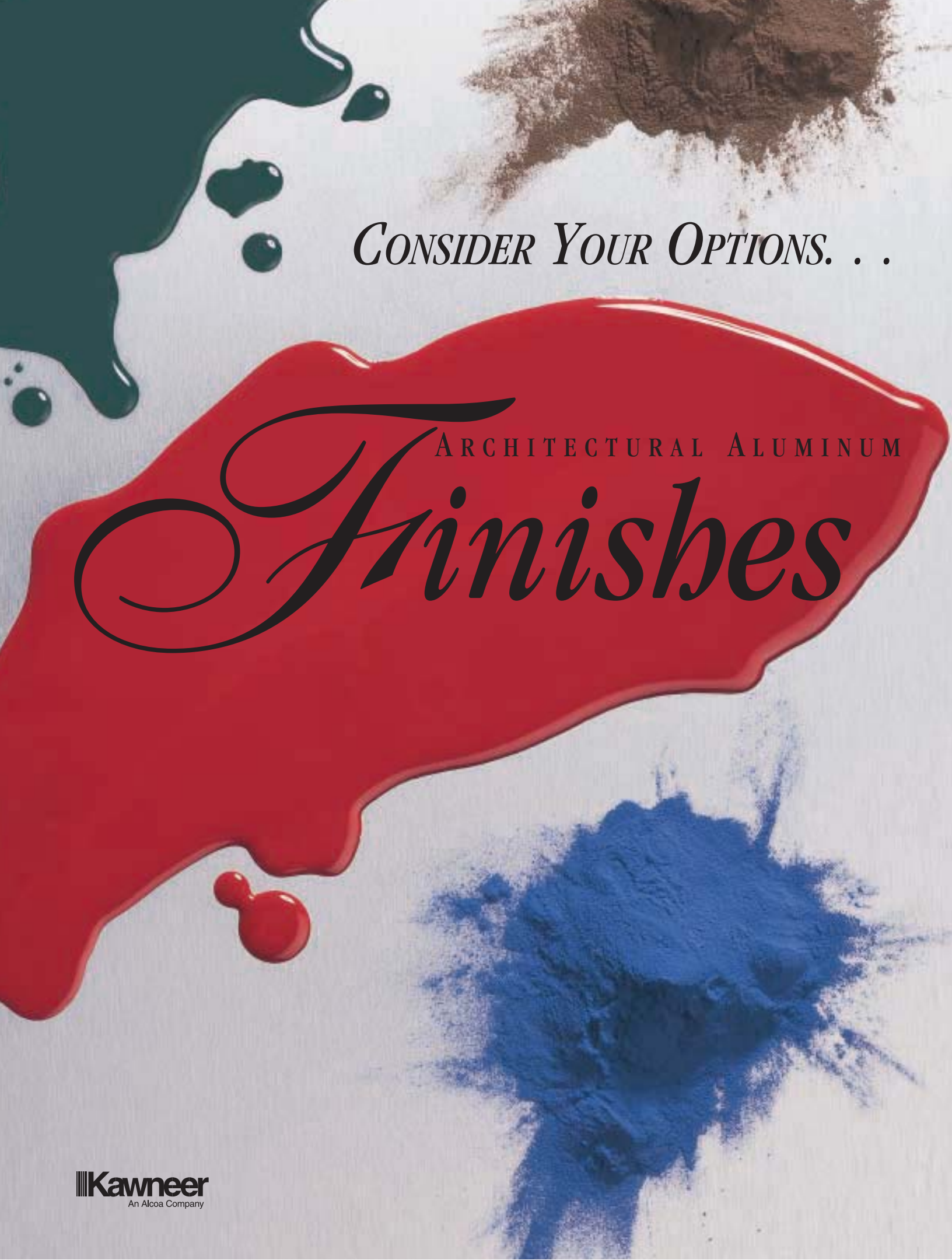

CONSIDER YOUR OPTIONS. . .
ARCHITECTURAL ALUMINUM
Finishes
Kawneer
An Alcoa Company

. . . That Enhance, Protect and Endure

The market for architectural aluminum products demands a greater variety of finish types and colors than ever before. The many reasons include:

- the competitive need to distinguish buildings
- aesthetic and design requirements
- new technology that results in higher performance and durability
- owner demands for cost effectiveness
- the need to protect the building owner's investment against the elements, pedestrian traffic and environmental contaminants
- public awareness of environmental concerns
- the increase in consumer sophistication and awareness of finish types and colors

Today's paint and powder finish types and colors challenge the anodizing processes that have dominated the architectural aluminum industry for many years. This brochure is designed to assist you in your choice of architectural aluminum finishes by presenting and reviewing the various types and explaining ways to maintain them for the longest possible life.


Painted

Market demand for a variety of colors and types has resulted in increased use of painted finishes — also known as organic coatings. Although anodizing remains the most frequently specified finish for architectural aluminum, substantial improvements in paint technology provide long-term performance and durability in a wide range of climates and environments.

Finishes
(Organic Coatings)

A comparison chart representing different types of organic coatings and their performance characteristics is included on page 13 for reference.

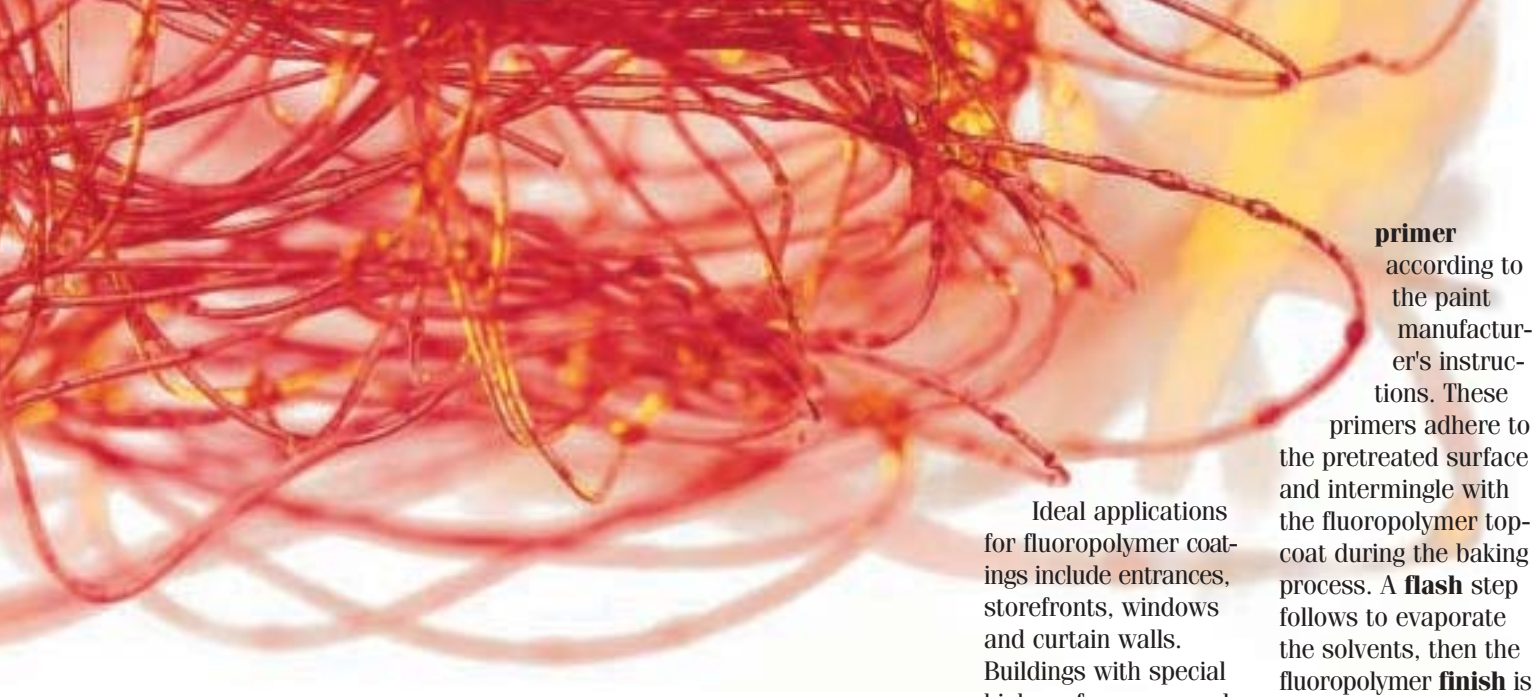
Liquid Paint

Liquid paints are typically sprayed on commercial architectural aluminum products and include acrylic, polyester and fluoropolymer. Both acrylic and polyester finishes can be modified with silicone to enhance performance.

