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CLEANING

and

MAINTENANCE

MANUAL

CARE OF ALUMINUM
INTRODUCTION

Neither dirt nor oxidation materially affects the strength and service life of aluminum. Cleaning and surface care are usually necessary only for the sake of appearance.

Aluminum, unlike most other metals, takes care of itself. Exposed to air, it combines with oxygen to form a tough, transparent protective oxide coating. Aluminum is therefore often used without surface treatment. When the surface is treated, and aluminum can be treated or "finished" in more ways than any other metal, further protection is provided.

All the finishes, including the non-finished or bare, may be kept clean and bright with mild soap and water alone. However, if cleaning has been postponed too long and the dirt is especially tenacious, a more aggressive cleaner and cleaning technique may be required. In such cases, best results are obtained when the cleaner and cleaning technique are matched to the soil and finish involved.

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I ALUMINUM FINISHES

A. Non-Finished (Bare):

Non-Finished (bare) surface is simply the metal's own self-produced oxide layer. It is thin but tough, transparent, tenacious and protective. Bare finishes vary in appearance depending on the fabrication technique. The texture may be smooth and mirror-like, embossed with a stucco look, wood-grain or other patterns.

With time, the surface of this finish may darken and discolor. Near the sea, it tends to turn grey; in the cities and near factories, it tends to turn brown or black.

B. Anodized Finishes:

Anodized finishes are extra thick oxide coatings produced by an electrochemical treatment. The thickness of the anodic layer can vary from 0.05 mil to more than 1.5 mil.

The anodic layer may be transparent or integrally colored. In both cases, the metal's natural luster will be visible. Or the anodize layer may be impregnated with lubricant, wax or both. When anodized aluminum is to be used architecturally, it is sometimes given a clear organic coating for protection against alkaline building products during construction and to facilitate cleaning afterwards. Anodizing substantially improves aluminum's resistance to weathering.

C. Chemical Conversion Coatings:

Chemical Conversion Coatings are coatings generally treated by chemical means alone. They are thinner and less abrasion-resistant than anodic finishes. Most often they are used as a base for paint. Occasionally, conversion coatings are used as final surfaces for products and utilitarian structures. Conversion coatings may be clear or colored gold, grey, golden brown, green or blue-green.

D. Painted finishes:

Painted finishes are organic coatings of various kinds applied to the surface of aluminum. In the plant, paint is applied over conversion coatings. In the field, paint or organic coating (lacquer) may be applied to any weathered aluminum surface or to a clean, grease-free aluminum surface after it has been roughened mechanically or treated with suitable wash primers.

E. Porcelain Enameled Finishes:

Porcelain enameled finishes are ceramic coatings which have been fired permanently onto the surface of the aluminum. Porcelain finishes are very hard, impervious to soils, acids and alkaline. These finishes come in many colors with smooth-textured surfaces.

F. Plated Finishes:

Plated finishes are produced by electro-depositing one or more different metals on aluminum. Gold, silver, copper and chromium are often used. Plating metal is deposited directly onto the aluminum and sometimes an intermediate metal is used.

G. Laminated Finishes:

Laminated finishes are produced by bonding a thin layer of wood, cloth, plastic or a combination of these materials and possibly others to the surface of aluminum. The care and cleaning required by the laminated surface is that required by the facing material. As there are different laminates in use, cleaning procedures cannot be described here but must be found by careful testing and consultation with the manufacturer.

II SIMPLE FINISH TEST

H. Non-Finished (Bare) Aluminum:

A steel needle or similar pointed tool is used to prick the metal's surface. If the metal is easily marked, and if the scratch is no broader than the tool's point, the aluminum is "bare". If the metal is rubbed with a rubber eraser, the metal may lighten in color and the eraser may darken.

I. Anodized Aluminum:

If a clean surface is rubbed with an eraser and neither the color of the metal nor the color of the eraser changes, the aluminum has been anodized. If either changes, the aluminum is bare.

