



Thermosash

BUILDING ENVELOPE SOLUTIONS™

Operations & Maintenance Manual (generic document)

Project Name:

Project Sample

Install Date:

2024

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1. Introduction

The purpose of the Operations & Maintenance Manual is to provide the following three major objectives:

1. The first and major aim is to supply to the building owner a concise document outlining all the relevant scope of works supplied by Thermosash Commercial Ltd (TCL) for this project that will require future cleaning, servicing, or maintenance.
Whilst finished aluminium and glass for instance, usually only require an approved programmed cleaning regime, some products such as hardware items and automatic doors necessitate a preventative maintenance program to ensure that these components supplied and installed by TCL provide a maximum and serviceable life.
2. Secondly to provide details and specifications on TCL products and components utilised on the project to enable straightforward cleaning and maintenance of that product.
3. Thirdly to inform the building owner of their responsibilities in ensuring the products and components return maximum longevity under the individual products warranty conditions.

This section outlines to the building owner a concise document outlining all pertinent areas of the products supplied by TCL for the specified project.

The following scope is deemed to require application of this manual.

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2. Operation and Maintenance Information

2.1 ALLOWABLE REPLACEMENT COMPONENTS

Where the replacement of a damaged product, or a substitution of a product is required, TCL must be notified of the intended work and shall verify all materials and methodology proposed for use. This is to occur before the work is to be carried out. Preferably this replacement work should be performed by TCL or as a minimum, under the supervision of a suitable TCL authorised representative.

Once this verification has been requested and given, TCL should be notified of time and date when the actual replacement of such materials will be performed. This is to ensure that the correct and compatible materials notified previously are used and that the products are suitable for the intended purpose or have not reached their batch use by dates.

NB. TCL manufacturer's warranties are dependent on the use of approved materials that are applied correctly.

2.2 FUTURE ADDITIONAL MODIFICATIONS

In the instances where modification of existing TCL installations is required, TCL must first grant approval of the modifications. If the modifications are allowable, TCL shall nominate the materials proposed for use. This is to occur before the work is to be carried out. Preferably this modification work should be performed by TCL or as a minimum, under the supervision of a suitable TCL authorised representative.

Common modifications to commercial installations are, but not limited to:

- Addition of internal blinds directly behind windows and doors (Affects the thermal safety assessment of the glass).
- Addition of solar tint film directly onto curtain windows and doors (Affects the thermal safety assessment of the glass).
- Addition of signage directly onto windows and doors glass or draped over the external face of the system (Affects the thermal safety assessment of the glass).
- Screw fixing any component directly to aluminium framing and cladding members (Affects the pressure equalisation and drainage principles of the system).
- Temporary removal and replacement of part or whole of any of the original contract scope (For instance to allow installation of large equipment).
- Permanent demolition of part or whole of any of the original contract scope.

Once this verification has been requested and given, TCL should be notified of time and date when the actual modification of such materials will be performed. This is to ensure that the correct and compatible materials notified previously are used and that the products are suitable for the intended purpose or have not reached their batch use by dates.

NB. TCL manufacturers warranties are dependent on the use of compatible materials that are fit for purpose.

2.3 RECOMMENDED REPLACEMENT PARTS TO BE HELD ON-SITE

It is recommended that the client/end user purchase a number of replacement parts to be stored in a suitable area on site at all times. In the case of broken glass, quick replacement of broken glazing addresses the obvious safety issues as well as prevents any potential for weather ingress. In the case of locking hardware and operable sash actuating mechanisms, if there is not quick replacement of damaged or broken parts within a product, other assemblies and parts may be affected, and potentially cause further damage. This is most prevalent under strong wind conditions where there are broken friction stays within operable sashes.

TCL can assist in the compilation of a suggested spares list based on the original orders placed for the project.

Spare Materials

Any spares required and/or replacement glass required must be ordered from TCL to ensure they are fit-for-purpose for the application, loading and seismic performance for human safety.

2.4 FREQUENCY OF CLEANING AND MAINTENANCE

The need for the window/façade cleaning and maintenance is a result of three requirements:

1. Aesthetic need to ensure that both the building is perceived to look acceptably clean and well maintained from the general public's point of view and for tenants or occupants' requirements.
2. For preventative maintenance.
3. To facilitate validity of product warranties.

