

White Paper - What's the best Condensate Drain Pan Material?

Acrylic Coated Galvanized Steel is the most common drain pan material used in the HVAC industry and is the least durable with a typical lifespan of 20 years. The bond between the acrylic and metal eventually breaks down allowing moisture to directly contact the metal. Galvanization provides little protection against chlorides, sulfates and acids all of which are present in urban environments.

The advantage of acrylic coated galvanized metal is it's less expensive than stainless steel

Stainless Steel is widely considered the best material for HVAC drain pans due to its perceived corrosion resistance. The corrosion resistance is a result of a very thin oxide layer on the steels surface. This oxide layer renders the surface electrochemically passive in the presence of corrosive environments.

The passive layer is formed from the addition of chromium to the steel. A minimum of 10.5% chromium is required to form the passive layer. The more chromium, the more stable the passive layer becomes.

The lack of oxygen or oxide deposits can weaken the passive layer and it will corrode much like any other steel. This is often identified as "pitting" corrosion. Aqueous environments laden with chloride can also weaken the passive layer very quickly. SS is also susceptible to MIC, microbial influenced corrosion, caused by stagnate water.

The biggest disadvantage of SS is the cost. 304 grade SS is typically 100% more expensive than acrylic coated galvanized steel.

Polymer (acrylonitrile butadiene styrene, ABS), is a terpolymer made by polymerizing styrene and acrylonitrile. This material is very tough and has high impact resistance in temperatures between -20C to 80C (-4F to 176F). Moulding is done at high temperatures, leaving a gloss finish giving the surface a low adhesion co-efficient which means its not prone to foreign material sticking to it and is easily cleanable. It offers excellent corrosion resistance to acids, chlorines and metal oxides so ideally suite for hydronic HVAC drain pan applications. It's also available in a 5VA material where fire and smoke ratings require UL 94 fire compliance.

The advantage of ABS is the cost. It's typically 5% the cost of 304 SS, and 10% the cost of coated steel.

Drain Pan Material Comparison			
	Acrylic Coated Galvanized Steel	304 Stainless Steel	Polymer
Durability/longevity	Good	Better	Best
Weight	Better	Good	Best
Corrosion Resistance	Good	Better	*Best
Flammability	Better	Best	Good
Cost	Better	Good	Best

Summary: Polymer is a very viable material for hydronic cooling HVAC drain pans. The failure mode of any drain pan is corrosion leading to leaks. The life span of a coated galvanized condensate drain pan is 15-20 years and 25 years for 304 stainless provided there is no pitting or metal oxide corrosion. Polymer will last indefinitely and is the least costly of the three materials.

*Warning: some refrigerant oils may adversely affect Polymer (ABS).