

ROOFING METALS COMPARISON CHART

	INVARIMATTE®	LEAD-COATED COPPER	BARE COPPER	PAINTED ALUMINUM	PAINTED GALVANIZED	BARE ALUMINUM	BARE GALVANIZED
Permanent High SRI	YES	NO	NO	NO	NO	NO	NO
Zero Bio-toxicity	YES	NO	NO	NO	YES	YES	YES
Permanent Finish	YES	NO	NO	NO	NO	NO	NO
Fire Resistance to 1000°F	YES	YES	YES	NO	YES	NO	YES
Hail Resistant	YES	NO	NO	NO	NO	NO	NO
No Oxidation/ Metal Loss	YES	NO	NO	NO	NO	NO	NO
Insulation Savings	YES	NO	NO	NO	NO	NO	NO
Stable Panels .015" Thick	YES	NO	NO	NO	YES	NO	YES
Weld-able	YES	NO	NO	NO	NO	YES	NO
Solder-able	YES	YES	YES	NO	NO	YES	YES
No Drainage Matting Needed	YES	YES	YES	YES	YES	YES	YES
No Panel Ventilation Needed	YES	YES	YES	YES	YES	YES	NO
Low Thermal Expansion	YES	YES	YES	NO	YES	NO	YES

PERMANENT HIGH SRI

Stainless steel is unique among roofing metals with respect to solar reflectance. Unlike metals and paint coatings that oxidize, stainless steel maintains its original reflective oxide film indefinitely. A solar reflectance of 94, calculated from readings taken from InvariMatte® stainless steel roofing panels 10 years after installation, were equivalent to cleaned, as well as new specimens. InvariMatte® has a low energy surface that resists the accumulation of dirt, accounting for the lack of degradation in solar reflectance. More can be learned at www.metalresources.net in a resource topic entitled "Reduce Global Warming".

ZERO BIO-TOXICITY

Stainless steel is safe enough for human implants, cookware, and most certainly building panels that are located in environmentally sensitive areas, such as wetlands. The same cannot be said for metals that oxidize, and leach biocides into the environment. In the case of lead coated copper, even construction workers are at risk of exposure during installation.

PERMANENT FINISH

InvariMatte® has a low glare uniform appearance that will last indefinitely, assuring the original design is maintained for the duration of the building's service life. Other metals will patina and paints will fade, making it very difficult to match new additions or expansions in the future.

FIRE RESISTANCE UP TO 1500°F

Since stainless steel has a melting point approaching 3000°F, airborne cinders, which can reach 1500°F will not compromise the material. Further, the poor thermal conductivity of stainless steel compared to these other metals provides added safety in slowing the penetration of heat through the metal. Stainless steel, therefore offers an additional measure of fire resistance compared to other metals:

Melting Points of Roofing Metals In Degrees Fahrenheit

STAINLESS STEEL	CARBON STEEL	COPPER	ALUMINUM	ZINC	LEAD
2750	2700	1983	1220	787	621

This greatly understates the softening that occurs to copper, aluminum, zinc and lead above only 600°F, at which point

they become structurally unsound. Carbon steel softens at 1000°F, but more importantly contracts at 1400°F, which in fires can cause walls to be pulled down. Stainless steel remains strong and without contraction at 1600°F, making it by far the most fire resistant roofing material.

HAIL RESISTANT

The resistance of a material to denting is proportional to the square of the yield and the thickness to the fourth power. Zinc and lead are exceedingly soft and will dent easily. Aluminum and copper have similar strengths, of about 20,000 psi, while carbon steel has a yield of about 35,000. InvariMatte® stainless steel is cold worked to an approximate yield strength of 55,000 psi. At a typical thickness for each material, this gives InvariMatte® stainless steel two and a half times the dent resistance of its closest competitor, carbon steel. And just as importantly, stainless steel is not a coated product so hail's destruction of paint or polymer coatings, does not lead perforation as it does with coated or painted roofs.

NO OXIDATION/METAL LOSS

Metal loss is an issue in seacoast and deicing salt environments. InvariMatte® stainless steel will not corrode and lose mass in these locations, provided the appropriate grade is used. Only type 316, the appropriate Marine grade for the continental US, is stocked by distributors. Other roofing metals will get thinner due to oxidation loss. Painted versions will keep this in check for a considerable period of time, so long as the metal remains protected by the coating. In addition, the superior corrosion resistance of stainless steel greatly reduces the risk of undesirable reactions with certain roofing underlayments. More can be learned at www.metalresources.net in a resource topic entitled "Metallic Corrosion".

INSULATION SAVINGS

Insulation requirements vary with locale. The advantage of stainless steel exists fairly equally in all climates. This is because stainless steel acts not just as an impervious barrier to weather, it is an almost impervious barrier to solar and other radiation. Because of its 90+ percent solar reflectivity, stainless steel acts as an external radiant barrier. This prevents heating by the sun in the summer and also prevents heat loss from the roof in the winter. Compared to a black roof, the stainless steel insulation savings because of the radiant effect equals R 20.

STABLE PANELS .015" THICK

Given the superior strength of InvariMatte® stainless steel compared to other metals used for roofing applications, panels as thin as .015" can be used to create a robust roofing system.

Yield Strength of Roofing Metals in psi

INVARIMATTE® STAINLESS STEEL	CARBON STEEL	ALUMINUM	COPPER	ZINC
55,000	34,000	21,000	20,000	18,000

WELD-ABLE

A welded joint is often preferential to other means of joinery and stainless steel's ability to be welded is a distinct advantage.

SOLDER-ABLE

Soldering InvariMatte® stainless steel can be done productively. As is the case with other roofing metals, pre-tinning improves soldering speed and joint integrity.

NO DRAINAGE MATTING NEEDED

Given the low mechanical properties of solid zinc, drainage matting is usually used to prevent panels from sagging. This detail is not necessary with stronger materials, especially stainless steel.

NO PANEL VENTILATION NEEDED

Zinc requires ventilation to prevent the backside of panels from corroding due to contact with moisture. Back coated zinc clearly helps in this regard, but thermal movement over time can compromise such coatings, calling into question the longevity of a zinc roofing system that depends upon a back coat.

Thermal Expansion Rates of Roofing Metals 10⁻⁶in./in./°F

CARBON STEEL	COPPER	INVARIMATTE® STAINLESS STEEL	ALUMINUM	ZINC
7.3	9.8	10.2	13.7	19.3

Metals like stainless steel with lower thermal expansion rates require fewer expansion joints and lap seams.



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