Advice is often sought concerning the frequency of cleaning of products, and the answer is quite simply "clean it when it is dirty in order to restore its original appearance". This may vary from **two to four times minimum a year for external applications**, or it may be once a day for an item in aggressive situations. The cleaning schedule should be defined specifically for each project in association with the Thermosash Service & Maintenance Division.

The frequency of cleaning and preventative maintenance schedules is dependent on the severity of the building environment and is determined by the amount of accumulation of grime and use and wear (especially on hardware items) that can be observed.

SUBCONTRACTOR'S AND SUPPLIER'S RECOMMENDATIONS

In general - It is recommended that the building façade / windows are to be inspected visually every three (3) months, commencing upon practical completion, except as specified otherwise in subcontract maintenance recommendations, or set out as a warranty condition for that product.

In a rural atmosphere where grime deposition and pollution of the atmosphere are at a minimum, cleaning may not be needed more frequently than every three months in order to remove deposits and restore the appearance. In commercial, industrial, and marine

environments more frequent cleaning, e.g., monthly, is necessary and **the maximum period between cleaning should never be more than three months**. Under the worst conditions involving heavy grime deposition and atmospheric pollution by both sulphur compounds and chlorides, even more frequent cleaning is advisable if deterioration of the anodic and painted finishes is to be prevented.

It is important to recognise that the physical presence of grime and dirt, or other foreign matter takes precedence over any routine maintenance scheduling recommended in this maintenance manual. Building management should take a pro-active approach to the inspection of the entire scope of the project works and schedule non-typical cleaning and maintenance as required, as unpredictable events such as spillages or renovation works internally or externally may necessitate additional attention.

2.5 SCHEDULE OF CLEANING

It is anticipated that the building will be exposed to a “Normal” range of environmental conditions. The following are guidelines for the cleaning frequency of individual elements within the façade based on exposure to “Normal” range of environmental conditions. However, if heavy soiling occurs, then more regular cleaning is required.

GLASS – External for Typical Façade

External glass must be cleaned at regular intervals (every three (3) months but not exceeding six (6) months) after the final construction clean at Practical Completion as set out in the warranty conditions. These cleaning intervals are required to prevent the build-up of detrimental substances on the surface of the glass, and extra non-typical cleaning may be required to achieve this.

GLASS – External for Sheltered Areas

These can be more at risk of degradation than exposed areas. This is because windblown salt and other pollutants may adhere to the surface and will not be cleaned away with rainfall. These areas should be inspected and cleaned on a more regular basis. The external glass must be cleaned at regular intervals (every four (4) months) after the final construction clean at Practical Completion. These cleaning intervals are required to prevent the build-up of detrimental substances on the surface of the glass, and extra non-typical cleaning may be required to achieve this.

GLASS – Internal

Internal glass should be cleaned at regular intervals to the end user’s own satisfaction after the trade clean at practical completion. These intervals are planned to prevent the build-up of detrimental substances on the surface of the glass, and extra non-typical cleaning may be required to achieve this.

POWDER-COAT Typical Façade Types

Painted finishes must be cleaned in accordance with AAMA 610.1-1979. **As a guide the typical cleaning regimes range from three-month intervals up to six months.** These intervals are planned to prevent the build-up of detrimental substances on the surface of the finish, and extra non-typical cleaning may be required to achieve this.

POWDER-COAT for Sheltered Areas

Can be more at risk of degradation than exposed areas. This is because windblown salt and other pollutants may adhere to the coated surface and will not be cleaned away with rainfall. These areas should be inspected and cleaned on a more regular basis. The external painted finishes must be cleaned at regular intervals (**every four months**) after the trade clean at practical completion as set out in the warranty conditions. These cleaning intervals are required to prevent the build-up of detrimental substances on the coated surfaces. Painted finishes must be cleaned in accordance with AAMA 610.1-1979.

ANODISED Surfaces

The frequency with which cleaning should be carried out will range from **monthly to six monthly** intervals according to the degree of contamination of the service environment. Aggressive environments may require more frequent cleaning.

HARDWARE

Inspections, cleaning, and maintenance as required must be held every **three (3) months** to prevent the build-up of detrimental substances on the external surfaces and internal mechanisms of all hardware items. Extra non-typical cleaning may be required to achieve this.

GASKETS, SEALS AND MOHAIR

Inspections, cleaning, and maintenance as required must be held every **six to 12 (6 – 12) months** to prevent the build-up of detrimental substances on the external surfaces and internal mechanisms of all hardware items. Extra non-typical cleaning may be required to achieve this. Moving parts/ sliding doors will cause higher levels of wear and degradation and shorter service life affecting replacement cycle.

