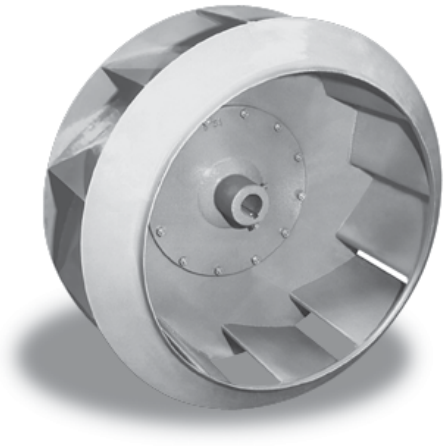
Protective Coatings Chemical Resistance Guide

Engineering Supplement Manual



The application of special finishes for the prevention of corrosion, abrasion and erosion has been the subject of study in the air handling industry for quite some time. As might be expected, some materials or finishes are more resistant to corrosion than others, but no finish or coating is completely immune from corrosion in all respects. Therefore, corrosion resistance is of degree only, based upon the choice of material made for any particular problem. The data published in this manual is based on the recommendations and claims put forward by the manufacturers of such paints or coatings. While we cannot be responsible for the accuracy of this data, it should serve as a useful guide in selecting special paints and/or coatings for handling corrosive atmospheres. Aerovent does not, however, assume any liability for the effectiveness of these coatings, since they are rated in accordance with their manufacturers' claims only.

The rate of corrosion on any application depends to a large extent on the concentrations of fumes, their temperature and the extent of moisture associated with them. These parameters make it extremely difficult to define corrosion resistance of any one coating by a single rating as shown by a letter in our guide. Plant engineers, with their experience on specific applications, are in a better position to suggest the best coating for their requirements. We suggest you refer to them when possible for such advice.

Some restrictions on fans to be coated are deserving of mention. Naturally, bearings cannot be placed in the airstream. The use of variable intake vanes and outlet dampers is not recommended, since it is almost impossible to properly protect some of their component parts such as linkages, bearings, etc. Shaft seals of a variety of types are available and should be used. Special types of seals may be required in some instances; refer to factory. Drains, especially in handling moist atmospheres, are a necessity. With these points in mind, the corrosion resisting paint or finish can be applied either to the complete airstream of the fan, or to the entire fan, both inside and out.

Coatings and Their Characteristics

For all special paints or coatings and their applications with variation in fan design, construction and metal preparation, AMCA recommended practice No. 2601-66 is carefully followed. For special paints, fans are phosphatized and washed followed by a prime coat and one or more finish coats depending upon the application and its requirement. In some cases, and as indicated, sandblasting of the parts to be coated is necessary, followed by the necessary coats of corrosive finish to the thickness specified in the chart.

