

Infrared Reflective Coatings

Low observable technology



AkzoNobel
Tomorrow's Answers Today

Blending in with its surroundings, particularly on land, can be achieved by 'conventional' visual camouflage. However, when sophisticated infrared imaging technology is used, it is still possible to 'see' the signature of personnel or equipment against the reflective profile of the background. Each object has its own reflective profile that differentiates it from the surrounding when observed through infrared viewing devices.



Visible image of a tank coated with IRR coating.

Infrared reflective (IRR) coatings enable the user to stealthily influence the signature of military assets. The coatings have the ability to reflect electromagnetic waves in such a way that they give the same signature to the observed object as the signature of the surrounding environment, both in the visible (VIS) and near infrared (NIR) spectra. Using infrared reflective coatings can disrupt the contours of objects, leading to a blurred image for the observer. Even when using specialised viewing devices, the object will blend in with the natural environment. This reduces the susceptibility to infrared surveillance devices and can improve the survivability of military assets, leading to improved effectiveness and reduced casualties.

Camouflage systems are developed according to specifications or to a country's own specific needs, depending on the environment the asset is being deployed to. The reflectance profile and gloss level of the coating are defined by specific environmental constraints, which includes the reflectance of natural soils and vegetation. In general, most countries use a disruptive pattern camouflage system in the visible range (400 to 700nm wave band). However, with the development of infrared detection technology, there is a growing need for effective infrared stealth capabilities.



IRR signature of personnel in non-camouflage and camouflage clothing.

Technology

The spectral regions of interest for infrared reflective coating technology are in the visible range and the near infrared range of the electromagnetic spectrum (700 to 2500nm wave band – figure 1). Near infrared is not visible to the human eye, but can be detected by special infrared viewing devices. Infrared reflective coatings in the VIS & NIR spectrum are formulated to simulate the signature of the surrounding environment by influencing the reflection patterns of infrared radiation. The reflection of infrared radiation by a coating is controlled primarily by the reflective profile and particle size of the pigments in the coating. All pigments used have been evaluated for reflectance, transparency and hiding power in the near infrared region.

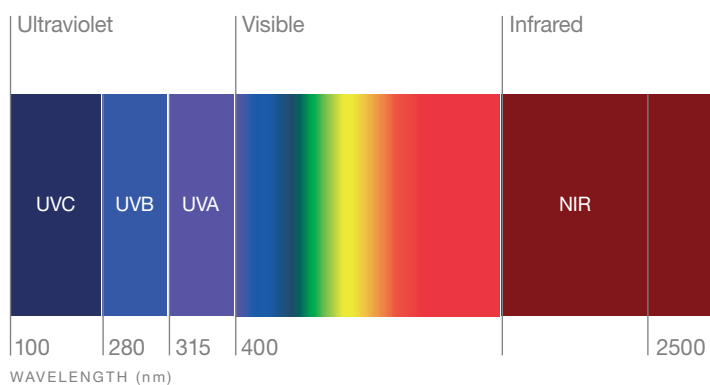
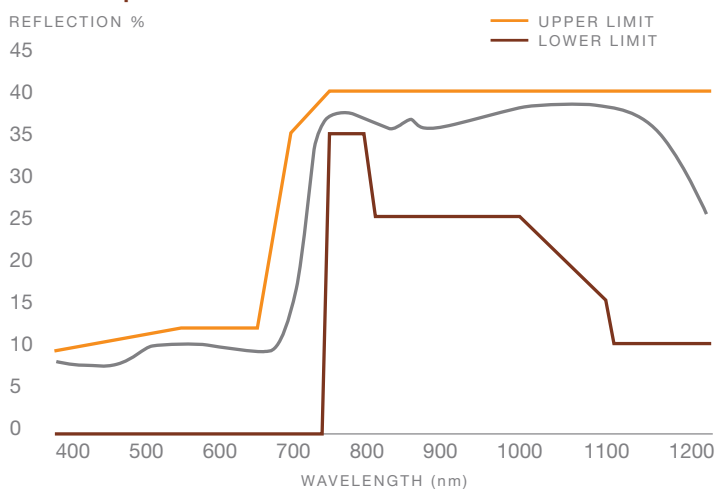


FIG. 1 - Schematic of the electromagnetic spectrum.

Reflection profile of Green



Optional functionalities:

Infrared reflective coatings can be tuned for specific missions. They can also be formulated as a Chemical Agent Resistant Coating (CARC). This means that a military asset painted with infrared reflective CARCs could provide protection to personnel and fixed assets from NBC (nuclear, biological and chemical) warfare while masking the visibility in both the visible and near infrared reflectance range.

The principle of controlled signatures can be implemented in all the relevant spectral ranges (VIS, Near-IR, Mid-IR, and Far-IR), in differing coating types with unique characteristics, to satisfy the requirements of the mission for which it is designed.

Summary:

The development of infrared detection technology, such as infrared cameras, created a need for effective infrared stealth capabilities. Using infrared reflective coatings enables us to influence the signatures of military assets. They have the ability to simulate the signature of the surrounding environment, both in the visible and near infrared range.

The complete coating solution depends upon the gloss and reflection pattern needed and the performance necessary for the success of the mission. Infrared reflective coatings can be formulated specifically tailored to the different mission requirements. Infrared 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 (CAAC).

More Information:

With a long and successful history of serving all sectors of the armed forces, 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.

Our specialist products meet the requirements of various coating defense standards and military performance specifications.

For more information on Infrared Reflective Coatings 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



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