SILICONE SEALS - Structural and Weather Seals

Inspections, cleaning, and maintenance as required must be held every **three (3) months** to prevent the build-up of detrimental substances on the external surfaces and internal mechanisms of all hardware items. Extra non-typical cleaning may be required to achieve this.

DRAINAGE WEEP SLOTS

Ensure drainage weep slots are free of debris and cleaned concurrently with all other cleaning schedules. Objective evidence of cleaning and any inspections by way of written records may be required. Insecticide should be used to kill spiders as required.

2.6 INSPECTION PROCEDURE

The condition and serviceability of any façade and/or window product, directly depends upon the frequency of inspections and tests and identification of any abnormalities that may reduce the effectiveness of the product over time affecting service life.

These inspections should be completed on both typical and non-typical portions of the building, thereby encompassing a portion of all the scope of work at each inspection.

Each individual component of the contract works must be sighted, such as:

- Glass.
- Aluminium framing.
- Aluminium coating condition.
- Gaskets and mohair seals.
- Hardware operation and condition.
- Structural/Weather silicone seals.
- Drainage weep slots.
- Parapet caps for potential gaps at joints.

Should any abnormality be found with the product then it is recommended that the defect should be inspected and/or tested in the presence of a representative of TCL and our opinion sought in the cause of the abnormality and advice on further inspection requirements.

The representative of TCL and relevant suppliers shall make recommendations on possible remedial action and determine the cause and extent of the abnormality.

2.7 RECORDS AND REPORTS OF CLEANING MAINTENANCE, INSPECTIONS, OR REPLACEMENT OF COMPONENTS

Reporting of work carried out during cleaning and maintenance, removal, and reinstatement of window and/or façade components and results of inspection and testing performed on the building façade shall be recorded.

Evidence of cleaning and any inspections by way of written records must be kept.

1. Notes of inspections must be marked on the supplied 'As Built' drawings for future reference, to facilitate easy identification of inspected areas, and to show clearly the appropriate details studied.
2. This recorded information not only provides the building maintenance personnel with an accurate history of maintenance carried out to aid in the scheduling and budgeting of same but can help in determining if a common pattern of maintenance issues will emerge in the future.
3. Recording of this information should be performed by the Building Maintenance Supervisor. This information must remain available to TCL during the warranty period for reference as required.

Failure to provide objective evidence of façade works and maintenance completed will void TCL warranties.

3. Cleaning and maintenance procedures

The following procedures are designed for the purpose of supplying the building management with guidelines on how to successfully clean and maintain the various surface finishes and hardware elements of the project.

Cleaning and maintenance procedures include general descriptions of the products and recommend the most practical cleaning and maintenance solutions to implement.

3.1 FAÇADE CLEANING & INSPECTION

ROUTINE MAINTENANCE AND INSPECTION

The requirements fall into four different categories:

1. **Every three months:**

1.1 Cleaning down of aluminium with non-alkaline detergent and warm water, applied using a soft cloth or sponge (refer cleaning specification).

2. **Every six months:**

2.1 Check structural silicone joints.

2.2 Check all internal Santoprene gaskets to ensure that there is sufficient compression between the curtainwall member of the glazed or panelled area. Also check to ensure that corner joints are still acceptable and that seals have not shrunk away from these joints.

2.3 Check that all external drain holes of the horizontal façade members are clear.

2.4 Check to ensure that the transom to mullion fixings are still secure and that excessive gaps or misalignment have not developed.

2.5 Structural glass tension truss and/or spider assemblies to be checked/adjusted.

2.6 Externally bolted façade elements, eg Sunblade/solarshade louvres, Treadgrate, Shadegrate, Skylights/rooflights with screwed on cappings, spider assemblies should be checked to ensure bolts are secure.

3. **After five years and then at 10 yearly intervals:**

3.1 Mullion to structure fixings to ensure that fixings have not corroded excessively and the restraining fasteners are secure.

In practice, for those checks in Category 3, it may not be possible to carry out all those on 100% of the building. It is therefore acceptable that, provided the external checks are satisfactory, the amount of internal checking required can be reduced to those areas visible or random checks of the internal areas are covered to highlight any potential problems (especially in a high wind-load area).

In Category 4 checks, these are, in practise, the most difficult to carry out as one of the main features of curtainwalling is that structural fixings are hidden from view. Every consideration should be given on all curtainwalling installations to a requirement for routine inspection of these fixings and we would recommend that a random check is done.