Fluoropolymer coatings generally contain between 50 and 70 percent by weight fluoropolymer resin called polyvinylidene fluoride or PVDF. Two companies manufacture the majority of PVDF used in the United States: Elf Atochem North America, Inc., and Ausimont USA, Inc., who manufacture KYNAR 500® and HYLAR 5000™, respectively. These resin manufacturers allow paint manufacturers to use the Kynar 500 and Hylar 5000 brand names only if they incorporate a minimum of 70 percent by volume weight into the paint system. Pigment is then added to provide color.

(Left) Reciprocating paint spray gun

(Far left) Bone White Painted Finish
Center for Environmental Sciences and Technology Management (CESTM), State University of New York (SUNY) at Albany, New York
Architect: Cannon & Associates, Grand Island, New York



Performance

Kawneer's 50 percent fluoropolymer paint systems meet the AAMA 2604 paint specification for high performance while the 70 percent fluoropolymer finishes also meet the superior performance of the AAMA 2605 specification (see pages 6-7). Both paint systems provide low gloss color with high performance and durability. For this reason, Kawneer and other high quality architectural aluminum product manufacturers recommend the use of fluoropolymer coatings.

When fluoropolymer finishes are baked, the resin particles, which look like balls of spaghetti, melt, uncoil and intermingle. Upon leaving the bake oven, the painted material is still "wet." Once cool, it forms a continuous, physically locked finish.

Fluoropolymer paints are extremely durable because the PVDF resin is essentially chemically inert. Modifiers must be added to give the fluoropolymer the required adhesion properties. A formulation based on 70 percent fluoropolymer resin has been found to give the optimum mixture for proper adhesion characteristics and weatherability. Textured "metallic" flake fluoropolymer finishes add increased performance and durability.

The cost of fluoropolymer paints will vary depending upon the color selected. Standard colors provided by most manufacturers will generally be considerably less expensive than custom colors. Typically, fluoropolymer paint systems require a primer and some utilize as many as three or four coats, including barrier and clear coats.

Ideal applications for fluoropolymer coatings include entrances, storefronts, windows and curtain walls. Buildings with special high performance and durability needs such as monumental projects with severe exposure to the sun's UV rays are ideal candidates for fluoropolymer finishes. For high traffic areas, textured metallic finishes and fluoropolymer coatings with greater pencil hardness provide increased abrasion resistance and toughness.

(For more specific performance information, see our separate Fluropon®, Permadize® and Acroflur™ color cards)

Application

To apply fluoropolymer finishes during the manufacturing process, at least six steps are necessary (see diagram below). First, a multi-stage chemical pretreatment produces a surface with a chemical conversion coating to **clean** the metal, promote primer adhesion and provide corrosion resistance. Second, the aluminum is coated with an acrylic or epoxy **primer** according to the paint manufacturer's instructions. These primers adhere to the pretreated surface and intermingle with the fluoropolymer topcoat during the baking process. A **flash** step follows to evaporate the solvents, then the fluoropolymer **finish** is sprayed on to the aluminum. Another **flash** procedure is followed by **baking** for approximately 10 minutes until the aluminum surface reaches a temperature of 450 ºF. Additional clear fluoropolymer **topcoat**, **flash** and **bake** steps are optional.

A clear topcoat may be necessary when the material is painted with certain "metallic" flake fluoropolymer coatings. The clear topcoat seals in the metallic flakes and prevents them from corroding. Kawneer also recommends a clear topcoat application for storefront framing and entrance areas where the finish may be physically abused by pedestrian traffic or where exotic pigments are used. It is important to note that there may be a slight color difference when applying clear coat to light colored pigments such as Bone White.

Clean ➤ Primer ➤ Flash ➤ Finish ➤ Flash ➤ Bake

(Optional)
Topcoat ➤ Flash ➤ Bake

Powder Coatings

Sometimes known as "dry paint," Powder Coatings are solvent free and emit no volatile organic chemicals (VOCs) into the atmosphere. These environmentally friendly "green" powder paint systems require less energy to apply and reduce waste in application as overspray can be reclaimed and reused.

Like liquid paint systems, powder paint systems are applied electrostatically to the metal substrate. Powder paints may incorporate TGIC (triglycidyl isocyanurate), polyester, acrylic, fluoropolymer or epoxy for additional performance and durability.

Performance

There are new polymer systems that allow some powder coatings to meet the performance requirements of the AAMA 2604 specification. Many also comply with most environmental regulations imposed by governments recognizing the need to preserve natural resources by imposing stricter safety and emission regulations. Powder coatings provide the solution to environmental concerns while offering high performance, durability and a wide variety of colors.

Some powder coatings demonstrate very good color retention and provide optimal corrosion resistance. Excellent durability, mechanical properties and abrasion resistance make these coatings ideal for high traffic entrances and storefront framing. Standard offerings may be available in a variety of gloss levels.

(For more specific performance information, see our separate **Interpon® D2000** color card.)

Application

Powder Coatings are applied in a similar manner to fluoropolymer paints with a few exceptions: a primer is usually not required, the flash steps are eliminated since these coatings contain no solvents and the finish cures at lower oven temperatures.

Clean ➤ Finish ➤ Bake

Pre-treatment cleaning processes

Specifications - Painted Finishes

The American Architectural Manufacturers Association (AAMA) has developed three specifications to assist in the selection of an organic coating for a given application:

AAMA 2603 - *Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.*

This specification is intended for paints that are applied to a large variety of products, including residential sliding doors, storm doors, siding and light commercial applications.

AAMA 2604 - *Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Architectural Extrusions and Panels.*

This specification covers high performance organic coatings, which are used on exterior architectural products manufactured by Kawneer and other manufacturers of high quality products.

AAMA 2605 - *Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.*

This specification covers superior performance organic coatings which are used on exterior architectural products manufactured by Kawneer and other manufacturers of high quality products.