If the eraser test is not conclusive, as it may not be perfectly clean, the needle test may be used. Aluminum oxide is hard and glassy. Considerable force will be necessary to penetrate it. The scratch will be wider than the point of the needle and the sound of the scratch will be audible. Anodized aluminum is sometimes given a clear organic coating. This can be detected with the needle test or by scratching a small area with a knife-edge.

J. Conversion Coatings:

The eraser test should show no change. Penetration by the point of a needle should not be too difficult. Scratch marks will be somewhat broader than the tool's point.

K. Painted Aluminum:

All paints, even the hardest baked-on paints, are soft compared to metallic and anodized surfaces. Paints have a plastic, gum-like texture. This can be detected with the needle test.

L. Porcelain Finishes:

These finishes will resist penetration by the point of a needle almost to the breaking point of the needle itself. These finishes are very hard.

M. Plated Finishes:

Gold and silver are soft metals and are easily scratched. A deep scratch will reveal the pale grey of the base of the aluminum as the precious metal plating is usually very thin.

Other plated metals can often be identified by their non-aluminum color. They may also be harder to penetrate and thicker than gold and silver, but fine slivers can sometimes be removed with a sharp tool. This cannot be done with any of the other finishes except some brittle paints.

Chromium plating is identified by its hardness and silvery brilliance. Chromium plating tends to be porous and when not maintained, oxygen enters the pores and produces grey specks.

III CLEANING ALUMINUM

N. Common Sense Cleaning Rules:

1. Match Cleaner to Finish:

Mild hand soap and warm water may be safely applied to any of the aluminum finishes. Steel wool, strong acids and abrasive cleaners should never be applied indiscriminately (though in their place, strong cleaners used correctly are highly effective).

2. Make a Spot Test to be Sure:

A few moments invested in testing a cleaner on an unobtrusive portion of the finish is a good insurance against major disappointment. Use the same concentration and technique planned for the entire job. Let the cleaner remain in place for some time, let it dry, and then inspect for stains. Test lacquered and painted finishes for softening and possible dissolution.

3. Watch Cleaning Frequency:

Where optimum appearance is desired and frequent cleaning is necessary, use mild cleaners. Abrasive cleaners can wear away the hardest finishes.

4. Follow Manufacturer's Directions:

Cleaners should not be applied indiscriminately. Varying concentrations and temperatures or extending the time to which the finish is exposed to the cleaning agent, all in an effort to speed cleaning, may produce disastrous results.

5. Do Not Mix Cleaners:

The resultant mixture may be harmful to aluminum finishes and hazardous to the user's health.

6. Avoid Drips and Splashes:

Cleaners that are harmless to some materials may damage others upon contact. Remove run-downs as quickly as possible.

7. Do Not Vary Cleaner Concentration:

In most instances, increasing or decreasing cleaner concentrations from that recommended by the manufacturer leads to highly unsatisfactory results.

8. Avoid Extreme Temperatures:

Heat accelerates chemical reactions. The cleaner may become over-active or its solvent may evaporate before job is done. In either event, the metal may be streaked or stained. On the other hand, cleaning should not be conducted at very low temperatures. Low temperatures reduce chemical activity, possibly stopping the action of the cleaning agent entirely. For best results, outdoor cleaning should be conducted on mild, cloudy days or in the shade.

9. Watch the Clock:

Cleaner product contact time should not be estimated but carefully timed. The manufacturer's directions should be closely followed and prolonged contact avoided.

10. Remove Cleaner Thoroughly:

Water-based cleaners should be rinsed with clear water after which the area is permitted to air dry or wiped dry with a clean cloth. Cleaners containing wax, oil or silicones are to be removed with a clean dry cloth. Traces of cleaner, wax, oil or silicones should not be left in cracks or corners.