Selection Chart

CORROSIVE REAGENT			ACIDS																			ACID SALTS, NEUTRAL SALTS, ALKALINE SALTS, ALKALIES, ETC.											
CORROSION RESISTANT: • METALS • PAINTS • COATINGS	COATING THICKNESS (MILS)	MAX OPERATING TEMP. (°F)**	ACETIC	BORIC	CARBOLIC	CARBONIC	CHROMIC	CITRIC	FLUOROBIC	FORMIC	HYDROBROMIC	HYDROCHOLIRC	HYDROFLUORIC	HYDROCHLOROUS	LACTIC	NITRIC 1%	PERCHLORIC	PHOSPHORIC 10%	PICRIC	SULPHURIC 1%	SULFURIC ACID 10%	SULPHUROUS	ALUMINUM CHLORIDE	ALUMINUM NITRATE	ALUMINUM SULPHATE	AMMONIUM CHLORIDE	AMMONIUM HYDROXIDE	AMMONIUM NITRATE	AMMONIUM SULPHATE	BRINE	BROMINE	CALCIUM CHLORIDE	CALCIUM CARBONATE	CALCIUM HYDROXIDE
METALS																																		
LOW CARBON STEEL	—	600°	U	F	F	F	F	U	X	U	U	U	U	U	U	U	U	U	X	U		U	U	U	U	U	E	F	U	X	U	F	X	F
ALUMINUM	—	250°	G	G	G	G	F	G	U	U	U	U	U	U	G	U	F	U	E	U		G	F	G	F	F	E	E	F	G	U	G	E	F
304 S.S.	—	1000°	G	E	F	G	G	G	C	G	U	U	U	U	F	E	G	G	E	U		F	F	E	F	F	E	E	U	E	U	F	E	E
316 S.S	—	1000°	E	E	F	E	E	E	X	G	E	U	U	U	G	E	E	E	E	F		G	F	E	G	E	E	E	F	E	U	F	E	E
PAINTS / COATINGS																																		
POLYURETHANE ACRYLIC LIQUID	4-5	250°	7*	7*	7*	7*	7*	7*	7*	7*	5-6*	5-6*	4*	4*	7*	9	8*	10	7*	10	8	8*	8*	8*	8*	8*	9	8*	8*	8*	8*	8*	8*	8*
EPOXY MASTIC+	5-12	300°	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	7-8	7-8	7-8	7-8	7-8	7-8	7-8	9-10	4-5	7-9	7-9	7-9
HIGH TEMP LIQUID	1.5-2	1200°																																
ZINC RICH PRIMER	2.8	250°	Chemical Exposure not Recommended Without a Topcoat.																															
POLYESTER POWDER	1.5-3	250°	10*	10	10	10	7	10	7	10	7	7	5	7	10	7	7	7	10	7		7	10	10	10	10	10	10	10	10	7	10	10	10
EPOXY POWDER	1-3	200°	10*	10	10	10	7	10	7	10	7	7	5	7	10	7	7	7	10	7		7	10	10	10	10	10	10	10	10	7	10	10	10
THERMOPLASTIC POWDER	7-12	158°	7-10a	7-10b	N/A	7-10b	3	7-10b	N/A	7-10a	7a	7a	3	3	7-10b	7-10a	N/A	7-10b	N/A	7-10a	7-10a	7-10b	7-10a	N/A	N/A	5a	N/A	N/A	N/A	7-10b	3	N/A	N/A	7-10a
HIGH TEMP POWDER	2.5-3.5	1000°																																
ZERO ZINC PRIMER	2.5-3.5	200°	Chemical Exposure not Recommended Without a Topcoat.																															

NOTES

1. Please refer to page 5 for descriptions.

* Not tested. For not tested chemicals, results are estimates. Actual testing should be done and concentration should be identified.

** Max. operating temperature indicates coating failure, not color change. Chalking or discoloration may below this temperature.

+ Ratings for Epoxy Mastic are estimates.

SELECTION INSTRUCTIONS

Coatings with E or G ratings should be selected, if possible, for best results throughout.

E = Satisfactory from 15% to 85% (depending upon coating) of concentration of fumes and for continuous operation. Also suitable for splash or condensation.

G = Good for up to 5% to 15% of concentration of fumes. Not recommended for applications involving splash or condensation.

F = Fair. Recommended for low (maximum 5%) concentration application. Should not be specified unless detailed application is available.

U = Unsatisfactory and hence not recommended.

X = Sufficient data not available at present. User comments would be appreciated.

SELECTION INSTRUCTIONS (CONT.)

10 = No effect

7 = Dulls, discolors

5 = Dulls, softens

3 = Test terminated

a = Max temperature for contact of 20°C

b = Max temperature for contact of 60°C

This information is intended only as a general guide to the resistance of coatings to various chemicals. It should not be used by the industry as the basis for final decisions as the specific end use application, design and/or conditions of use may have added effects on performance in a particular chemical environment. It is recommended that laboratory testing of the specific end use application be conducted under expected service conditions.