The chart highlights important differences between these three specifications:

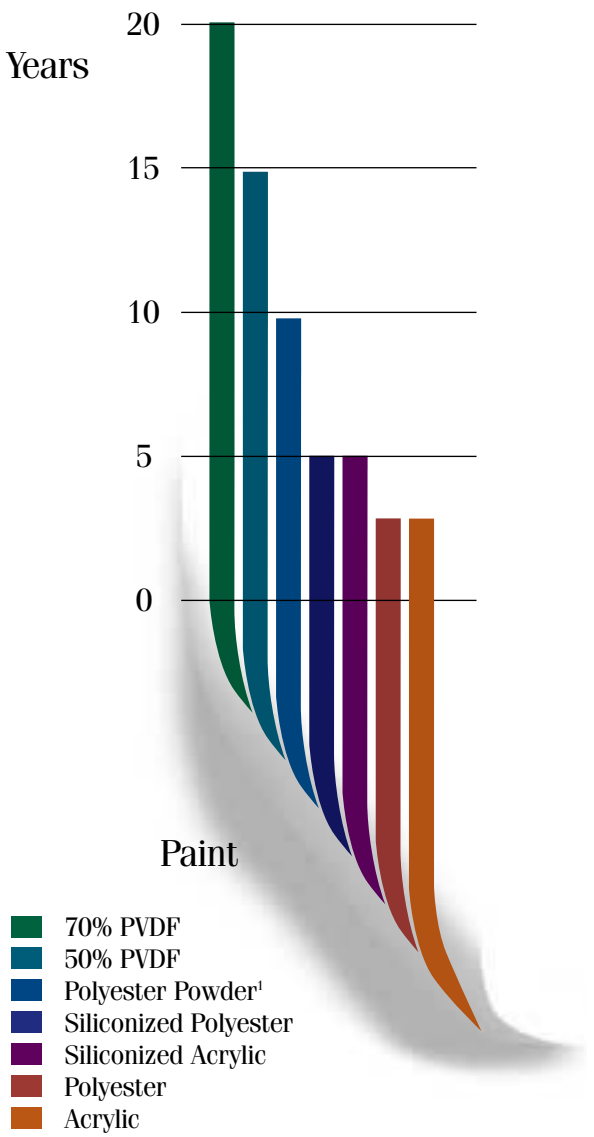
Testing thickness and color quality of painted finish

Criteria	AAMA 2603	AAMA 2604	AAMA 2605
Minimum Coating Thickness	.8 mils	1.2 mils	1.2 mils
Pre-treatment	None required	Multi-stage cleaning with chemical conversion coating 30mg/ft² min.	Multi-Stage cleaning with Chrome Phosphate conversion coating 40mg/ft² min.
Abrasion Resistance	No requirements	Falling sand test - Abrasion coefficient of 20 min.	Falling sand test - Abrasion coefficient of 40 min.
Chemical Resistance	Muriatic Acid/Mortar Resistance Test	Muriatic Acid/Mortar Resistance/Nitric Acid Fumes Test	Muriatic Acid/Mortar Resistance/Nitric Acid Fumes Test
Color Retention	1 year South Florida exposure	5 years South Florida exposure (Max 5Δ E)	10 years South Florida exposure (Max 5Δ E)
Gloss Retention	No requirements	Minimum of 30% after 5 years, South Florida exposure	Minimum of 50% after 5 years, South Florida exposure
Corrosion Resistance	1,500 hr. Humidity/ Salt Spray	3,000 hr. Humidity/ Salt Spray	4,000 hr. Humidity/ Salt Spray
Chalking Resistance	No requirements	No more than #8	No more than #8 for colors (#6 for Whites)
Film Adhesion	Dry Adhesion/ Wet Adhesion	Dry Adhesion/ Wet Adhesion/ Boiling Water Adhesion	Dry Adhesion/ Wet Adhesion/ Boiling Water Adhesion
Erosion Resistance	No requirements	Less than 10% after 5 years, South Florida exposure	Less than 10% after 5 years, South Florida exposure

For further information or for abbreviated specification suggestions for painted finishes, contact your Kawneer regional sales office or your local representative.

Banner Red Painted Finish
Just for Feet, Fort Lauderdale, Fla.
Architect: Mark L. Saltz Architects, Inc., Fort Lauderdale, Fla.

Comparative Performance - Chalk & Color Retention*



* Chalk and color retention performance varies considerably depending on paint type, pigment, building location and maintenance of the finish.

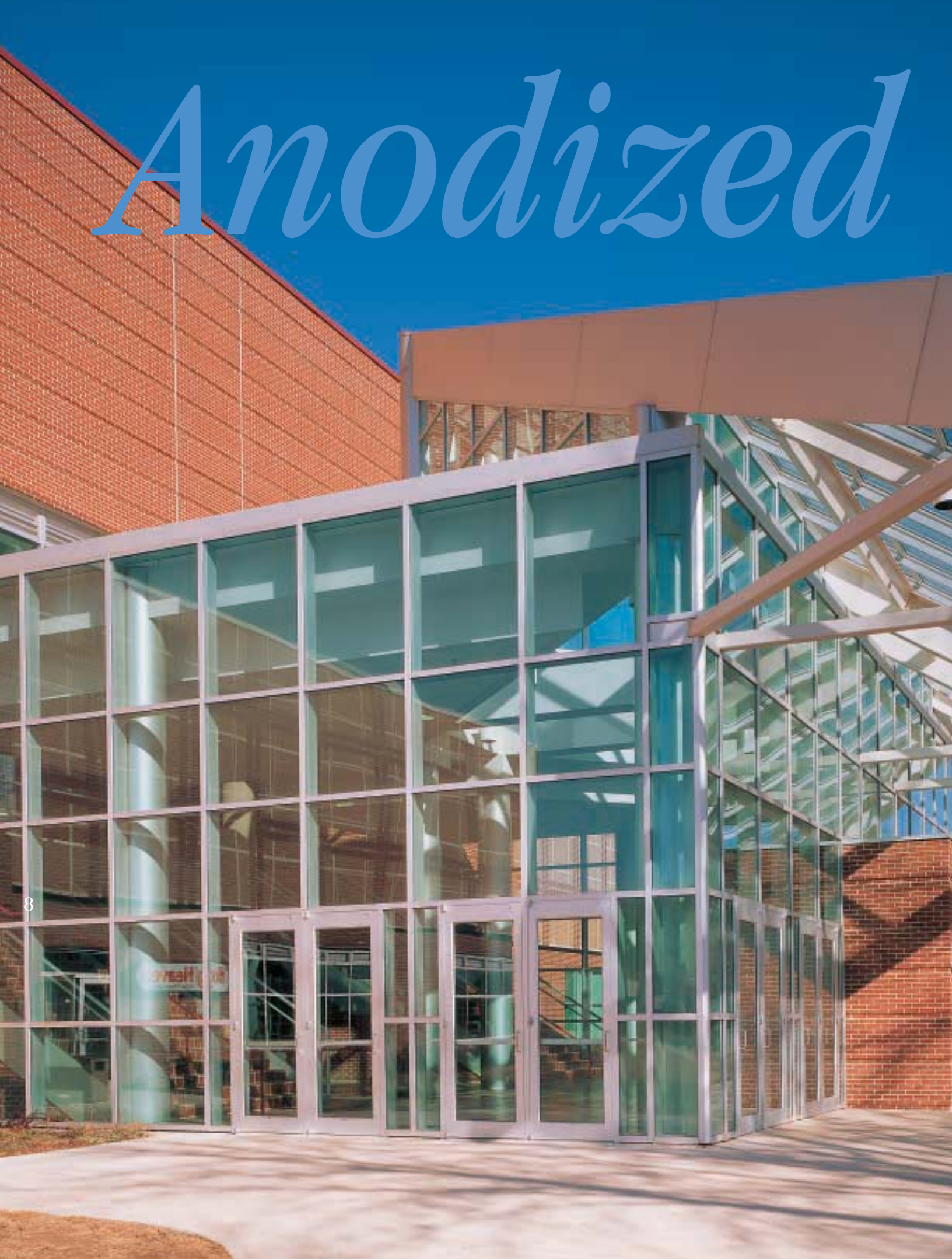
This chart represents an overall comparison only of chalk and color retention based on the limits specified within AAMA 2605.

