

Concrete for damaged tires ... a sustainable engineering solution

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The title may seem strange at first glance, especially to fellow engineers implementing in the workplace, as this type of concrete that contains crumbs (crumbs) obtained from damaged tires has become in common use since the nineties of the last century. Every year, due to the population increase and the increase in the number of vehicles used, the problem of damaged tires has become a serious issue in most countries of the year. Where studies and statistics showed dangerous indicators related to the environment resulting from the disposal of damaged tires to uninhabited areas or even sea water for disposal, as well as their use as fuel in furnaces. The problems resulting from throwing damaged tires into the environment are that they are a source of mosquito and insect growth, slow decomposition, and a source of fires that may last for years, as happened in the Emirate of Wales. The concept of using this type of environmental waste in the construction sector has emerged as a solution to get rid of its negative effects from By converting damaged tires into rubber crumbs using manual methods or automatic machines, they are used in the construction of retaining earth walls, improving soil properties, in asphalt mixtures, as a filler in concrete or as a replacement for aggregates.

The studies devoted to investigating the properties of this type of concrete revolved around three main points. First, is this type of aggregate replaced as an alternative to gravel (coarse aggregate) or sand (fine aggregate) and secondly, to what percentage can the replacement be, as for the third, what is the effect of the replacement method on the properties of the resulting concrete. Experiments during that period showed that increasing the size of the tire crumbs had a positive effect on the properties of concrete related to impact and resistance to moving loads and collision, but it showed a significant decrease in the concrete's resistance to compression and tensile strength, especially when using rubber particles of sizes that correspond to the size of gravel (that is, greater than 4.75 mm approximately) and even for measurements that ranged between 3-4 mm. Thus, the trend towards

replacing the fine aggregate (sand) through subsequent research and studies has become an optimal solution to avoid the significant decrease in the required resistance.

In general, and through what has been studied in this field, rubberized concrete is characterized by showing good resistance to impact loads and moving loads, and even as a protective layer against bullets in some types of facilities and shelters that require this or in concrete paving layers and can also be used in concrete barriers Moderation in highways Barriers in which it is required that the concrete be of good energy-damping capacity to preserve the lives of people in the event of a collision without the need for this concrete to be of high resistance. Research and studies are still going on to this day to search for the properties of this type of environment-friendly concrete or work to improve its properties by adding other materials such as mineral additives or fibers of various types. In this regard, it is important to mention that in most cases the proportion of aggregate of this type of concrete should not exceed 30% as the volume of fine aggregate and choose a size greater than 1 mm of rubber particles.

In our beloved country, it is now required to intensify scientific efforts in order to obtain data related to the distribution of damaged tires in the vast lands using geographic information systems to control the places where they are put up as well as to recycle them, paying attention to factories that specialize in recycling damaged tires and turning them into rubber crumbs and supporting and encouraging this type of Industry, and focus research on this type of concrete on its use in buildings and the benefit of thermal and sound insulation properties and other uses.