Provided the above checks are carried out and problems developing are remedied, we would estimate that a normal building life of some 60 years is achievable before a major refurbishment of the system is required. However, during this period it may be necessary to replace structural silicone joints, glazing gaskets and other like material where either inspection or performance deterioration highlight the requirements.

3.2 GLASS CLEANING

All glass surfaces should be kept clean by prompt removal of all dirt and residue.

Many substances can form on glass and should be removed as often as possible to ensure an acceptable appearance and to avoid permanent damage resulting in either a more expensive clean up methodology or eventual replacement. Glass is normally hydrophilic which means that water is attracted to the glass. Water generally carries differing amounts of sediments and residues and deposits these on the glass during evaporation.

LIMITATIONS OF WARRANTIES APPLICABLE TO CLEANING AND MAINTENANCE

The product must be kept free from contact with wet cement, hard foreign objects, metals, and abrasives. No liquid set films, plastic film or sign or similar device is applied to any surface of the glass by others without written approval from TCL.

Warranties are limited to “normal” range of environmental conditions.

Normal atmospheric conditions exclude:

- a) Corrosive or aggressive atmospheres such as those contaminated with chemical fumes, gasses other than those present in normal clean atmospheric air.
- b) Exposure to water or moisture, intermittent or continued submersion in water or any other liquid or solid material which may cause rainbow type staining.
- c) Exposure to radiation of any type other than normal sunlight.
- d) Corrosive salt spray.
- e) Acid rain from high density traffic flows.
- f) Strong wind with sand.

Consultation with TCL before project initiation is required for these situations.

GENERIC GLASS CLEANING METHODOLOGY AND PRODUCTS

If possible, apply a pre-clean soaking of water onto the glass to soften the dirt particles. Apply a nonabrasive mild detergent solution or dilute ammonia and water to glass either by spraying or using a clean grit free cloth, sponge or paper towel saturated with cleaning solution. Complete coverage of area to be cleaned is a necessity. For ease in cleaning, an area not exceeding ten to fifteen square meters at a time is recommended.

Wipe the above cleaning solutions on the glass in a circular motion and apply light to moderate pressure. Approximately three to five passes of the affected area may be required, depending on the adhesion and severity of the residue or sedimentation on the glass.

After cleaning with solution rinse the glass surface with generous amounts of clean water, removing all traces of cleaning solution from glass surface. Using a squeegee or clean, lint free dry cloth or paper towel to remove water from the glass surface. If dirt residue is still evident on the glass when dry, repeat the above.

NB CAUTIONS AND TECHNIQUES

Alkalis that have leached from construction concrete onto glass can cause staining or etching of the glass surface. It is important that all glass should be cleaned, as soon as possible, if such conditions exist. In most cases, the longer the residue is left on the glass, the greater potential for permanent marking/staining of the glass.

The run-off from other adjacent materials used by sub trades may be difficult to remove from the glass surface. It is important that all glass should be cleaned, as soon as possible, if such conditions exist. In most cases, the longer the residue is left on the glass, the greater potential for permanent marking/staining of the glass.

Do not clean glass when glass is exposed to direct sunlight. Glass should be cleaned by starting at the top of the building or top pane of glass and systematically working down to glass installed on lower levels. This technique reduces the possibility of residue and cleaning solution run down on glass previously cleaned.

Additional care should be exercised when cleaning all glass surfaces to ensure that gritty cloths, the metal parts of squeegees, or other sharp, hard objects do not scratch the glass surface during the cleaning procedures. Metal scrapers must not be used at any time. Scratched glass due to improper cleaning procedures is easily identified and damaged glass due to this occurrence will not be replaced under a warranty claim.

It is suggested that the building owner provide a qualified inspector who will see that the desired effect is being obtained with the use of sound procedures. Inspection should commence early in the cleaning procedure.

Consideration must be given to the adjacent building surrounding possible effect of run down on shrubbery, personnel, equipment etc located below. These factors may require considerations toward methodologies and timing.

Exposed aluminium silicone seals – either structural or weather seals, and glazing gasketry and mohair's should be cleaned concurrently with the glass.

3.3 ALUMINIUM POWDER-COATED PAINTED SURFACES

Aluminium possesses excellent resistance to atmospheric corrosion even in its natural or 'mill finish' condition although the appearance is much improved and resistance to atmospheric attack is greatly increased by finishing with powder-coat paint. However, the surface condition may deteriorate in certain circumstances, and it is therefore necessary to maintain the finish by regular cleaning if the original appearance is to be retained. It is emphasised that this deterioration does not materially affect the strength or service life of the aluminium itself

although roughening of the surface can ultimately interfere with the operation of moving parts such as sliding sash units.