White and light pigmented colors of some lower cost paint finishes may exceed these values. High performance PVDF coatings of certain pigments or multiple coats may also exceed these values.

For more specific performance data and warranty information, consult your paint manufacturer.

[1] Polyester Powder that meets AAMA 2605.

Anodized



Finishes

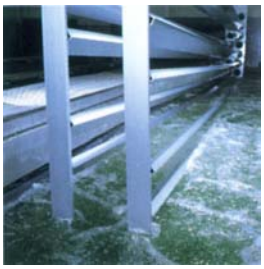
Anodizing is a general term that describes the process of converting the surface of aluminum to aluminum oxide. Under carefully controlled conditions, anodizing produces a uniform oxide coating that is two to 500 times thicker than that produced by natural oxidation which results in a very thin, blotchy finish.

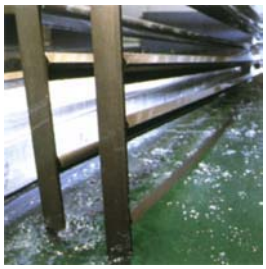
Performance

Controlled anodizing produces a coating that protects aluminum from the environment. It is a long-lasting and proven coating that resists scratching, abrasion and corrosion from marine or industrial atmospheres and provides excellent protection from the sun's damaging ultraviolet rays.

Production Process

Controlled Anodizing requires several operations where aluminum is moved in and out of tanks carrying chemical baths and rinses:





1. A non-etching cleaner removes soil and other organic deposits from the metal.
2. Caustic soda etches the aluminum, removing a thin layer of metal and eliminating imperfections from the surface while reducing the shine. The etching process by itself provides no protection.
3. The aluminum is placed into a solution of acid and water (the electrolyte) and an electrical current is passed through, causing the water molecules to separate into hydrogen and oxygen. Aluminum has an affinity for oxygen and quickly combines to form a layer of aluminum oxide. The length of time the aluminum is submerged, the temperature of the solution, the chemical concentration and the electrical current all control the thickness of the coating to produce a Class I or Class II finish.

Clear Anodized Finish
Bud Walton Arena, University of Arkansas, Fayetteville, Ark.
Architect: Rosser International, Atlanta, Ga., in association with Mott Mobley McGowan & Griffin, PA; Architects, Fort Smith, Ark.

Loading racks for the anodizing tank

Aluminum extrusions are lowered into the anodizing tank

4. Finally, the finish must be sealed to close the "pores" produced in the anodizing process — an extremely important step that prevents foreign matter from entering the base metal and causing corrosion or staining.

Integral Color Anodizing vs. Electrolytically Deposited Color

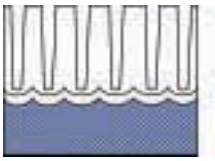
Integral color anodizing is a process in which colors are part of the aluminum oxide coating process. Colors are not added but develop from alloying elements which are already present in the aluminum.

The integral color anodizing process utilizes a different acid solution from that used in clear anodizing. The processing time and density of the electrical current are also significantly different. Depending upon the alloy, the electrolyte and the process used, colors in various shades of bronze to black can be obtained.

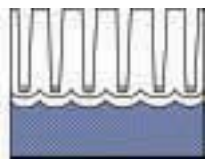
The electrolytically deposited two-step color process is the most widely used for anodizing in the United States. The process produces colors and performance characteristics similar to those produced by the integral color anodizing process. The first step uses the same acid electrolyte as the clear finish, resulting in the same colorless oxide coating that is thick, dense and hard. The second step involves submerging the aluminum into a color tank where stable metallic compounds are electrolytically deposited at the base of the "pores" created in the previously formed oxide coating. A range of bronze colors from champagne to dark bronze and black are produced by this method.

In the production of colored anodic coatings, some variation of color is unavoidable. Whether produced by the integral color or two-step process, some slight color differences will occur among the pieces on a load and from one batch to another because of process variables. It is important that this be recognized as a characteristic of anodized finishes, so that the material can be arranged on the job to accommodate the slight color variations and even enhance appearance.

Two-Step Oxide Coating



1 - Electrolyte solution coating.



2 - Color added to bottom of coating pores.

The Importance of Class I or Class II Designations

The designations Architectural Class I and Class II provide the best means of identifying anodized finish thickness, the most important attribute of good finish quality. Other commercial terms can represent any coating thickness and, therefore, any quality level. They only have real meaning when coupled with "Class I" and "Class II" designations.

For the best finish performance, Kawneer strongly recommends an architectural Class I designation for integral color and electrolytically deposited coatings. This thicker coating is less susceptible to weathering and more resistant to corrosion and scratching than the Architectural Class II color coatings. Thus, Kawneer's Permanodic® Class I process provides the ultimate anodized finish.

Designations for Anodized Finishes

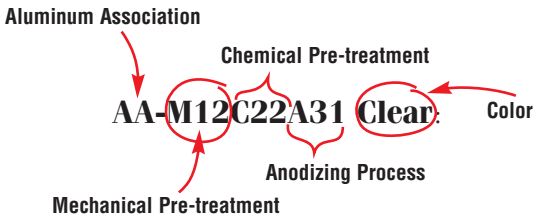
Kawneer and the majority of the architectural aluminum industry recognize the Aluminum Association designation system for aluminum finishes. This system is a general description of anodized coatings produced in all industries. For example, four of Kawneer's standard finishes are designated:

#14 Clear AA-M12C22A41
#17 Clear AA-M12C22A31
#29 Black AA-M12C22A44
#40 Dark Bronze
AA-M12C22A44

Other finishes, such as #18 Champagne, #26 Light Bronze and #28 Medium Bronze (AA-M12C22A44) are available as special orders.

Designations Explained:

- The first two letters refer to the Aluminum Association.
- The letter "**M**" and two numbers indicate what type of mechanical pre-treatment, if any, is used. M12 means no mechanical finishing is done. Mechanical finishing before anodizing is sometimes done to eliminate the surface defects produced by poor extrusion practices. Kawneer carefully maintains extrusion practices so that these defects do not occur.
- The "**C**" followed by two numbers indicate what type of chemical pre-treatment is used. C22 means that the surface is chemically etched to a medium-matte appearance.
- The letter "**A**" followed by two numbers indicates the general anodizing process used. For example, A31 means a clear Class II coating. A41 is a clear Class I coating.
- These colors should be followed by the color desired, e.g. Dark Bronze.



Specifications — Anodized Finishes

The AAMA has developed a specification to provide performance criteria as well as assist in the selection of an anodized coating for a given application:

AAMA 611 — Voluntary Standards for Anodized Architectural Aluminum.

Class I — High performance anodic finishes used in exterior applications receiving periodic maintenance, such as curtain walls.

Class II — commercial anodic finish used in interior applications or exterior applications receiving regularly scheduled cleaning and maintenance such as storefronts.

The table (left) shows properties and performance for Class I and Class II anodized finishes.

Organic Dyes

Color can also be obtained through the use of organic dyes. In this process, the die is absorbed into the pores of an unsealed anodic coating. Various shades of red, yellow, blue and green are possible. However, many of these colors are not light fast and may fade unevenly depending upon the exposure of different sides of a building. The side exposed to the sun's ultraviolet rays will fade more than the others. Since the color is contained near the surface of the oxide coating, it can be more susceptible to abrasion and weathering. Thus, the process is more appropriate for interior work or for trim on household appliances and has not been widely used for architectural aluminum products requiring long-term color retention and performance.