O. Cleaners and Techniques:

Aluminum Cleaners are arbitrarily divided into the following five groups:

1. Mild Soaps, Detergents and Non-Etching Cleaners:

Mild soaps, detergents and non-etching cleaners that can be applied with bare hands may be used for cleaning aluminum finishes. Detergents too strong for the hands, such as some automatic dishwasher detergents, should be spot-tested first. Some of these can bleach paint and discolor non-finished and anodized aluminum.

Non-etching cleaners are alkaline or acid-based formulations mixed with inhibitors, which permit the cleaners to remove soil without attacking the metal or the finish. The nature of these chemicals, their strengths and the time they should remain on the work vary from cleaner to cleaner. Some mixtures may irritate the skin on contact. Rubber gloves or a long-handled fiber brush should be used. After cleaning, the aluminum should be thoroughly rinsed with clean water and dried.

2. Solvent and Emulsion Cleaners:

Solvent and emulsion cleaners, while generally mild in their action, are more effective on stains and soils than cleaners in the first group. These may be used without difficulty on bare, anodized, conversion coated and porcelain-like aluminum. When used on painted (and lacquered) finishes, solvent and emulsion cleaners should be spot-tested first. The wrong solvent containing emulsion can remove many of the paints and clear organic coatings (lacquers) used with aluminum.

Both mild cleaners and the solvent-emulsion cleaners will remove dirt and some stains. They will not, however, restore the appearance of aluminum that has weathered too long or remove heavy grime encrustation. For these advanced conditions, a more aggressive cleaner and technique is required.

3. Abrasive Cleaners:

Abrasive cleaners will restore weathered aluminum and remove most stains and grime. These cleaners are manufactured and sold under various generic descriptions including; polish, cleaner, cleaner-polish, wax polish, metal brightener, scouring powder, etc. Their effectiveness on various soils and darkened aluminum depends on their formation and vigor of application.

Abrasive cleaners contain abrasives to which water, oil, wax, silicones, soap, acid or alkaline may be added either singly or in a combination. The abrasives cut away the dirt and surface oxidation; the soaps, acids and/or alkaline clean. Traces of the wax, oil or silicones remain behind after the compound has been added or removed. They provide luster and a small measure of surface protection.

Abrasive cleaners containing fine grit or polishing agents may be used with care on all aluminum finishes. Care is necessary because even the finest polishing agent is an abrasive and prolonged rubbing may dull a bright, speculated finish in time or cut through thin gold or silver-plating. For the ultimate in speculated finishes, the metal must be buffed.

Household cleaners often contain coarse abrasives. They should never be used on any surface other than porcelain without caution.

Cleaners containing moderately coarse grit may be used freely on porcelain finishes only. All other finishes require considerable caution. Moderate abrasives can dull a bright finish in a relatively short time.

Cleaners in this group are often used to remove heavy soils and oxides prior to final cleaning and polishing with a fine-grit cleaner. When this is done, the abrasive cleaner must be thoroughly removed before the polish is applied. Otherwise, a few grit particles may find their way onto the final cleaning pad and produce noticeable and possibly permanent scratches.

Applied to bare aluminum, moderate abrasives produce a finely scratched, light grey surface. The scratches are easily blended into a matte or satin finish by working the abrasive in the direction of the grain.

Steel wool acts as an abrasive when rubbed against a finish. When applied to aluminum, all the steel particles left behind must be removed or the particles will rust and leave stains. Stainless steel wool is therefore preferred.

Abrasive cleaner-polishes are applied to a clean cloth and rubbed over the soiled area. Polishing with a clean, dry cloth follows this. Cleaner-polishes leave a thin wax-like coating which give additional protection. However, this film inhibits the adhesion of any subsequent paint or lacquer that may be applied. If the aluminum is to receive an organic coating, do not use a cleaner-polish unless cleaned with a solvent first. If the cleaner-polish contains silicones, even solvent cleaning may not assure good adhesion.