Powder coating is available in 4 levels of application. Each higher level of application offers an increasing level of paint warranty in regard to retention of colour and film integrity. The maintenance of powder-coated aluminium is covered by AAMA 610.1-1979 (ref Appendices) which end users must follow regarding cleaning interval recommendations, with atmospheric environments acting as a variable affecting the intervals.

Limitations of warranties applicable to cleaning and maintenance

Warranties are limited to “normal” range of environmental conditions. Normal atmospheric conditions exclude:

- a) Corrosive or aggressive atmospheres such as those contaminated with chemical fumes, gasses other than those present in normal clean atmospheric air.
- b) Exposure to water or moisture, intermittent or continued submersion in water or any other liquid or solid material which may cause rainbow type staining.
- c) Exposure to radiation of any type other than normal sunlight.
- d) Corrosive salt spray.
- e) Acid rain from high density traffic flows.
- f) Strong wind with sand.

Consultation with TCL before project initiation is required for these situations.

CLEANING METHODOLOGY

The exact procedure for cleaning will vary depending on the nature and degree of soiling. Method of cleaning, type of cleaning, etc. of one component of the building must be used with consideration for other components such as glass, sealants, painted surfaces, etc.

Removal of light surface soiling may be accomplished in several ways. Some testing is recommended to determine the degree of cleaning necessary to accomplish the task. An initial step of forceful water rinse from the top down is recommended prior to any cleaner application. Significant benefit is gained with some type of surface agitation. Low water volume with moderate pressure is much better than considerable volume with little pressure.

Physical rubbing of the surface with soft, wet brushes, sponges or cloth is also helpful. As an initial step, apply a water rinse with moderate pressure to dislodge the soil. If this does not remove the soiling, then a concurrent water spray with brushing or sponging. We do not recommend the use of water blasters. The washing should be done with uniform pressure, cleaning first with a horizontal motion and then with a vertical motion. Apply cleaners only to an area that can be conveniently cleaned without changing position. The surface must be thoroughly rinsed with clean water. It may be necessary to sponge the surface while rinsing, particularly if cleaner is permitted to dry on the surface. The rinsed surface is permitted to air dry or is wiped dry with a chamois, squeegee or lint free cloth.

Rundown of cleaner (from any operation) to the lower portions of the building should be minimised and these areas should be rinsed as soon as possible to lessen streaking, etc. Do not allow cleaning chemicals to collect on surfaces or to "puddle" on horizontal surfaces,

crevices, etc. These should be flushed with water and dried. Always clean coated surfaces down from top to bottom and follow with a thorough rinsing with clean water.

Mild soaps or detergents ruled safe for bare hands are safe for coated aluminium. Stronger detergents such as some dishwasher detergents should be carefully spot tested. Some of the latter would necessitate rubber gloves, long handled brushes, etc. With any, the finish should be thoroughly rinsed with clean water and dried. A non-abrasive mild detergent solution will not have any deleterious effects. Use cloth, sponges or a soft bristle brush for application and rinse well after use.

NB. CAUTIONS AND TECHNIQUES

Over cleaning or excessive rubbing can do more harm than good. Strong solvents or strong cleaner concentrations can cause damage to painted surfaces. Always test a small area first. Avoid abrasive cleaners. Do not scour painted surfaces. Do not use household cleaners that contain abrasives on painted surfaces. Abrasive material such as steel wool, abrasive brushes etc can abrade, wear and harm finishes. Additional care should be exercised when cleaning all surfaces to ensure that gritty cloths, the metal parts of squeegees, or other sharp, hard objects do not scratch the surface during the cleaning procedures. Metal scrapers must not be used at any time. Scratched finishes due to improper cleaning procedures are easily identified and damages due to this occurrence will not be replaced under a warranty claim.

Never use paint removers, aggressive alkaline, acid, or abrasive cleaners. Do not use trisodium phosphate or highly alkaline or highly acid cleaners. Follow manufacturers' recommendations for mixing and diluting cleaners. Never mix cleaners. The mixing of cleaners may not only be ineffective but also very dangerous. Avoid drips and splashes.

Remove run downs as quickly as possible.

