolate the building from the ground and/or to install seismic energy dissipating elements at the appropriate places of the building. With this method, better protection could be provided, by designing correctly against the earthquake and therefore significant structural damage level could be minimized.

The earthquakes have been carried on to be an important factor that threatens the social and economic future of the countries, as we can observe the results of them. Thus, it is insisted on the resolutions that minimize the seismic effects of the buildings should demonstrate a high performance level in the expected earthquakes. The seismic isolators and energy dissipating devices are seen to be effective solutions within this context, which are placed in the building appropriately to damp the seismic energy or placed between the foundation and vertical structural systems damping the seismic energy under the ground of the building, thus decreasing the effects of lateral loads on top floors.

Application of earthquake protection systems in buildings whether will be constructed and were constructed -especially the historical ones-, increases the importance of these technologies. But construction of this technologies is very difficult at all so compensate to overcome all this difficulties ANTI-SISMIC BRICK as a remedy.

A. ANTI SISMIC BRICK AS A REMEDY

Sisbrick is a new class of earthquake-resistant building material that seismically isolates partition walls from the main building structure, significantly reducing the tension between these two elements and, therefore, the damage incurred.

Researchers have designed a new seismic isolator that improves the way buildings respond to earthquakes. The key to the Sisbrick, as the invention is known, lies in the way different materials have been combined to achieve two main effects: it is able to absorb horizontal seismic movements, while also supporting vertical loads (for instance, partition walls) that act on the integrity of the building frame. Designed specifically for use in partition walls, its brick form means it can be readily incorporated into traditional construction techniques, without the need for additional measures or equipment.

Techniques and special bricks to improve the way buildings respond to earthquakes are already available on the market. However, what sets Sisbrick apart is its approach to partition walls. As researcher Luis Pallarés at the UPV's Concrete Science and Technology Institute (ICITECH) explains, these structures greatly condition a building's response to a seismic event. Merely making partition walls more resistant does not address the more widespread damage caused by earthquakes. The Sisbrick's large capacity to absorb the horizontal movements caused by earthquakes seismically isolates the partition walls from the main building frame: "They effectively serve as an insulating barrier, avoiding the transfer of loads from these partition elements to the main structure. By doing so, their impact on overall structural integrity in the face of an earthquake is greatly reduced"

This also brings real seismic response into line with projected seismic response as calculated at the building design stage. Francisco Javier Pallarés, also of ICITECH, tells us that "today, seismic calculations only take into consideration the structure of the building frame and do not consider the partition walls, despite the clear and widely-reported influence they have on a building's response to earthquakes". By isolating the partition walls from the main frame, these calculations become more reliable.

On top of the convenient brick form, only a relatively small amount of these bricks is needed to achieve this seismic isolation.

Laboratory testing proves that, if the bricks are arranged in a specific way, just a small amount can afford significant gains in seismic wave absorption. Specifically, partition walls that incorporate Sis bricks can absorb horizontal movements in the order of three times greater than those that do not. This translates into considerably less tension in the partition walls, meaning correspondingly less tension is transferred to the building frame during earthquakes.

II. ANTI SISMIC BRICK CONSIDERATIONS

A. WHAT IS SISBRICK

SISBRICK is a seismic isolator shaped conventional brick or block. It consists of a matrix formulation which gives special properties to achieve seismic isolation sought. This is also contributing inserted in its matrix elements, endowing it with improved properties for behaviour outside the plane.

B. DIFFERENT SIZES OF ANTI-SISMIC BRICK

SISBRICK 7 MEDIUM SIZE

- ✓ Length 24 cm
- ✓ Wide 7 cm
- ✓ High 11 cm

SISBRICK 7LARGE SIZE

- ✓ length 33cm
- ✓ Wide 7cm
- ✓ Height 16 cm

SISBRICK 9 MEDIUM SIZE

- ✓ Length 24 cm
- ✓ Width 9 cm
- ✓ Height 11 cm

SISBRICK 9 LARGE FORMAT

- ✓ 33cm long
- ✓ Width 9 cm
- ✓ Height 16 cm



Fig1: Anti Sisbrick

III. STRUCTURAL RESPONSE USING SISBRICK DURING EARTH QUAKE

A. SEISMIC STRUCTURAL RESPONSE USING “NORMAL BRICK”

When an earthquake on a building constructed of reinforced frames concrete or metal occurs, a horizontal relative displacement occurs between a plant and another, commonly called 'drift' or 'drift'. The deformation and stresses occurring as a result of horizontal forces introduced on the resistant structure normally considered in seismic calculations.

When the frames are filled with brick or block walls, the overall structure is stiffened together and the seismic response is different from that provided for in the calculations without considering the internal partition. The drift of each plant produces in partitions compression connecting rods whose ends terminate in the head and the base of the pillars that make up each closed frame.

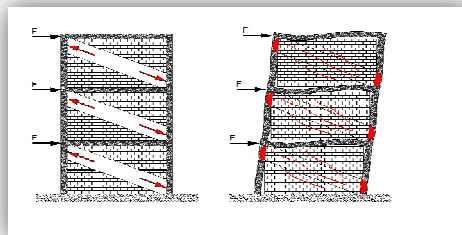


FIG 2: Deformation porch coerced by the interior walls. Cranks diagonal compression acting on head and base columns. Right) Damage usual pillars and partition walls.