Large areas may be cleaned with the help of power-driven polishers and buffers. Caution must be used to make certain the high speed of the wheel's edge doesn't cut into the finish and that pressure is kept moderate to avoid overheating the finish. Wheel pads and gloves should be changed frequently to make certain abrasive particles do not clump-up and dig into the work.

Coarse abrasive cleaners are sometimes used to prepare anodized surfaces for painting. Pressure should be light to avoid deep scratches which may be visible through the paint.

Coarse and moderate abrasive cleaners are sometimes compounded with active chemical cleaners. The combination produces a fast-acting cleaner that must be used with care. Bare aluminum is sensitive to chemical-based cleaners which may etch the finish if permitted to remain long. Anodized aluminum may develop white blemishes if chemical cleaners remain in place too long.

4. Etching Cleaners:

Etching cleaners are normally added to water and applied to heavily-weathered and soiled bare aluminum. They should be applied with caution as they remove small quantities of metal each time they are used. These cleaners are not normally used on painted, plated, anodized or conversion coatings.

There's a number of proprietary etching cleaner formulations on the market and each manufacturer's directions for concentration, exposure time and safety should be carefully followed.

The general procedure with these solutions is as follows:

Prepare the mixture, if need be, as directed on the container and apply it carefully with a sponge or brush to an area no larger than can be kept wet. The cleaner is permitted to remain in place the recommended time, then thoroughly flushed-off with cool water. When this has been accomplished, the next area is treated and so on.

Whether the etching cleaner is first applied to the top or the bottom of the aluminum to be cleaned depends on its size. Comparatively small areas such as storefronts and truck sides are best cleaned from the bottom up. Etchant drips will affect already cleaned aluminum far less than they will aluminum not yet cleaned. When large areas, such as tall buildings are to be cleaned with an etching cleaner, it is best to start at he top. Etchant drip will, to a large extent, be isolated from the metal by the soil on the building surface.

Using a fine abrasive such as pumice or fine stainless (00 or 000) wool or an abrasive nylon pad to rub wet metal during the etching procedure may increase cleaning speed. The pumice may be sprinkled on a wet cloth or on an abrasive pad.

For uniform results, the metal should be grease-free before the water-based ecthant is applied. Each area must be rubbed equally and soak periods must be also be similarly timed. After the etchant has done its job and has been thoroughly washed away, the metal surface may be slightly frosty (an appearance somewhat similar to that produced by caustic etching).

Using hot water for final rinse may increase the drying speed of trucks and smaller aluminum products. Small parts may be rinsed in methyl alcohol and water.

5. Special Cleaners:

Special cleaners include steam, rotary, wire brushes and abrasive blasting. They are considered special because they require more than hand equipment.

Pure steam may be applied without excessive caution on bare, plated and porcelain aluminum finishes. Steam jets should not be brought too close nor held too long on paint. Anodized or conversion coated finishes may soft, lose adhesion, blush or craze if overheated or exposed very long.

Adding chemical cleaners to steam increases its speed and efficiency but introduces the question of compatibility. Spot tests should be made. If this is not practical, it is best to clean with caution (decrease exposure time and increase length of stem nozzle distance to surface). Do not vary cleaner concentration from that recommended by the manufacturer. Doing so may produce deleterious effects.

When a cleaner is added to the steam, the cleaned part must be washed down in clean water prior to drying.

Power-driven wire brushes may be used to clean aluminum when other methods fail. This is a time consuming and drastic cleaning method. It requires skill and experience as careless handling of the brush can readily damage the aluminum surface.

A disc type brush with stainless steel or German silver wires of usually No. 35 Birmingham gauge is used. The trick to an unmarred finish is keeping the bristles vertical to the work and just lightly touching. The brush is moved slowly and evenly over the entire surface.

Power-driver stainless steel wool or abrasive impregnated nylon pads may be used in place of the brush. Abrasives may or may not be added to the pads as desired. To produce sheen on the metal's surface, the pads are lubricated with soapy water, oil or grease.

