LIGHTING EQUIPMENT MATERIALS – CONSIDERATIONS

The choice of which price level of lighting equipment to specify and use in an industrial application inevitably leads to a thorough discussion of what type of material the fixture body or housing is constructed. The answer is, of course, tied directly to the specific requirements of the application.

As we discussed, the true costs of any constructed project must be based on measurements beyond the initial costs of purchase and installation of the lighting equipment. An integral part of a quality thought process to maximize the benefits to the facility owner must be the durability of the lighting fixture. Central to this durability is the fixture's housing.

Each of the various materials available in fixture construction for the industrial environment has its purpose. For those specialized environments in today's industrial application optimum performance is demanded for efficient, safe and economical operations. The choices generally are standard plastic, fiber gears plastic, aluminum, anodized aluminum, cold rolled steel, pre-painted steel and stainless steel.

CLEANABILITY

Mild, gentle cleaning would probably not eliminate any of the material choices on a short term basis. Standard dry cleaning or wash down would quickly begin various levels of deterioration in virtually all the choices except stainless steel. High pressure hose-down, water cleaning simply destroys the standard plastic unit and chlorinated cleaning solutions and other similar substances create another condition to consider.

CORROSION

The cleaning described above and various environments with elevated levels of relative humidity will eliminate several more of the candidates. The cold rolled steel unit will rust at a rate determined by the intensity of system. Pre-painted steel will do better but will show signs of corrosion at edges created by cutting, piercing drilling, etc., during the manufacturing process. Painted units and aluminum fixtures will show signs of oxidation which will begin the decaying process, either in terms of photometric or electrical performance. All of these types of deterioration will highlight the need for concern in the next area.

CONTAMINATION

The varying degrees of deterioration mentioned above simplify the understanding of opportunities for contamination as these pieces of equipment begin to come apart. This situation provides only an unfortunate choice among costly alternatives… reduced lighting performance, a sub-standard environment with unsafe consequences, more frequent maintenance, fixture replacement or some combination of these. Inevitable deterioration of aluminum can create other problems.

OTHER CONSIDERATIONS

Fiberglass is a form of plastic. As such, this type of fixture takes on an insulative quality. With this heat bottled inside. electrical cycling can result. This cycling can create a type of thermal shock which can subsequently result in a cracked housing. Imagine the outcome of a hose-down or contamination check on such a defective unit.

In addition, routine cleaning has a tendency to destroy the base plastic material in fiberglass. This eroding exposes glass fiber which can be a safety hazard while still on the fixture or a contamination catastrophe if allowed to fall off into a specialized process or come in contact with humans.

All of this discourse has been considering environments with normal corrosive atmospheres. Aluminum has generally low comparative resistance to a great variety of acids, bases, salts, wet gases, solvents, oils and fuels. Fiberglass's chemical resistance is better than aluminum but less than stainless steel and with fiberglass's other potential shortcomings, stainless steel often becomes the best choice.

As in every application, thorough understanding of the specific requirements of the installation will direct the user to the appropriate solution. GUTH Lighting can help in reaching that understanding.

LIGHTING EQUIPMENT MATERIALS – CORROSION RESISTANCE COMPARISON

	316	304	AL	P/P	FRP
General Outdoor	4	4	4	4	4
Marine Outdoor	4	4	3	4	4
General Industrial	4	4	3	4	4
Pure Water	4	4	4	4	4
Sea Water	4	4	2	4	4
ACIDS					
Acetic	4	4	3	4	4
Boric	4	4	4	4	4
Chromic	4	4	2	3	4
Citric	4	4	3	4	4
Fatty	4	4	4	4	4
Formic	4	3	1	4	4
Hydrochloric	1	1	1	3	3
Hydrofluoric	1	1	1	3	1
Nitric	4	4	3	3	2
Phosphoric	4	4	2	4	3
Picric	4	4	2	4	3
Sulfuric	3	2	1	4	3
Ammonium Hydroxide	4	4	3	4	4
SALTS					
Potassium Hydroxide	4	4	1	4	2
Sodium Hydroxide	4	4	1	4	2
Aluminum Sulfate	4	4	2	4	4
Ammonium Chloride	4	4	1	4	4
Ammonium Nitrate	4	4	4	4	4
Ammonium Phosphate	4	4	2	4	4
Borax	4	4	3	4	4
Copper Sulfate	4	4	1	4	4
Ferric Cloride	1	1	1	4	4
Ferric Sulfate	4	4	2	4	4
Magnesium Chloride	4	4	1	4	4
Magnesium Sulfate	4	4	3	4	4
Mercuric Chloride	2	2	1	4	4
Nickel Chloride	4	4	1	4	4
Potassium Chloride	4	4	1	4	4
Potassium Sulfate	4	4	4	4	4
Sodium Bicarbonate	4	4	3	4	4
Sodium Bisulfate	4	4	2	4	4
Sodium Chloride	4	4	2	4	4
Sodium Hypochlorite	4	3	1	4	4
Sodium Nitrate	4	4	4	4	4
Sodium Phosphate	4	4	1	4	4
Sodium Silicate	4	4	3	4	4
Sodium Sulfate	4	4	4	4	4
Sodium Thiosulfate	4	4	4	4	4
Zinc Chloride	4	4	1	4	4
Zinc Sulfate	4	4	3	4	4
Calcium Chloride	4	3	1	4	4
Sodium Carbonate	4	4	1	4	4

	316	304	AL	P/P	FRP
WET GAS					
Ammonia	4	4	4	4	4
Carbon Dioxide	4	4	4	4	4
Chlorine	4	4	1	4	4
Hydrogen Sulfide	4	4	4	4	4
Nitrogen Dioxide	4	4	2	4	4
Sulfur Dioxide	4	4	2	4	4
Carbon Disulfide	4	4	4	4	4
SOLVENTS					
Acetone	4	4	4	4	4
Benzene	4	4	4	3	4
Carbon Tetrachloride	4	4	3	3	4
Ethyl Acetate	4	4	4	4	4
Ethyl Alcohol	4	4	3	2	2
Ethyl Ether	4	4	4	4	4
Ethylene Dichloride	4	4	4	3	4
Ethylene Glycol	4	4	3	4	4
Freon	4	4	3	4	4
Methyl Alcohol	4	4	3	4	4
Methyl Ethyl Ketone	4	4	4	4	4
Methylene Chloride	4	4	4	3	4
Perchloro-Ethylene	4	4	4	3	4
Tichloro-Ethylene	4	4	4	3	4
Toluene	4	4	4	3	4
Xylene	4	4	4	3	4
OIL & FUEL					
ASTM No. 1 Oil	4	4	4	4	4
ASTM No. 3 Oil	4	4	4	4	4
Detergents	4	4	3	4	4
Gasoline	4	4	4	4	4
Grease	4	4	4	4	4
Jet Fuel	4	4	4	4	4
Hydraulic Fluid (ester)	4	4	4	4	4
Kerosene	4	4	4	4	4
Motor Oil	4	4	4	4	4

316 = 316 Stainless Steel
304 = 304 Stainless Steel
AL = Aluminum
P/P = Polyethelene
FRP = Fiberglass Reinforced Plastic

CORROSION RESISTANCE	
EXCELLENT	**4**
GOOD	**3**
FAIR	**2**
POOR	**1**