

USEFULNESS AND QUALIFICATIONS OF ROOFING GRANULES

Roofing granules are in essence what gives asphalt shingles their aesthetic appeal. The blend of colours, depth and richness of appearance are nothing short of an individual manufacturer's artistic creation and imagination. Although appreciated mostly for their appearance, roofing granules serve an even more important role than aesthetics.

Roofing granules serve the function of protecting the integrity of the shingle from the elements. Specifically, granules protect and preserve the asphalt shingle from solar ultraviolet radiation. Granules, which are predominantly manufactured using natural stone, are crushed, screened and sized to various gradation sizes from the very small particles (0.425 mm) to the larger particles (1.7 mm) with multiple groups of sizes in between these, all selected in specific percentages of the overall granule blend mixture. This is referred to as the "particle size distribution" of the granules, or the "gradation distribution". These granules are manufactured in such a way that when applied to and embedded in the shingle's asphalt coating the particles interlock together in order to provide the absolute maximum coverage of the asphalt.

The manufacturing of coloured granules is simply a process where the blended stone particles are coated with a combination of organic and/or inorganic pigments similar to paint. The pigment slurry mixture, once applied to the stone, is baked on at high temperatures causing the pigment mixture to be fused to the stone in a ceramic process. The selection of the type and quantity of pigments utilized will determine the final appearance and colour of the product. Once the roofing granules are cooled, they undergo a rigorous set of tests to certify the quality and longevity of the product. Multiple colour readings using a spectrophotometer are performed at different intervals during the manufacturing process. Colour fixation tests are also performed to make certain that the pigmentation has adhered properly to the stone and to ensure that the colour will remain stable over time (although the colour may fade slightly, historically roofing granules have proven to be relatively colour-stable). Many other tests are also done on the coloured granules prior to shipment such as testing for alkalinity, asphalt staining, water repellence, moisture content and bulk density.

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Although the particle size distribution and colouring processes are of crucial importance, the selection of the natural stone itself is in fact just as important. Several characteristics are essential when analyzing and selecting an appropriate and suitable stone. Some of the key characteristics sought are: its hardness, its opacity to solar ultraviolet rays and its iron content.

HARDNESS: A suitable stone must be sufficiently hard, otherwise once coated the natural stone could break apart or fracture either during the manufacturing process or by contractors and homeowners walking on the shingles during or after their installation. The majority of natural stones are simply too soft to be suitable for coloured roofing granules. Brittle stone such as limestone, dolomite or slate would break apart which would lead to exposure of the uncoloured interior portion of the stone and possibly to premature mineral granule loss.

OPACITY TO SOLAR ULTRAVIOLET RAYS: Opacity, or conversely translucency to solar ultraviolet rays is the ability of the stone to prevent or allow light to pass through it. Typically a granite or quartz type stone lets light pass through easier than a darker stone such as trap rock or gabbro. Even though coloured roofing granules are surface-coated, the ability of the granule to prevent light transmission is determined by the base rock, not by the ceramic colour coating. Ultraviolet rays which passes through the granules would lead to premature degradation of the asphalt coating which adheres the granule to the shingle.

IRON CONTENT: A third but equally important characteristic is the iron content found in stone. Generally speaking most stone sources have a small percentage of iron as part of the stone's chemical composition. For the most part the iron content is not encapsulated in the stone thus allowing for traces of rust to leach from the stone. A suitable stone would have very little iron in its composition and such iron would, to some extent be encapsulated in the stone, preventing it from "leaching" from the granules and causing rust stains on the finished roof.

A well-made asphalt shingle which incorporates a hard, durable, opaque, rust-resistant, colour stable roofing granule will add both aesthetic appeal and weather resistance to any roof.

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