Abrasive blasting produces a roughened, matte appearance on aluminum surfaces by removal of metal and sometimes used on new work as a mechanical finish. The resultant texture of the metal is dependent on factors such as the type and size of the abrasive, air pressure and position of the nozzle in relation to the aluminum surface.

Because the roughened surface fingerprints easily and retains dirt, a coating is usually employed to preserve the appearance of the abrasive blasted metal.

Clean, fine abrasives applied with relatively low air pressure, should be suitable for removing heavy dirt deposits or for preparing aluminum surfaces for painting or repainting. The abrasive used should not be reclaimed from previous use to clean other materials. Abrasive blasting should be used with caution on thin sections of aluminum since distortion of metal may occur.

IV CARE & CLEANING OF ARCHITECTURAL ALUMINUM PRODUCTS

P. Pre-Installation Practices; On-Site Aluminum Damage:

Damage can be reduced and the need for extensive storage periods eliminated by means of a controlled delivery schedule.

1. On-Site Storage:

Whenever possible, all aluminum architectural products should be stored at a stable temperature, indoors or protected from wind-blown rain, combustion products and construction dust.

When this is not possible, non-packaged or non-wrapped aluminum may be safely stored in the open. The parts are placed on edge, above ground and separated sufficiently to allow free airflow passage.

Kept distant from smoke and construction fallout, occasional rainfall will do no harm. If storage is longer than a day or two, a sheet of plastic or tarp should be raised over the metal. The sheet should not touch the aluminum, as there must be sufficient space to encourage air movement. If a tarp is used, make certain it has not been treated with fungicides containing heavy metal or chlorides.

If the aluminum has been packed in ordinary paper or cardboard, the metal must be moved indoors into a stable temperature or the wrappings must be removed. Otherwise, moisture may form inside the package. Once inside the water will not come out by itself. Caught in the rain, ordinary packaging material will be thoroughly soaked and remain wet for days. Wet wrapping should be removed immediately.

If these precautions are not taken, the metal may be water stained. Some cartons are marked with dyes and ink that could run and stain when wet.

Q. Installation and Care:

During installation, the aluminum must be protected from building fallout (wet plaster, mortar, dust, paint, welding splatter, etc.). Wet plaster and wet mortar should be removed immediately and the soiled area washed down with clean water. Solvents should be used to remove oil-based paints before they dry. Muriatic Acid (hydrochloric) used for cleaning brick must be prevented from dripping onto the aluminum. Should this happen, the acid should be immediately washed off with clean water.

Sometimes aluminum is sealed in a plastic bag if the part is to be mounted in an exposed area. The bag is later cut free and mastic is applied to seal the joint between the aluminum and adjacent construction.

R. Protective Coverings:

Doors, door frames and similar aluminum members that will be installed and are serviced before the building is fully completed are often shipped to the site protected by pressure-sensitive tape and/or strippable plastic coatings.

These protective coatings should be left in place as long as possible. If necessary for installation, small areas may be removed to install clips, bolts and other fasteners.

However, once the job is done the strippable coating should be removed. Time, heat and especially sunlight can degrade them and make them increasingly difficult to remove. If they cannot be easily stripped, they are best removed with the aid of solvent. Force should be used very cautiously to avoid damage to underlying metal.

On some construction jobs, a protective coating or shield is advisable after the aluminum has been installed. Indoors, any compatible pressure-sensitive tape, plastic sheeting or heavy *Kraft* paper treated for compatibility with the aluminum may be used. Outdoors the protection must be water-proof and air-tight to prevent the entrance of water and condensation inside the protection. A simple alternative for outdoors is a wood barrier. It can be pitched to shed water and the free flow of air will prevent condensation.

Heavy grease is also useful as a protective coating measure when wood or paper is not easily installed. Any clean commercial grease may be used. It can be applied by hand or with a wood paddle and removed the same way. Final cleaning may be done with a clean cloth and solvent. For large areas, steam cleaning may be used.