Criteria	Class II Anodized Finish	Class I Anodized Finish
Oxide Coating Thickness	0.4 to 0.7 mil	Minimum of 0.7 mil
Oxide Coating Weight	2.40 mg/cm^2	4.18 mg/cm^2
Apparent Density	2.32 g/cm^3	2/32g/cm^3
Abrasion Resistance	Not degraded by abrasive paper	Not degraded by abrasive paper
Corrosion Resistance	1,000 hours	3,000 hours
Weathering	5 years, South Florida exposure	5 years, South Florida exposure
Seal Test	Minimum weight loss 40 mg/dm^3	Minimum weight loss 40 mg/dm^3

For further information or for an abbreviated specification suggestion for anodized finishes, contact your Kawneer regional sales office or local representative.

Quick

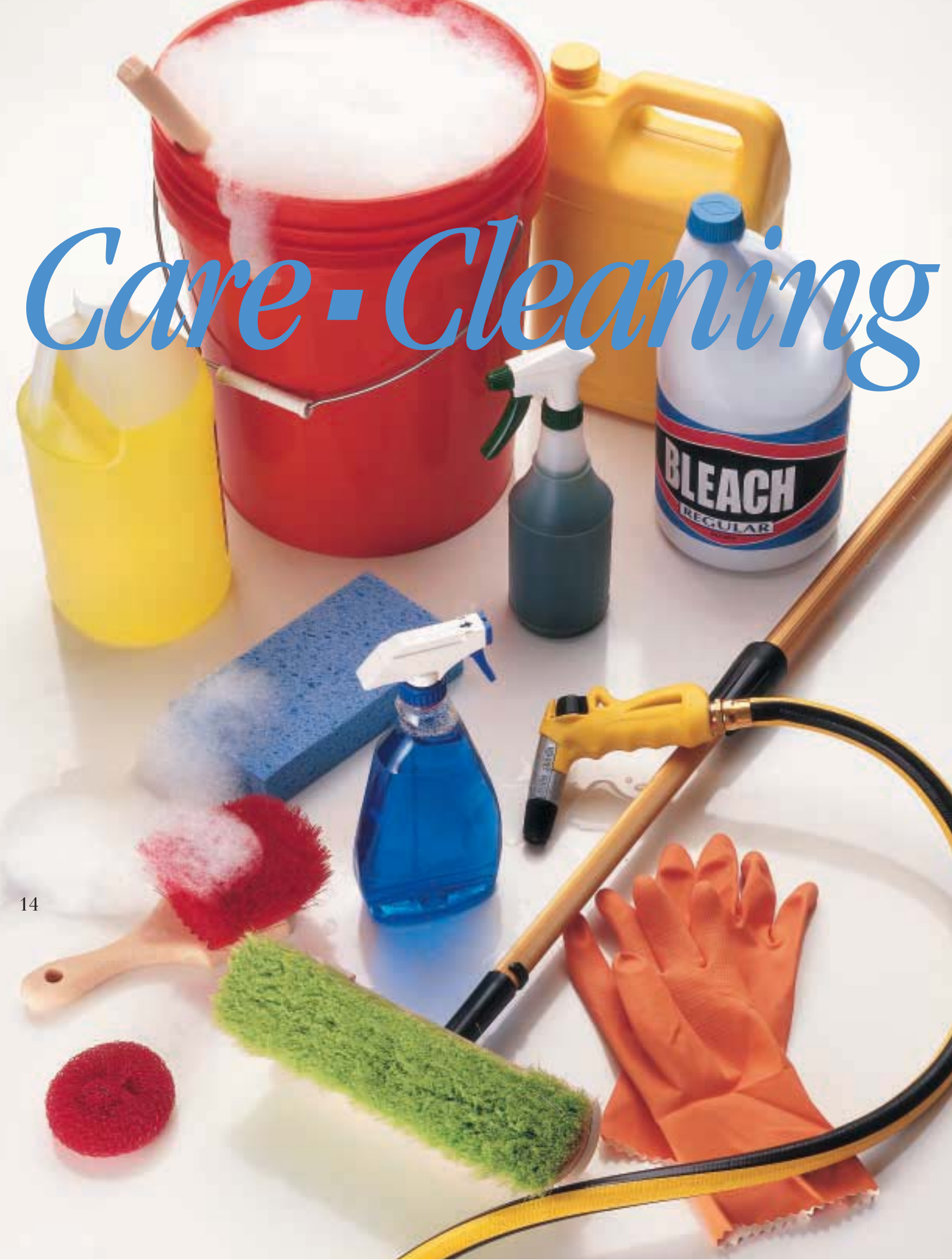
Guide

	70% Fluoropolymer (PVDF) p.3-4	**50% Fluoropolymer** (PVDF) p.3-4	**Powder** p.5	**Anodized** p.9-11
Some Typical Applications	*Monumental/ high performance:* Curtain wall and architectural window applications such as high-rise offices, commercial bldgs., hospitals, universities, etc.	*Non-monumental Projects:* Heavy commercial windows, curtain wall, storefronts & entrance projects, such as shopping centers, low-rise commercial bldgs., schools, etc.	*Environmentally friendly, non-monumental:* Storefront & entrance projects Shopping centers, low-rise commercial bldgs., schools, etc.	*Any high or low-rise application that includes curtain wall, storefronts, entrances or windows.*
Characteristics	Superior color and gloss retention, corrosion resistance and color range.* Meets superior paint performance level of AAMA 2605. p.6 "Soft" paint can scratch or mar more easily than 50% paints or anodizing.	A harder, more durable finish than 70%. Reduces scratches & marring near high traffic entrances. Meets high performance level of AAMA 2604. p.6. Metallic particle option provides increased abrasion resistance. Slightly less color & gloss retention than 70%. Limited in some vivid (red) colors compared to 70%* Limited to more earth tones and pastel colors.*	Environmentally friendly & solvent free. Offers superior abrasion resistance to 50% or 70% fluropolymer paints. Full range of colors available.* Meets high performance of AAMA 2604. p.6 Slightly less color & gloss retention than 70%. Custom shades available subject to technical approval.	Superior surface hardness, abrasion resistance & scratch resistance compared to any other coating. Will not peel or chalk. Inorganic coating is an integral part of the aluminum. Meets AAMA 611. p.11 Limited color selections (clear, black and bronzes).* Poor resistance to alkaline & acid.
*Color Selections**	✔✔✔✔	✔✔✔	✔✔✔	✔✔
Color Retention	✔✔✔✔	✔✔✔	✔✔✔	✔✔✔✔
Abrasion Resistance	✔	✔✔	✔✔✔	✔✔✔✔
Environmental Impact	✔	✔✔	✔✔✔✔ *p.5, 23*	✔✔✔✔
Alkaline/Acid Resistance	✔✔✔✔	✔✔✔	✔✔✔✔	✔
Uniformity Of Finish	✔✔✔✔	✔✔✔✔	✔✔✔✔	✔✔✔
Cost	$ $ $ $	$ $ $	$ $ $	$ $

* Please see Kawneer paint color cards or anodized samples for colors and detailed performance information.

Clear Anodized Finish
Harley-Davidson Motor Company, Wauwatosa, Wis.
Architect: Klein-Dickert Milwaukee, Inc., Pewaukee, Wis.

Care - Cleaning



Inspection

Whether painted or anodized, architectural aluminum finishes require care before, during and after installation. Both types of finishes are resistant to corrosion, discoloration and wear. However, harsh chemicals, abuse or neglect can mar aesthetics. In addition, all exterior surfaces collect varying amounts of soil and dirt, depending upon geographic area, environmental conditions, finish and building elevation. Periodic maintenance inhibits long-term accumulation of soil, which can accelerate weathering of finishes. Frequent cleaning of finished aluminum that is exposed to harsh marine environments is particularly important.

