Solar Heat Reflective Coatings

Cool chemistry

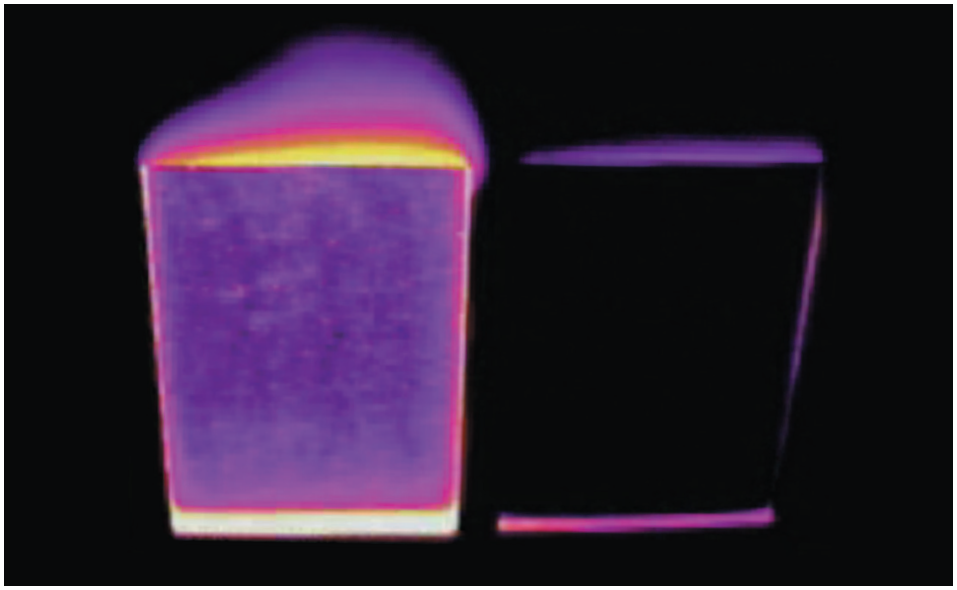
AkzoNobel
Tomorrow's Answers Today

What is a Solar Heat Reflective coating?

Objects painted in light colors tend to reflect the heat and stay relatively cool to the touch when exposed to the sun. Conversely, dark surfaces tend to absorb the heat with a subsequent temperature increase. For example, when you place your hand on a dark colored vehicle that has been out in the sun, the exterior substrate feels very warm and the interior temperature of the vehicle also increases. This is because most dark colors absorb a large portion of infrared radiation (heat) from the sun.

Solar heat reflective coatings (SHR) have an integrated technology that reflects infrared radiation (heat) from the sun and keeps the coated item cooler, independent of the color of the coating. This can help to minimise air conditioning unit work load and operational cost, while providing a more comfortable working environment for personnel and protection of heat sensitive electronic equipment.

When used as a camouflage coating, surfaces painted in colors which appear to be visually identical, can reach considerably lower temperatures than those surfaces painted with conventional camouflage coatings in the same visual color.



Through the use of a thermal imaging camera, a visual record is made of the temperature of the test materials. The panel on the left uses traditional pigments, while the panel on the right uses cool chemistry pigmentation.

Technology:

Solar energy that reaches the earth is absorbed in wavelengths of 300 nanometers (nm) to 2500 nanometers. About 5% of this solar energy is in the Ultraviolet (UV) range. Another 46% of the total energy of the sun is in the visible spectrum where light in all its various colors is visible to the naked eye. The remaining 49% is in the Infrared (IR) range. Radiation in this region is invisible to the naked eye, but we can still feel the effects of its energy in the form of heat (figure 1).

It is important to note that objects can absorb, reflect and emit radiation outside the visible spectrum.

Spectrum of solar radiance

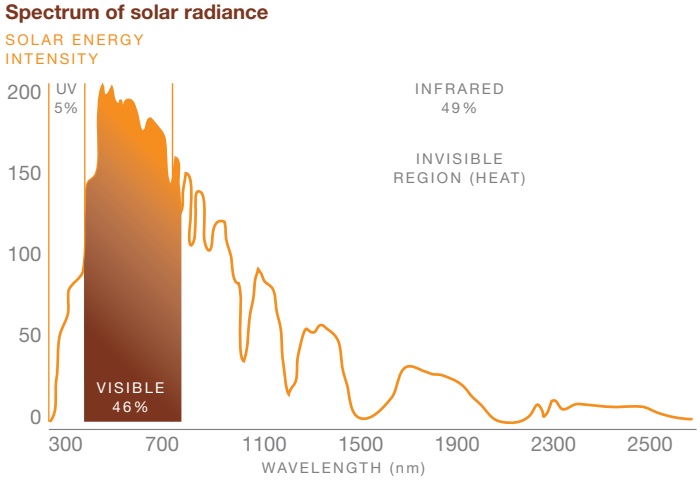
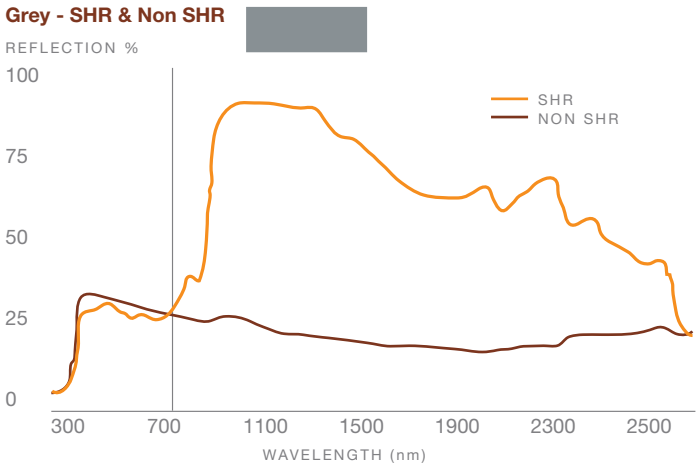


FIG. 1 - SPECTRUM OF SOLAR RADIANCE.