S. When to Insulate:

Aluminum should not be placed in direct contact with wood fiberboard or any porous material that may absorb water and cause corrosion.

When such contact cannot be avoided, an insulating barrier between aluminum and the porous material must be installed. The type of barrier depends on the porous material and in the case of chemical treatment, the chemicals used. Seasoned or green wood, treated or untreated and other absorbent materials may be satisfactorily insulated from aluminum by painting them with two coats of aluminum house paint and sealing the joints with caulking compound. Use only treated wood that has been preserved with pentachlorophenol (5% minimum concentration), creosote and zinc napthanate.

Aluminum is compatible with some stainless steel alloys, chromium, zinc and small areas of white bronze. Where permanent contact with other metals cannot be avoided, the risk of galvanized corrosion can be greatly reduced by painting the other metal at the contact area with zinc chromate followed by two coats of non-lead paint such as aluminum paint or a single layer of heavily-bodied bituminous paint. When dissimilar metal cannot be painted, the aluminum may be given an insulating treatment. As an alternative, a strip of plastic or a similar insulator may be used in place of paint.

In severely corrosive atmospheres and high moisture areas, the edges of the dissimilar metal joint may be sealed with compatible building mastic or caulk.

Architectural aluminum should not be positioned in the path of water drainage from copper and other heavy metals. When this cannot be avoided, the heavy metals should be painted to prevent contamination of the aluminum.

T. Care After Installation:

Once the building is up and/or windows are installed and in use, aluminum cleaning is a simple routine, easily handled by the superintendent and crew.

Architectural aluminum is cleaned the same as all other finished aluminum parts and fabrications. The frequency of cleaning is determined by the desired appearance of the aluminum and atmospheric conditions (i.e., rainfall, smog, heavy condensation, etc.).

U. General Cleaning Tips:

Aluminum that is in direct sight at ground level and immediately higher is cleaned most frequently. Less obvious areas are cleaned less frequently. Building exteriors at elevations above everyday view are in some cases never cleaned.

Several pitfalls should be avoided in cleaning architectural aluminum. One is the human tendency of cleaning personnel to use aggressive cleaners that work much more rapidly than mild cleaner. The other is the tendency of scouring brass, bronze and stainless steel with harsh cleaners. Another belief is that substituting an occasional application of heavy duty cleaner in place of mild cleaners that are used more frequently can reduce costs.

1. Mild Cleaners:

Aluminum that is lightly soiled or which must be kept spotless and cleaned more frequently should be cleaned with a mild cleanser. Mild cleaners include most soap and detergent that can be applied with bare hands or commercially prepared non-etching cleaners. These may be used as often as required on all aluminum surfaces.

The soap and detergent products are added to water and applied with a soft cloth or sponge. Afterwards, they are removed with a clear water rinse. The non-etch cleaners must be applied directly by the manufacturer. They should not be used on sun-heated metal or on cold days as streaking may result. Cleaners should not be mixed and should not be permitted to remain on metal longer than specified. Non-etch cleaners are removed with a clear water rinse.

Should the mild cleaners fail to provide satisfactory results, solvent and emulsion cleaners may be tried.

2. Solvent and Emulsion Cleaners:

Solvent and emulsion cleaners are particularly effective on oil and grease stains and other types of soils. Some of these cleaners contain solvent or emulsion that have the ability to soften and dissolve certain paints and clear organic (lacquer) used on aluminum. To preclude finish damage, all solvent and emulsion cleaners should be tested on a small area. Cleaners are generally applied with a clean cloth and removed the same way. Remaining residue can be washed off with mild soap and water.

Both solvent and emulsion cleaners are mild in their actions. They will remove dirt and some stains. They have little effect on weathered aluminum and heavy grime encrustation. Such conditions require more aggressive cleaners.