For efficiency and economy, glass and aluminum cleaning should be scheduled at the same time. It is recommended that cleaning of the architectural aluminum be scheduled at least annually and possibly more frequently, depending upon:

- Geographic area
- Industrial vs. rural location
- Rainfall
- Foggy or coastal regions where condensation and drying cycles create atmospheric salt and dirt deposits
- Recessed or sheltered areas lacking rainfall and encouraging condensation that increases soil adhesion

General Cleaning - Painted and Anodized Finishes

Certain precautions must be taken when cleaning painted and anodized surfaces:

- Select the appropriate cleaning method after identifying the finish.
- Do not use abrasive household cleaners or materials like steel wool or hard brushes that can wear and harm finishes.
- Excessive abrasive rubbing should not be used since it can damage the finish
- Avoid drips and splashes and remove run-downs as quickly as possible.
- Consider the effects of run-downs on shrubbery, personnel and equipment and schedule cleaning appropriately.
- Strong cleaners should not be used on window glass and other components where they might come into contact with the aluminum.
- Avoid temperature extremes which can accelerate chemical reactions, evaporate or strengthen cleaning solutions, cause streaking, staining or blotching.
- Do not mix cleaners or substitute a heavy-duty cleaner for a safer, milder cleaner.
- Never use paint removers or aggressive alkaline, acid or abrasive cleaners.
- Always do a test on a small area first and follow manufacturers recommendations for mixing and diluting cleaners.
- Make sure cloths, sponges and cleaning equipment are grit-free.

Cleaning procedures to remove construction or accumulated environmental soils and discoloration should be initiated as soon as possible. Mortar, cement and other alkaline materials will quickly corrode anodic coatings if allowed to dry on the metal surface. Cleaning should start at the top of the building and proceed to the ground level in a continuous drop the width of the stage or scaffolding. The type of procedure depends upon the degree of soiling.

Removal of Light Surface Soil

Trial and error testing employing progressively stronger cleaning procedures can determine which method will be most effective:

- A forceful water rinse should create initial surface agitation.
- If soil is still present after air drying the surface, scrubbing with a soft brush or sponge and concurrent spraying with water should be attempted.
- A 5 percent solution of industrial or commercial detergent and water should be applied with soft brushes, sponges or cloth using uniform alternate horizontal and vertical motion. Detergent should be safe for bare hands — stronger detergents should be spot tested.
- After washing, the surface should be rinsed thoroughly with clean water and allowed to dry. Do not allow detergent solution to dry on aluminum.
- Cleaner run-down should be minimized and rinsed immediately
- A thorough rinse should remove solution from joints, crevices and surfaces
- If it is necessary to remove oil, wax, polish or similar materials *from anodized finishes*, MEK, mineral spirits or an equivalent solvent is recommended. *(See cautions † listed under "Removal of Non-Water Soluble Deposits," page 18)*

Painted Finishes

Removal of Stains

▪ Sodium hypocholorite solution (laundry bleach, Clorox) may assist in removing certain stains from painted finishes.

▪ Hydrochloric acid, or 10 percent muriatic acid, diluted with 10 volumes of water, may assist in removing rust or alkali mortar stains from Fluropon® or Duranar® surfaces.

▪ Limit contact to 5 minutes. *Caution: acid solutions are corrosive and toxic. Flush all surfaces with water immediately after use.*

▪ Ascetic acid (vinegar) or oxalic acid solutions may be used for the same purpose. *Flush with water.*

▪ *Anodized surfaces should not be washed with acidic or caustic solutions.*

Mildew Removal

Remove mildew from painted aluminum finishes with a basic solution of:

1/3 cup detergent
2/3 cup trisodium phosphate (TSP)
1 quart sodium hypochlorite, 5% solution (bleach)

Rinse with clear water immediately.

Anodized Finishes

Removal of Stains

Once all the general cleaning procedures have been exhausted, cleaning with an abrasive pad soaked in clean water or a mild detergent cleaner may be tried:

▪ Using uniform pressure, hand scrub the metal surface using a palm size nylon cleaning pad. Thoroughly wet with clean water and a mild detergent cleaner or pumice powder. Start at the top and work down, rubbing in the direction of the metal grain.

▪ After scrubbing, the surface should be rinsed thoroughly with clean water or wiped with solvent to remove all residue.

▪ The surface should then be air dried or wiped dry with a chamois, squeegee or lint-free cloth, particularly if cleaner has dried on the surface.

▪ A power cleaning tool, such as an air-driven reciprocating machine fitted with cleaning pads, may be necessary for removal of unusually heavy soils. During this operation, the surface being cleaned must be continually wetted with clean water or a mild detergent cleaning solution to provide lubrication and a medium for carrying away the dirt. The machine should move in alternate vertical and horizontal strokes.

▪ After machine scrubbing, the area must be rinsed and thoroughly scrubbed again with a stiff bristle brush. A final rinse completes the operation and the cleaned surface is allowed to air dry or is wiped dry. It is important to remove promptly cleaner run-down on uncleaned surfaces to avoid staining.

Removal of Non-Water Soluble Deposits

†Solvents may be used to remove non-water soluble deposits such as tar, grease, oil, paint and graffiti. However, extreme care should be used when using solvents on painted surfaces. Many solvents will reduce the gloss level of painted finishes and, if allowed to remain on the finish for more than a few minutes, may soften the paint and damage the coating. It is suggested that the painted area that comes into contact with the solvent be limited as much as possible.

†Extreme care must be exercised when solvents are used since they may damage organic sealants, gaskets and finishes. Solvents should never be used on anodic finishes protected by clear organic coatings, such as lacquer, unless the organic coating has deteriorated and is to be removed. Organic solvents should be used only in accordance with manufacturers' safety recommendations.

†Most organic solvents are flammable and/or toxic and must be handled accordingly. Avoid open flames, sparks and electrical motors and use adequate ventilation, protective clothing and goggles.

Removal of Non-Water Soluble Deposits

Alcohols	Petroleum Solvents	Aromatic and Chlorinated	Ketones, Esters and Lacquer Thinner	Acetone Paint Remover
Denatured (ethanol) Isopropyl (rubbing)	VM&P Naphtha Mineral Spirits Turpentine (wood or gum spirits)	Xytol (Xylene) Toluol (Toluene)	Methyl Ethyl Ketone (MEK) Methyl Isobutyl Ketone (MIBK) Ethyl Acetate (nail polish remover) Butyl Acetate Lacquer Thinner	Acetones Paint removers
Cautions				
†Use with care. See cautions above.	*†Use with care. See cautions above.*	*†Use with care. See cautions above.* *These solvents should be used with caution on painted surfaces and limited to a maximum of five minutes exposure. A test should be carried out before using them.*	*†Use with care. See cautions above.* *Use with extreme caution on painted surfaces. Contact should be limited to a maximum of one minute and a test should be carried out prior to use. Manufacturers are not responsible for damage from unrestricted use.*	*These should **NOT** be used on painted surfaces.*

Silver Painted Finish
Shanghai Securities Exchange, Shanghai, China
Architect: The Webb Zerafa Menkes Housden Partnership (WZMH), Canada

Protective Coatings

Architectural aluminum products should be protected from damage at the job site during and following installation. Cement, plaster, terrazzo, and alkaline and acid-based materials used to clean masonry are very harmful to finishes and should be removed with water and mild soap immediately or permanent staining may occur. Examples of protective coatings include:

Lacquer

It is possible to apply a clear lacquer coating to the surface of anodized aluminum. Although this coating provides additional temporary protection against corrosive chemical attack, this finish has many weaknesses:

- Lacquer changes the appearance of anodized finishes and can accentuate color variations.
- The glossy surface destroys the effect of different colors from different angles, which is often desirable with integral and two-step color.
- The surface appears painted rather than anodized.
- The coat is never completely uniform and as it weathers away, thinly coated areas become bare first, causing a blotchy appearance.
- Adhesion is not perfect and numerous, small white areas appear where there is loss of adhesion, resulting in an unattractive appearance.