Avoid temperature extremes. Ideally, cleaning should be done at moderate temperature. Heat accelerates chemical reactions and may evaporate water from solution. Cleaning should be done on the shaded side of the building or ideally on a mild, cloudy day. Cleaning under adverse conditions may result in streaking or staining.

Do not substitute a heavy-duty cleaner for a frequently used mild cleaner.

It is suggested that the building owner provide a qualified inspector who will see that the desired effect is being obtained with the use of sound procedures. Inspection should commence early in the cleaning procedure.

Consideration must be given to the adjacent building surrounding possible effect of run down on shrubbery, personnel, equipment etc located below. These factors may require considerations toward methodologies and timing.

3.4 ALUMINIUM ANODISED SURFACES

Aluminium possesses excellent resistance to atmospheric corrosion even in its natural or 'mill finish' condition although the appearance is improved and resistance to atmospheric attack is greatly increased by anodising. However, the surface condition may deteriorate under certain circumstances, and it is therefore necessary to maintain the finish by regular cleaning if the original appearance is to be retained. It is emphasised that this deterioration does not

materially affect the strength or service life of the aluminium itself although roughening of the surface can ultimately interfere with the operation of moving parts such as sliding sash units.

Anodising film is general available in a limited range of colours with varying anodising film thickness, ranging from 10 to 25 microns. The maintenance of anodised aluminium is covered by NZ SFA 3503-03 in regard to cleaning intervals, with film thicknesses and atmospheric environments acting as variables affecting the intervals.

The following is an extract from SFA 3503-03, Maintenance of anodised aluminium:

“Regular cleaning is essential if the finish of anodised aluminium is to be preserved over the years. Deterioration of the anodic oxide coating can occur, mainly as a result of grime deposition and subsequent attack by moisture, particularly when it is contaminated with sulphur compounds. Deposited grime retains the contaminated moisture on the anodised surface permitting attack to proceed and, thereby, damaging the anodic oxide coating, which cannot be renewed in situ.”

Limitations of warranties applicable to cleaning and maintenance

Warranties are limited to “normal” range of environmental conditions. Normal atmospheric conditions exclude:

- a) Corrosive or aggressive atmospheres such as those contaminated with chemical fumes, gasses other than those present in normal clean atmospheric air.
- b) Exposure to water or moisture, intermittent or continued submersion in water or any other liquid or solid material which may cause rainbow type staining.
- c) Exposure to radiation of any type other than normal sunlight.
- d) Corrosive salt spray.
- e) Acid rain from high density traffic flows.
- f) Strong wind with sand. Consultation with TCL before project initiation is required for these situations

CLEANING METHODOLOGY

The exact procedure for cleaning will vary depending on the nature and degree of soil. Method of cleaning, type of cleaning, etc of one component of the building must be used with consideration for other components such as glass, sealants, painted surfaces, etc. Removal of light surface soil may be accomplished in several ways. Some testing is recommended to determine the degree of cleaning necessary to accomplish the task. An initial step of a forceful water rinse from the top down is recommended prior to any cleaner application. Significant benefit is gained with some type of surface agitation.

Low water volume with moderate pressure is much better than considerable volume with little pressure.

Physical rubbing of the surface with soft, wet brushes, sponges or cloth is also helpful. As an initial step, apply a water rinse with moderate pressure to dislodge the soil. If this does not remove the soil, then a concurrent water spray with brushing or sponging. The washing should be done with uniform pressure, cleaning first with a horizontal motion and then with a vertical motion. Apply cleaners only to an area that can be conveniently cleaned without changing position. The surface must be thoroughly rinsed with clean water. It may be necessary to sponge the surface while rinsing, particularly if cleaner is permitted to dry on the surface. The rinsed surface is permitted to air dry or is wiped dry with a chamois, squeegee or lint free cloth.

Rundown of cleaner (from any operation) to the lower portions of the building should be minimised and these areas should be rinsed as soon as possible to lessen streaking, etc. Do not allow cleaning chemicals to collect on surfaces or to "puddle" on horizontal surfaces, crevices, etc. These should be flushed with water and dried. Always clean coated surfaces down from top to bottom and follow with a thorough rinsing with clean water.

Mild soaps or detergents ruled safe for bare hands are safe for coated aluminium. Stronger detergents such as some dishwater detergents should be carefully spot tested. Some of the latter would necessitate rubber gloves, long handled brushes, etc. With any, the finish should be thoroughly rinsed with clean water and dried. A non-abrasive mild detergent solution will not have any deleterious effects. Use cloth, sponges or a soft bristle brush for application and rinse well after use.