3. Abrasive Cleaners:

Abrasive cleaners may contain water, oil, wax, silicones, soap, acid or alkaline in addition to the abrasive from which this class of cleaners obtains their name. As to the effect these cleaners have on aluminum varies with the compound and the aluminum's finish. It is important that an abrasive cleaner be spot-tested carefully before use.

Abrasive cleaners are sprinkled on a clean, damp cloth and applied to the metal with a light rubbing action. Another clean cloth is then used to remove the spent polish. Some of the wax or silicone contained in the cleaner remains behind to protect the metal somewhat. The manufacturer's directions must be followed closely.

Steel wool or nylon pads, either alone or with abrasives and/or wax or soap added may also be used as an abrasive, but steel wool particles may rust and cause stains.

Areas too large for hand cleaning may be cleaned with the aid of power-driven pads loaded with abrasive cleaners. Care must be exercised to avoid scratches.

3. Etching Cleaners:

Etching cleaners are more rapid and effective on certain types of soils and some weathered aluminum finishes than hand-applied abrasive cleaners. In some cases, etching cleaners may produce more pleasing results. Etching cleaners are aggressive and should be applied cautiously and not excessively. Cleaner concentration application time and safety precautions suggested by the manufacturer should be followed carefully.

When used to clean building exteriors (one floor or the entire building), it is best to begin at the top of the area and work down. The solution is applied to a small area at a time with a sponge or brush. Drips should be avoided and wiped up if possible.

Rubbing the work surface with fine stainless steel wool or an abrasive nylon pad can increase etching cleaner effectiveness. A fine abrasive may be added to either of these tools. All areas must be rubbed equally well to produce an evenly cleaned surface.

Each area is washed down with clean water as soon as cleaning is completed. The etchant should not be permitted to remain on the area longer than directed. Work should be confined to the shady side of the building or done on cloudy days.

3. Special Cleaners:

Special cleaners include steam cleaners and power-driven wire brushes. Steam, with or without a cleaning compound, is especially useful for grease or oil-based soils in large areas. The wire brush is useful for large areas that have weathered heavily. Pure steam may be used with moderate caution on all finishes, except painted finishes. With finishes, thought to be painted, a small area should be spot-tested first. When a cleaner is added to the steam, spot-tests should be made on all finishes before the entire area is cleaned.

With or without cleaner, the steam jet is brought a foot or so from the work and moved slowly from side to side. The jet should not be permitted to strike one small area for any length of time as that spot may be overheated and adversely affected. When cleaned with steam alone, no further treatment is required. When a cleaning agent is included, the surface must be thoroughly washed down with clear water after cleaning.

Power-driven wire brushes remove metal and must therefore be used with care if the work surface is not to be marred. Stainless steel wire or German silver wire brushes (usually No. 35 Birmingham gauge) are used. The bristles (kept vertical to the work) are moved slowly and evenly over the entire surface.

V. Protection After Cleaning:

The frequency and cost of cleaning can be reduced by the use of commercial waxes and other clear coating formulations that may preserve good appearance of the cleaned aluminum for appreciable lengths of time. Perhaps as much as a year or more, depending on the coating material selected and severity of the environment.

In addition to extending the cleaning cycle, such materials may subdue or eliminate streaks, stains and other discoloration that may remain after cleaning.

FASTENERS AND HARDWARE

During normal or excessive use, the fasteners used to attach all hardware including cam handles, cam strikes and keeps, all venetian blind controls or brackets, jamb or tandem locks, underscreen pushbars, roto-operators and screen mounting clips or brackets, may become loose and require re-tightening. When required, this procedure may be performed by maintenance personnel and will not affect any applicable warranty.

During initial usage and periodically throughout the life of operating handles, roto-operators and jamb or tandem locks; the hardware may require lubrication. Win-Vent recommends aerosol white lithium grease or silicone, whichever may be selected by building owner. Application of lubricant may be performed by maintenance personnel as needed without affecting any applicable warranty.

The above procedures are considered routine maintenance and do not constitute a warranty issue with the manufacturer.