Selection Chart

CORROSIVE REAGENT			ACID SALTS, NEUTRAL SALTS, ALKALINE SALTS, ALKALIES, ETC.															HYDRO-CARBONS				GASES & FUMES						MISC.					
CORROSION RESISTANT: • METALS • PAINTS • COATINGS	COATING THICKNESS (MILS)	MAX OPERATING TEMP. (°F)**	CALCIUM DISULPHIDE	COPPER SULPHATE	FERRIC CHLORIDE	HYDROGEN PEROXIDE	POTASSIUM CYANIDE	POTASSIUM HYDROXIDE	POTASSIUM DISCHROMATE	SODIUM BICARBONATE	SODIUM CHORIDE	SODIUM DICHROMATE	SODIUM HYDROXIDE 1%	SODIUM HYDROXIDE 5%	SODIUM HYDROXIDE 10%	SODIUM HYPOCHLORITE	ZINC CHLORIDE	ZINC SULPHATE	BENZENE	BUTAINE	GASOLINE - UNLEADED	XYLOL/TOLUOL	STEAM VAPOR - SAT.	AMMONIA GAS - DRY	AMMONIA - WET	CHLORINE - DRY	HYDROGEN SULPHIDE	SULPHUR DIOXIDE	ACETONE	ALCOHOL ETHANOL	FORMALDEHYDE	ISOPROPYL ALCOHOL	METHYL ETHYL KETONE	MINERAL OILS
METALS																																		
LOW CARBON STEEL	—	600°	F	U	U	U	X	G	G	X	G	G	E			X	X	F	E	X	G	E	G	X	X	F	U	F	E	E	F		E	G
ALUMINUM	—	250°	E																				E	E	E	U	F	G	E	G	E		E	E
304 S.S.	—	1000°	E	U	U	E	U	U	E	E	G	X	U			G	U	E	E	E	E	E	E	E	E	U	F	F	E	E	E		E	E
316 S.S	—	1000°	G	E	U	E	E	E	E	E	G	X	E			F	U	E	E	X	E	E	E	E	E	F	E	G	E	E	E		E	G
PAINTS / COATINGS																																		
POLYURETHANE ACRYLIC LIQUID	4-5	250°	8*	8*	8*	8*	8*	8*	8*	8*	8*	8*	10	8	7	7*	7*	7*	7*	7*	8	6*	9*	8*	7*	7*	7*	7*	9*	9	9*	9	9	9*
EPOXY MASTIC+	5-12	300°	7-9	7-9	7-9	7-9	7-9	7-9	7-9	7-9	7-9	7	7	7	7	7-9	7-9	7-9	7	7	7	7		7-8	7-8	7-8	5-6	5-6	7-8	7-8	7-8	7-8	7-8	7-8
HIGH TEMP LIQUID	1.5-2	1200°																																
ZINC RICH PRIMER	2.8	250°	Chemical Exposure not Recommended Without a Topcoat.																															
POLYESTER POWDER	1.5-3	250°	10	7	7	7	10	10	7	10	10	7	7			7	10	10	10	10	5	5	10	10	10	10	7	7	7	10	10		5	7
EPOXY POWDER	1-3	200°	10	7	7	7	10	10	7	10	10	7	7			7	10	10	10	10	5	5	10	10	10	10	7	7	7	10	10		5	7
THERMOPLASTIC POWDER	7-12	158°	3	7-10b	N/A	3	N/A	5a	N/A	N/A	7-10b	N/A	3	3	3	3	7-10b	7-10b	7a	7a	N/A	3	7-10b	5	7a	N/A	7-10b	5a	5a	5a	7-10a	5a	5a	7-10a
HIGH TEMP POWDER	2.5-3.5	1000°																																
ZERO ZINC PRIMER	2.5-3.5	200°	Chemical Exposure not Recommended Without a Topcoat.																															

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CORROSION RESISTANT: • METALS • PAINTS • COATINGS	COATING THICKNESS (MILS)	MAX OPERATING TEMP. (°F)**	POLYVINYLACETATE	TRI CHLORETHYLENE	DIETHYLINE GLYCOL MONOBUTYL ETHER	MOTOR OIL (MOBIL 10W-30)	HYDRAULIC OIL (PENNZOIL)	CUTTING OIL (RIGID)	SKYDROL (500B4L)	TIDE SOAP 10%	FANTASTIC	BLEACH	BREAK FLUID (DOT 3 WAGNER PREMIUM)	COLA	AROMATIC CONTROLLED VM&P NAPHTHA
METALS															
LOW CARBON STEEL	—	600°	X	F	—	—	—	—	—	—	—	—	—	—	—
ALUMINUM	—	250°	X	F	—	—	—	—	—	—	—	—	—	—	—
304 S.S.	—	1000°	X	E	—	—	—	—	—	—	—	—	—	—	—
316 S.S	—	1000°	X	G	—	—	—	—	—	—	—	—	—	—	—
PAINTS / COATINGS															
POLYURETHANE ACRYLIC LIQUID	4-5	250°	9*	9*	8	10	10	7	7	10	7	7	7	10	9
EPOXY MASTIC+	5-12	300°	7-8	7-8	7-8	7-8	7-8	7-8	7-8	7-8	7-8	7-8	7-8	7-8	7-8
HIGH TEMP LIQUID	1.5-2	1200°													
ZINC RICH PRIMER	2.8	250°	Chemical Exposure not Recommended Without a Topcoat.												
POLYESTER POWDER	1.5-3	250°	10	5											
EPOXY POWDER	1-3	200°	10	5											
THERMOPLASTIC POWDER	7-12	158°	N/A	3	7-10a	5a	5a	N/A	N/A	N/A	N/A	5a	N/A	N/A	7-10b
HIGH TEMP POWDER	2.5-3.5	1000°													
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Description of Coating Materials