A. SEISMIC STRUCTURAL RESPONSE USING “SISBRICK”

By using SISBRICK, device insulator seismic, deformation of the structural frame without total constraint of partitioning it is allowed, so the appearance of dangerous diagonal compression struts are difficult and gantry behaves similarly to as it has been calculated without the interaction of the partition. They thus facilitate the knots and twists that can be developed modes of failure ultimate limit state specified in the design phase with modern methods of calculation based on the formation of plastic hinges.

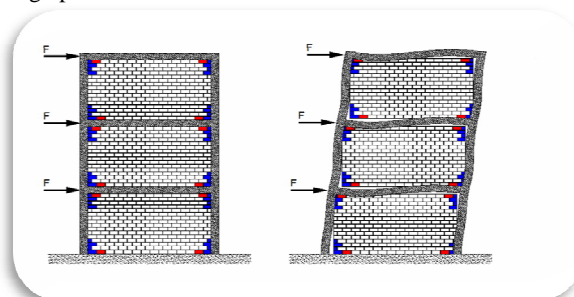


FIG: 3 Deformation of the porch to horizontal seismic forces using insulating brick SISBRICK.

Protection of pillars and partitions. Additionally, the stresses in the wall are reduced to be difficult forming compression struts, so the septum and protects human and economic losses associated with reduced breakage of pillars.

B. WORKING OF SISBRICK

SISBRICK is a seismic isolator shaped conventional ceramic brick or block. Together it has mechanical features that allow it to absorb relative movements between the partition conventional brick and the building structure, while having orthotropic properties

being able to withstand loads in the desired direction. With this movement absorption and having stiffness lower than the brick wall and the building structure, makes the formation of the diagonal compression struts causing damage to the heads and sockets of the pillars, and damage to the septum.

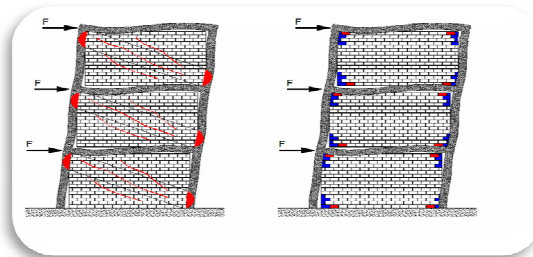


FIG4: Deformation porch coerced by the interior walls. Cranks diagonal compression acting on head and base columns. Right) Damage usual pillars and partition walls.

C. UTILIZATION

SISBRICK put in work in the traditional way, like a ceramic brick or block is involved. The septum is made with the usual materials using the conventional technique, and a small number of key locations SISBRICK elements in the partition is arranged to achieve the desired seismic isolation. Thus SISBRICK is responsible for absorbing the relative movements between the wall and the building structure, protecting the cutting pillars diagonals introduced by compression struts, and reducing stresses in the partitions.

The seismic isolation system consists SISBRICK two types of elements. Elements that are in contact with the pillars (blue in the figures), which allow absorption horizontal movements, and elements that contact beams (in roj0 in the figures), which allow absorption vertical movements.

Typical dimensions for partitioning, here are some recommended system utilization SISBRICK provisions are shown to cover contacts between pillars and beams.

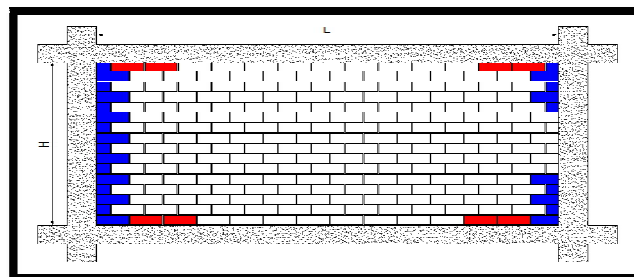


FIG: 5 Different configurations depending on the size and degree of isolation septum.

It is also recommended to SISBRICK for incomplete partition pillar.

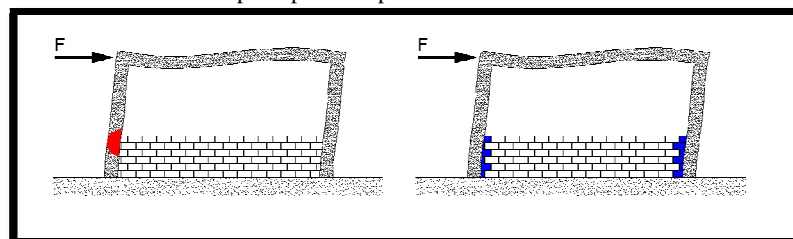


FIG: 6 (Left)creating short and damage in the same incomplete partition pillar.
(Right) Protection of short pillars using SISBRICK.

D. ADVANTAGES

- It allows the seismic response of the structure is more similar to as planned during the design phase.

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- ✚ Irregularities in the distribution allows partitioning, both in plan and elevation, affecting the overall rigidity of the building and can result in additional torques.
- ✚ Allows architectural flexibility, to place or remove partitions without recalculating the original structure, it facilitates structural insulation.
- ✚ It helps reduce human and economic losses in case of earthquake.

IV. CONCLUSION

- ✚ Constructions by using Anti Seismic Bricks gives good result, used bricks in at the four corners of the partition wall. When compared to the other techniques. Depending up on experiments' what they did.
- ✚ Testing is currently being carried out into the thermal and acoustic isolation .Even if this experiments give good result this technique will be a revelonatry one in construction of "ANTI-SEISMIC BUILDING".

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