Strippable Plastic

Available for years, strippable plastics have not improved sufficiently for general architectural use:

- Most of the materials are polyvinyl-chloride based; they are designed with cohesive strength but very low adhesive strength.
- It is difficult to obtain adequate and uniform thickness and as the film becomes thin, the cohesive strength decreases while the adhesive strength increases.
- Prolonged exposure to the sun tends to make the vinyl film brittle and make it tenacious.
- Thin coatings have to be removed in small pieces.
- Thick coatings are likely to loosen with handling and tend to peel off prematurely.
- When properly applied, these coatings provide good protection, but they are expensive to apply and to remove.

In the light of the disadvantages encountered with the use of protective coatings, Kawneer does not recommend their use for most architectural aluminum product applications. It is suggested that a barrier such as Visqueen be installed around the aluminum to protect it from other construction trades.

Insulating Coatings

When aluminum is attached directly to steel or other metals, a coating should be applied to serve as an insulator between the two different metals. The most common coating is zinc-based primer, which should be applied to the steel or other metal rather than to the aluminum. Zinc pigment provides cathodic protection for the coated metal and the formulation used depends on the vehicle and solvent system.

Where aluminum is installed with direct contact with uncured concrete plaster or other alkaline material, it is advisable to apply a coating to the aluminum to protect it from corrosion. Zinc and clear lacquer are often used for this purpose.

Bituminous paint is also used for insulation. It is an inexpensive asphalt or coal tar derivative with excellent resistance to water as well as salts, acids and alkalines that depend upon water as a carrier for ionization. The low cost encourages users to employ a thick coating which acts as an insulation barrier against galvanic action.

Bituminous paint is readily dissolved by almost any organic solvent, such as gasoline, lacquer thinner, turpentine, kerosene, etc.

Rework Procedures for Painted Finishes

There are currently no set rework procedures for all of the possible situations that arise. Whenever reworking on the surface exposes the aluminum substrate, it is safe to assume the pre-treatment of that area no longer exists and special considerations are in order. When bare aluminum has not been exposed, recoating is generally satisfactory. Touch-up enamel is intended only for scratches and minor defects. If extensive areas need to be replaced or repainted, contact the aluminum manufacturer.

Field Touch-Up Procedures for Painted Finishes

(1) Surface Preparation

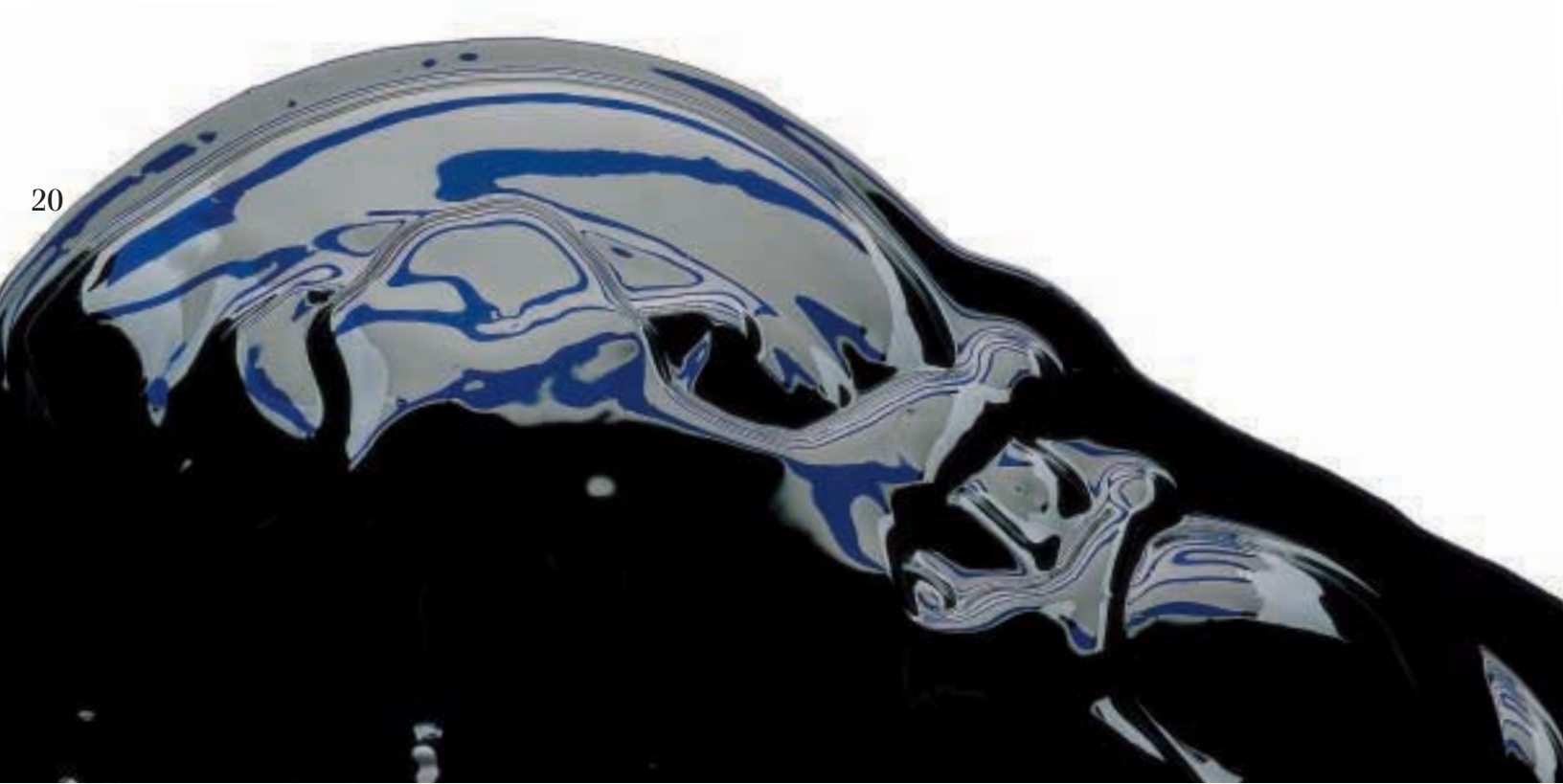
a. Surface must be clean, dry and free of foreign contaminants

b. Lightly scuff and sand surface to be recoated, feathering edges at the damaged area

c. Remove sanding dust and other contaminants with solvent dampened lint-free cloth or use tack cloths

d. Areas of bare aluminum must be pretreated with conversion coatings such as Amchems Alumiprep #33 and Alodine 1201, according to label directions given by the manufacturer

e. Immediately prime any bare aluminum with approved component wash primer. Follow label directions closely.



(2) Application of the Air Dry Touch-Up Enamel

a. Ambient air temperatures and surface temperatures should be above 50°F for application of the paint and for a reasonable length of the initial drying period (24 hours minimum).

b. Application is usually made with air spray equipment. Rolling and brushing does not provide a smooth film due to the drying speed of the touch-up type coatings, although rolling or brushing is possible for small scratches or minor defects.

c. A multiple light pass technique to slowly build to the desired 1.0 mil minimum film thickness is recommended.

(3) Touch-Up Product Reduction

Follow specific instructions for the paint product being used.