Solar heat reflective coatings are designed to reflect invisible infrared radiation (heat). Independent on the visual darkness, they reduce solar heat build-up without impairing the durability of the finish. This is accomplished with special pigmentation and formulation techniques, using Solar Reflective Pigments. Solar Reflective Pigments have been altered, physically and chemically, to reflect infrared radiation while still absorbing the same amount of visible light, thus appearing as the same color as lesser reflecting pigments, yet staying much cooler (figure 2).



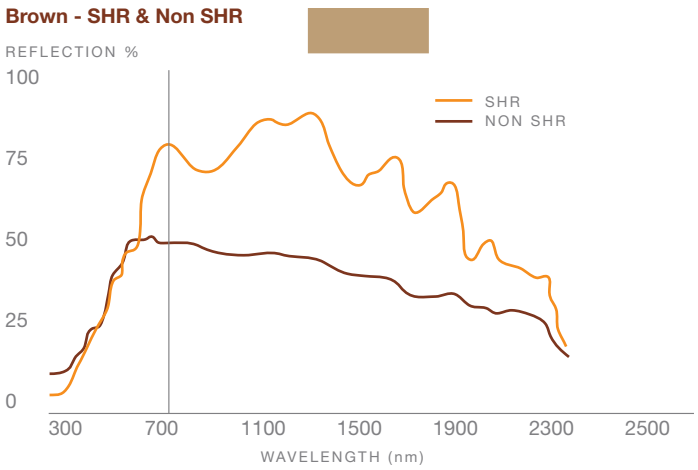


Fig. 2 - SHR coatings show a substantial higher reflection of infrared radiation.

In some cases, solar heat reflection can be further improved by applying a thin layer of white basecoat under a thin layer of the final color. This is particularly effective for colors which are “semi” transparent in the Near Infrared (NIR) region (figure 3). The approach taken to achieve the lowest solar heat absorption is color dependent.

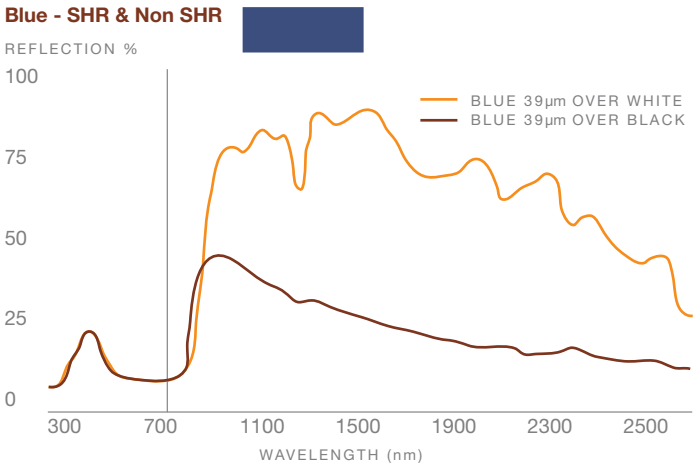


Fig. 3 - Blue topcoat applied over a white basecoat shows a substantial higher reflection of infrared radiation.

Optional functionalities:

SHR coatings can also be formulated as a Chemical Agent Resistant Coating (CARC). This means that a tank painted with SHR CARCs could provide protection to personnel and fixed assets from NBC warfare while keeping the interior of the tank cool, reducing cooling energy consumption, in addition to providing visual and thermal camouflage.

Summary:

Solar heat reflective coatings are developed to answer to the need for cool coatings in varying colors. They have the ability to reflect heat from the sun, which helps to provide a more comfortable indoor working environment whilst operating in hot climates. They help to minimise air conditioning unit work load and operational cost, in addition to providing protection to heat sensitive electronic equipment.

SHR coatings can be formulated specifically tailored to the different requirements of the aerospace or land defense industry. In case of military use, the complete coating solution depends upon the shade of camouflage needed and the performance necessary for the success of the mission. Solar Heat Reflective coatings can not only be formulated as a Chemical Agent Resistant Coating (CARC), but also as a temporary camouflage and Chemical Agent Absorbing Coating.

More Information:

Equipped with over 75 years of accumulated experience and technical know-how in the aerospace and land defense industry, AkzoNobel is ideally placed to offer advice and specialist coating technology that not only protects and enhances operating image and performance but also adds efficiency and quality during asset construction.

For more information on SHR and other specialist coatings, contact your local AkzoNobel Aerospace Coatings representative, visit our website at www.akzonobel.com/aerospace or e-mail us at: customer.service@akzonobel.com

AkzoNobel
Tomorrow’s Answers Today

www.akzonobel.com/aerospace

We’re the largest global paints and coatings company and a major producer of speciality chemicals. We supply industries worldwide with quality ingredients for life’s essentials. We think about the future, but act in the present. We’re passionate about developing sustainable answers for our customers. Based in Amsterdam, the Netherlands, we have 60,000 employees working in more than 80 countries - all committed to excellence and delivering Tomorrow’s Answers Today.

AkzoNobel Aerospace Coatings is an ISO 9001, ISO 14001 and AS9100 certified company.

G2_SHR_UK
05/10