NB. CAUTIONS AND TECHNIQUES

Over cleaning or excessive rubbing can do more harm than good. Strong solvents or strong cleaner concentrations can cause damage to painted surfaces. Always test a small area first. Avoid abrasive cleaners. Do not scour painted surfaces. Do not use household cleaners that contain abrasives on painted surfaces. Abrasive material such as steel wool, abrasive brushes etc can abrade, wear and harm finishes. Additional care should be exercised when cleaning all surfaces to ensure that gritty cloths, the metal parts of squeegees, or other sharp, hard objects do not scratch the surface during the cleaning procedures. Metal scrapers must not be used at any time. Scratched finishes due to improper cleaning procedures is easily identified and damages due to this occurrence will not be replaced under a warranty claim.

Never use paint removers, aggressive alkaline, acid, or abrasive cleaners. Do not use trisodium phosphate or highly alkaline or highly acid cleaners. Follow manufacturers' recommendations for mixing and diluting cleaners. Never mix cleaners. The mixing of cleaners may not only be ineffective but also very dangerous. Avoid drips and splashes. Remove run downs as quickly as possible.

Avoid temperature extremes. Ideally, cleaning should be done at moderate temperature. Heat accelerates chemical reactions and may evaporate water from solution. Cleaning should be done on the shaded side of the building or ideally on a mild, cloudy day. Cleaning under adverse conditions may result in streaking or staining.

Do not substitute a heavy-duty cleaner for a frequently used mild cleaner.

It is suggested that the building owner provide a qualified inspector who will see that the desired effect is being obtained with the use of sound procedures. Inspection should commence early in the cleaning procedure.

Consideration must be given to the adjacent building surrounding possible effect of run down on shrubbery, personnel, equipment etc located below. These factors may require considerations toward methodologies and timing.

3.5 GENERAL HARDWARE

Regular periodic maintenance is required on all proprietary hardware items supplied such as (but not limited to) Locks, hinges, catches, rollers, door closers and the like.

Maintenance schedules are proportional to usage and wear, site and environmental conditions. The effects of ultraviolet light, atmospheric pollution, general dirt and grime and airborne salt deposits can all accumulate over time and should be removed at regular intervals. These intervals are planned to prevent the build-up of detrimental substances on the external or internal mechanisms of the hardware's, and extra non-typical cleaning may be required to achieve this in extreme environments.

Limitations of warranties applicable to cleaning and maintenance

Warranties are limited to "normal" range of environmental conditions. Normal atmospheric conditions exclude:

- a) Corrosive or aggressive atmospheres such as those contaminated with chemical fumes, gasses other than those present in normal clean atmospheric air.
- b) Exposure to water or moisture, intermittent or continued submersion in water or any other liquid or solid material which may cause rainbow type staining.
- c) Exposure to radiation of any type other than normal sunlight.
- d) Corrosive salt spray.
- e) Acid rain from high density traffic flows.
- f) Strong wind with sand.

CLEANING METHODOLOGY

FIXING SCREWS. All hardware's are kept in place by fixing screws or some type of similar proprietary retaining item. Inspections of the screws to check for integrity of fixings and connection to frames must precede cleaning. Despite the use of base aluminium and high-grade stainless steel for fixings – it is impossible to prevent completely the initiation of the corrosion process due to the chemical reaction between dissimilar metals. This process occurs only after time and it is imperative that the fixings are regularly cleaned alongside the aluminium surfaces and that they are lightly coated after cleaning with oil-based sprays such as CRC, RP7 or WD40.

HINGES. Must be kept free of dirt, grime, and foreign materials. Inspections of the hinges to check for integrity of fixings and connection to door frames and/or glass must precede cleaning. Hinges should be brushed to remove loose particles. A concurrent water spray with brushing or sponging should remove stubborn dirt residuals. Any remaining substances can be removed with a non-abrasive mild detergent solution. Use cloth, sponges or a soft bristle brush for application and rinse well after use. Ensure that hinge joints are lightly coated after cleaning with oil-based sprays such as CRC, RP7 or WD40.