Polyurethane Acrylic Liquid

Direct-to-metal (DTM). The coating is designed to provide a highly durable, high gloss, high build, one-step system suitable for non-corrosive exposures and more harsh environments. Our Polyurethane Acrylic, which can be brushed, rolled or sprayed, is formulated to provide maximum topcoat appearance and industry-leading polyurethane performance.

Epoxy Mastic

Satin gloss, high build epoxy mastic, based on amido amine modified polyamide epoxy technology. The resulting coating is designed to be highly durable and to deliver outstanding corrosion and chemical resistance. It is well-suited for caustic environments.

High Temp Liquid

a high quality, flat finish pure silicone alkyd, designed to resist temperatures up to 1,200ºF (649ºC). This coating is formulated to provide long-term protection. To achieve high temperature resistance, heat must be applied between 600ºF – 800ºF (316ºC – 427ºC) to the painted metal in order to fuse the coating to the surface. The maximum heat resistance of our High Temperature Liquid occurs only after the fusion process. Our High Temperature Liquid is designed for indoor and outdoor use with low UV exposure.

Zinc Rich Primer

A moisture-cured organic zinc-rich coating based on polyurethane technology. The resulting coating is designed to be highly durable and to deliver outstanding corrosion resistance. Our Zinc Rich Primer is intended to be used as a primer and should be topcoated.

Polyester Powder

Designed for decorative and protective end service applications where exterior durability is a requirement. Recent enhancements have provided premium durability Polyester Powders that withstand South Florida weathering exposures beyond five years. Polyester Powders provide very good chemical and solvent resistance, and scratch and mar resistance.

Epoxy Powder

Designed for general purpose decorative and protective end applications where exterior UV durability is not a requirement. Epoxy chemistries will chalk and fade upon exposure to ultraviolet rays, resulting in aesthetic changes only. Epoxy Powder is formulated to provide superior chemical and solvent resistance, and scratch and mar resistance. Epoxy Powder has a variety of formal recognitions from Underwriters Laboratories, NSF, FDA and automotive companies. In addition, epoxy is the standard chemistry for fusion bonded epoxy (FBE) coatings for pipe and rebar.

Thermoplastic Powder

Specifically designed to provide a long lasting, tough coating to mild steel, galvanized steel and aluminum used in exterior applications. It is based on an alloy of acid modified polyolefins. Thermoplastic Powder is resistant to stress cracking, adverse weather conditions, detergents, salt spray and typical airborne pollutants. The coating maintains excellent adhesion to the metal substrate without the need for a separate primer. The material also provides good abrasion and impact resistance.

High Temp Powder

A thermosetting silicone powder designed as a coating for High Heat Resistance applications. Depending on the substrate type, this coating is capable of withstanding operating temperatures of up to 1,000°F (538°C) for four hours with minimal visual change, no loss of adhesion and providing very good corrosion resistance. This coating is good for outdoor applications requiring UV resistance.

Zero Zinc Primer

Designed to provide excellent adhesion properties with the substrate and the topcoat. It is also formulated to deliver high anti-corrosion resistance to components subjected to severe environmental conditions. Zero Zinc Primer is designed for the architectural, transportation, industrial machinery and agricultural equipment markets. It is appropriate for applications requiring outstanding anti-corrosion protection with no heavy metals and all the benefits of a powder coating.

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