Ceramics for Heat Shielding Pavement

Features

The heat island effect is often observed in urban areas where most roads have asphalt pavement partly because the asphalt pavement accumulates a large amount of heat from the sun. This effect is a cause of concern because it facilitates generation of photochemical oxidants which cause localized torrential downpours and air pollution. A measure to prevent heat accumulation in the pavement by shielding the entire road surface against heat has been taken for the alleviation of this effect. However, this measure has a problem that severe force of passing vehicles wears out the heat shielding materials from the road surface.

“Tough Coore®” is a ceramic product for heat-shielding road-surface coating of AGC Ceramics Co., Ltd. It consists of very hard pigments of alumina-zirconia eutectics combined with heat-shielding binder for application on road surface. The combination of the two materials increases abrasion resistance significantly while maintaining the heat-shielding performance. It has already been used for the heat-shielding of approx. 200,000 m² of road surface since its sales began in 2012. Since the byproduct of the manufacturing process of electrocast refractory bricks used in glass melting furnaces is used in the manufacture of “Tough Coore®”, its manufacturing contributes to reduction of manufacturing waste. “Tough Bahn EH,” hard aggregate rated at 9 on the Mohs’ scale of hardness, is also used with “Tough Coore®” to reduce slipperiness of the road surface coated with the heat shielding binder.

“Tough Bahn®”, colored aggregate, developed to prevent slippage of vehicles on the road and make the division of lanes clear, is also widely used. It is contributing to the safety in bicycle lanes which are being created for the separation of bicycle and pedestrian traffic.

Basic Concept or Summary

Heat-shielding pavement is pavement which reduces a rise of road surface temperature by reflecting a large proportion of near-infrared radiation which accounts for almost half of the solar radiation energy. Inorganic pigments such as Tough Coore are used as heat shielding materials and are made to adhere to road surface by application with resin binders. Since application of heat-insulating materials makes road surface slippery, hard anti-skid aggregate is also to be applied on the same road surface to ensure the safety of road traffic.

As the surface temperature rises less on heat-shielding pavement than on ordinary pavement, its use is expected to contribute to the improvement of the thermal environment in pedestrian space and areas along roads and alleviation of the heat island effect.

Definition of heat-shielding pavement

Heat shielding pavement is defined as pavement which is expected to reduce the rise of the surface temperature by 10 °C or more with the function to prevent heat absorption on its surface by reflecting a large proportion of near-infrared radiation on the condition of the brightness at 50 when the temperature of new asphalt surface reaches 60 °C in an indoor irradiation test.

Source: JASE-W Japanese Smart Energy Products & Technologies
https://www.jase-w.eccj.or.jp/technologies/index.html

Asphalt pavement

Ordinary asphalt

Tough Coore Coat

Schematic diagram of a crosssection of asphalt pavement

Heat-shielding performance

Ordinary asphalt

Tough Coore Coat

Road surface temperature

Morning

Noon

Evening

Time of the day

Tough Coore is designed so that the temperature of the Tough Coore coat is 50 °C or below when the temperature on the surface of newly installed ordinary asphalt reaches 60 °C.
Installation in Practice or Schedule

Domestic

- A school commuting road near an elementary school in Shinjuku City, Tokyo
- A road in Minato City, Tokyo
- Entrance to a factory
- A scene in Tokyo Prefecture
  (*"Tough Coore™" is not used in the construction of the tower.*)
- Minato City

Overseas

Contact: AGC Ceramics Co., Ltd.,
New Product & New Business Promotion Group
Tel: +81-3-5442-9182 Fax:+81-3-5442-9190
http://www.agc.com/portal/infra_road.html