LOCKS. The mechanism of locks relies on the function of many parts. These parts must be kept free of deleterious materials. Inspections of the handles to check for integrity of fixings and connection to door frames and/or glass must precede cleaning. External surfaces must be kept clean with a non-abrasive clean cloth damp with a mild detergent solution. Atmospheres with a high level of saltwater deposit a layer of fine salt particles that must be removed as soon as it is sighted upon inspection. Internal workings of locks, catches etc., should be kept in good working order by applying a light spray of lubricant similar to CRC, RP7 or WD40. Care should be taken to ensure that any finished surfaces (e.g., paint etc.), in close proximity to the hardware being maintained, are well protected to avoid damage to the finishes.

HANDLES. Inspections of the handles to check for integrity of fixings and connection to door frames and/or glass must precede cleaning. External surfaces must be kept clean with a non-abrasive clean cloth damp with a mild detergent solution. A concurrent water spray with brushing or sponging should remove stubborn dirt residuals.

FREQUENCIES

The procedures mentioned above need to be carried out as often as necessary to prevent deterioration in the installed environment, however we recommend the following minimum frequency of application:

- General environments 6 monthly minimum.
- Marine and industrial environments 3 monthly maximum.

Regular maintenance is required to all hardware, even stainless steel; otherwise, the manufacturer's warranty may be voided.

PERFORMANCE STANDARD FOR MAINTENANCE & INSPECTION (IF APPLICABLE)

Thermosash Commercial requires an annual facade inspection to check all moving parts, façade cleaning, external bolted fins, structural glass/canopies, solarshade items, tension assembly tension loads and auto doors for fire egress compliance requirements and Thermosash PS 1 Design Producer Statement conditions. Inspections/service work required must be completed by Thermosash Commercial due to product guarantees including any reglazes given the specialist nature and engineering solutions incorporated in the scope of work. NB Main Contractors must provide water-tight openings and structure.

4. Project Specification Register

4.1 FAÇADE SPECIFICATION

- PW1000 Glazed Aluminium Curtainwall with Integrated Fins

4.2 GLASS SCHEDULE

- 32mm IGU Vision Glass (8T+14AS+10T)
- 32.76mm IGU Vision Glass (8T+14AS+10.76HS Laminated)

4.3 MATERIAL FINISHES SCHEDULE

- Duratec Zeus Ironsand Matt 9008109M- Curtainwall
- Duratec Zeus Appliance White Matt 9001274M – Fins

5. Removal and reinstatement of components

The following procedures are provided solely as a general descriptive methodology regarding removal and reinstatement of components supplied or installed by TCL. Before any such procedures are carried out, please notify TCL.

If any procedure is performed whilst still under the project warranty periods, this work shall be done by TCL to ensure that the project warranties on the components is not void due to incorrect work / methods being performed. If it is not possible to supply personnel from TCL directly then an appropriate level of supervision should be requested to guide the labour provided. Personnel performing such maintenance work on the building façade should be suitably qualified and have industry experience in the work that is required to be done.

Record of maintenance and repairs is to be documented and evidence retained in Section 6 of this maintenance manual. Records are to be completed during any removal and reinstatement of components inspection or maintenance on the façade as a historical record or work completed.

External access must be provided to all façade elements. If the project has a flush façade and there is no Building maintenance unit available on the building, a purpose made swing stage shall be installed to allow external access where required. In addition, if re-glazing, a roof mounted lifting device is required with suitable battery-operated suction plates for supporting the components.

Note: The following procedures should only be considered as technical working procedures and not a safe work method statement. Full risk assessment documentation and appropriate work method statement should be prepared based on the local governing workplace health and safety laws, prior to any work commencing on site. TCL can assist in this documentation.

6. Inspection and Maintenance Programme

RECOMMENDED PREVENTATIVE PROGRAMME FOR MAINTENANCE OF FAÇADE AND ALUMINIUM JOINERY						
TASK	3 MONTHLY	6 MONTHLY	9 MONTHLY	12 MONTHLY	2 YEARLY	5 YEARLY
Clean Aluminium Joinery/Curtainwall Panels						
Clean Glass (Including Rubber Gaskets)						
Automatic Door Service						
Check Weather Seals						
Check Rubber Glazing Gaskets						
Check Structural Silicone Joints						
Check External Drain Holes are Clear of Debris						
Check Transom to Mullion Gaps & Alignment						
Care & Maintenance of Window & Door Hardware						
Check Externally Bolted Façade Elements – Skylights – Adjustment by Thermosash personnel only						

8. Appendices and attachments

- 8.1 Leak Questionnaire
- 8.2 AAMA 610-1-1979
- 8.3 Warranties
- 8.4 As-Built Drawings

SAMPLE