Hartford Mist "Metallic" Painted Finish
Park Meadows, Denver, Colo.
Architect: Anthony Belluschi Architects, Chicago, Ill.

Inspection

It is recommended that the building owner or manager provide an engineer or other qualified representative to inspect cleaning work on anodized and painted finishes. Care should be taken to see that metal, seams, crevices, sills and other areas that may trap water, cleaner or dirt are clean and dry. A final inspection is recommended to ensure that no discoloration or stains remain on the surface.

Reference Publications

Recognizing the need for the aluminum industry to provide information on the care and maintenance of exterior wall finishes, the AAMA has released a two publications:

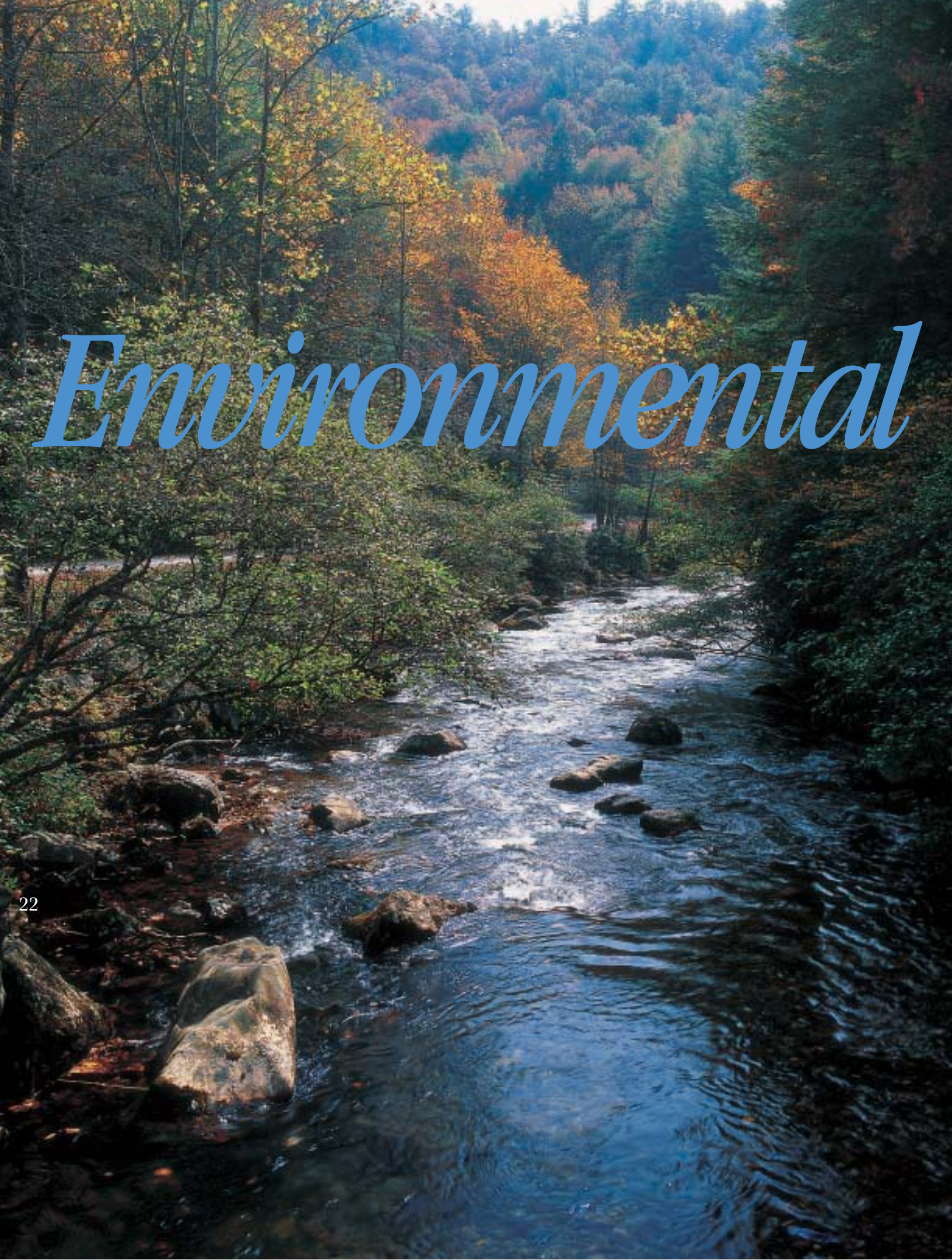
AAMA 609, Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.

AAMA 610, Voluntary Guide Specification for Cleaning and Maintenance of Painted Aluminum Extrusions and Curtain Wall Panels.

These specifications have been summarized in this brochure and outline methods, equipment and materials to clean painted and anodized aluminum after construction and for subsequent, periodic maintenance. The information provided is useful to building owners, managers, architects, contractors and others in the building industry who are interested in the proper care and maintenance of architectural aluminum.

To obtain a copy of these publications, contact:

American Architectural Manufacturers Association
1827 Walden Office Square
Suite 104
Schaumburg, Illinois 60173
Tel: 847/303-5664



Environmental

Painted Finishes

Liquid paint is composed of three basic elements: resin, which forms the body of the coating; pigment which supplies color; and solvent which allows the resin and pigment to be transferred and applied to the surface. The solvent evaporates, leaving the resin and pigment to form a dry film coating on the surface. It is this solvent evaporation that causes pollution in the form of volatile organic compounds (VOCs).

Considerations

Companies manufacturing architectural aluminum products with painted finishes should be in full compliance with all Federal and State clean air regulations. Permit conditions will vary from state to state but all include the requirements of the Federal clean air standards. Several states require paint facilities to include thermal oxidizers, which destroy VOCs at an efficiency level of 98 percent. Where applicable, painting plants also hold permits under the requirements of U.S. EPA Title V, which is a federal permit program required under the Clean Air Act Amendments of 1990.

Painting operations generate hazardous waste. All flammable material is processed as fuel for cement kilns and is, therefore, destroyed in the burning process. Chrome-bearing sludge is generated in the paint water treatment systems and is stabilized by EPA-approved companies and placed in lined landfills. Kawneer Company is in full compliance with all Federal and State clean air and waste disposal regulations for paint application.

Powder coatings contain only resin and pigment. Today's technology allows the spraying of the dry components directly onto the surface where electrostatic attraction holds the coating material in place. The powder is then subjected to heat which causes it to melt and form a solid coating on the surface. Because there is no solvent to evaporate, powder paint is considered to be environmentally friendly.

Photograph courtesy of The Dillard House, Dillard, Ga.

Anodized Finishes

There is no hazardous waste generated by environmentally aware manufacturers during their anodizing operations. The major waste product is hydroxide sludge, much of which is sold to chemical companies that reclaim the aluminum. Some is landfilled and many companies are investigating alternative uses for the sludge in an attempt to reduce landfill use.

Anodizing process water is purified in water treatment plants at each plant. The processed water is partially recycled into the process with the remainder entering the local sewer system. Manufacturing facilities hold permits that require regular sampling and discharge analysis. No regulated substances are introduced into the air from the anodizing process. Kawneer creates no hazardous waste in its anodizing operations and holds all necessary permits.

Warranties

Architectural aluminum product manufacturers usually provide warranties covering their finishes. It is important to read carefully this information and make comparisons as part of the decision and specification process. It is important to remember that high quality finishes that meet AAMA standards are cost effective in the long-term and frequently offer improved aesthetics.

Black Anodized Finish
Courtesy Corporation, Buffalo Grove, Ill.
Architect: Dobrin & Associates, Northbrook, Ill.

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