

TEN PLUS SPEC NOTE: This master specification section includes TEN PLUS SPEC NOTES for information purposes and to assist the architect / specification writer in making appropriate decisions. TEN PLUS SPEC NOTES always immediately precedes the text to which it is referring. The section serves as a guideline only and should be edited with deletions and additions to meet specific project requirements.

TEN PLUS SPEC NOTE: This specification section follows the recommendations of the Construction Specifications Canada, Manual of Practice including MasterFormat, SectionFormat, and PageFormat. Optional text is indicated by square brackets []; delete the optional text including the brackets in the final copy of the specification. Delete all TEN PLUS SPEC NOTES in the final copy of the specification. This Section is written for the Canadian industry with units of measurement shown in SI Metric and Imperial measurement following in square brackets.

PART 1:GENERAL

1.1 SUMMARY

- .1 This Section includes requirements for supply and installation of fixed louvers, bird screens, blank-off panels and attachment brackets as shown on drawings, as specified and as required for complete and proper installation.
- .2 Fixed louvers to be furnished include the following:
 - .1 Storm Resistant Louver
 - .2 Drainable Louver
 - .3 Stormproof Louver
 - .4 Straight Blade Louver
 - .5 Sight Proof Louver

1.2 RELATED REQUIREMENTS

TEN PLUS SPEC NOTE: Include in this paragraph only those sections and documents that directly affect the work of this section. Do not include Division 00 Documents or Division 01 Sections since it is assumed that all technical sections are related to all project Division 00 Documents and Division 01 Sections to some degree. Refer to other documents with caution since referencing them may cause them to be considered a legal part of the Contract. Edit the following paragraphs to suit specific project conditions.

- .1 Section 03 30 00 - Cast-In-Place Concrete [03300 - Cast-In-Place Concrete]
- .2 Section 04 20 00 - Unit Masonry [04200 - Masonry Units]
- .3 Section 05 12 00 - Structural Steel Framing [05120 - Structural Steel Metal Framing]
- .4 Section 05 40 00 - Cold-Formed Metal Framing [05400 - Cold-Formed Metal Framing]
- .5 Section 05 50 00 - Metal Fabrications [05500 - Metal Fabrications]
- .6 Section 06 10 00 - Rough Carpentry [06100 - Rough Carpentry]
- .7 Section 07 42 00 - Wall Panels [07400 - Roofing and Siding Panels]
- .8 Section 07 92 00 - Joint Sealants [07900 - Joint Sealers]
- .9 Section 08 11 00 - Metal Doors and Frames [08100 - Metal Doors and Frames]
- .10 Section 08 14 00 - Wood Doors [08200 - Wood and Plastic Doors]

- .11 Section 08 41 00 - Entrances and Storefronts [08400 - Entrances and Storefronts]
- .12 Section 08 44 00 - Curtain Wall and Glazed Assemblies [08900 - Glazed Curtain Wall]
- .13 Section 09 90 00 - Painting and Coating [09900 - Paints and Coatings]
- .14 Division 23 - Heating, Ventilating and Air Conditioning (HVAC) [15700 - Heating, Ventilating and Air Conditioning Equipment]

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM):
 - .1 ASTM B209-10, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate
 - .2 ASTM B211-12e1, Standard Specification for Aluminum and Aluminum Alloy Rolled or Cold Finished Bar, Rod, and Wire
 - .3 ASTM B221-12, Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - .4 ASTM E90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- .2 Canadian Standards Association (CSA):
 - .1 CAN/CSA-S157-05/S157.1-05 (R2010), Strength Design in Aluminum / Commentary on CSA S157-05, Strength Design in Aluminum
 - .2 CAN/CSA-S136-07, North American Specification for the Design of Cold-Formed Steel Structural Members
- .3 Architectural Aluminum Manufacturers Association (AAMA):
 - .1 AAMA 605.2-95, Voluntary Specification for High Performance Organic Coatings on Aluminum Extrusions and Panels
 - .2 AAMA 800-10, Voluntary Specifications and Test Methods for Sealants
 - .3 AAMA 2605-11 Superior Performing Organic Coatings on Aluminum Extrusions and Panels
 - .4 AAMA TIR Metal Curtain Wall Fasteners (2000 Addendum)
- .4 Air Movement and Control Association International Inc. (AMCA):
 - .1 AMCA Standard 500-L-12, Laboratory Methods of Testing Louvers for Rating
 - .2 AMCA Publication 501-09, Application Manual for Louvers
 - .3 AMCA Publication 511-10 (Rev. 8/12), Certified Ratings Program - Product Rating Manual for Air Control Devices

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate the Work of this Section with the installation of ductwork; Sequence work so that installation of louvers coincides with installation of HVAC materials without causing delay to the Work.

- .2 Pre-Construction Conference: Arrange a site meeting attended by the Contractor, the Subcontractor, the Consultant, materials supplier(s), and other relevant personnel before commencement of work for this Section; as indicated in Section 01 31 13 Project Meetings [01310 Project Management and Coordination].
 - .1 Review methods and procedures related to installation, including manufacturer's written instructions;
 - .2 Examine substrate conditions for compliance with manufacturers installation requirements;
 - .3 Review temporary protection measures required during and after installation.

1.5 SUBMITTALS

- .1 Provide requested information in accordance with Section 01 33 00 Submittals Procedures [01300 Submittal Procedures].
- .2 Action Submittals: Provide the following submittals before starting any work of this Section:
 - .1 Product Data:
 - .1 AMCA Certified Air flow and water entrainment performance test results
 - .2 Material types and thickness
 - .2 Shop Drawings: Submit shop drawings showing the location, finished appearance and dimensions of each type of louver. Show all material, thicknesses, connections, fastenings, shapes and finishes.
 - .3 Coating Samples: Submit samples of factory applied coatings and finishes for Consultant's initial selection.
 - .4 Samples: Submit for approval 305mm (12") long sample lengths of each type of louver blade and frame extrusion prior to full scale production, showing finish colour.
- .3 Information Submittals:
 - .1 Certification: Submit product test reports based on evaluation of comprehensive tests performed by a qualified testing agency for each type of louver required for this project.
 - .2 Performance Requirements: Provide AMCA Certified test data as required to confirm that the louvers have the specified air and water performance characteristics.
 - .3 Acoustical Performance: Where applicable, submit test reports to confirm that the louvers meet the specified STC and Noise Reduction requirements.
 - .4 Structural Requirements: Unless otherwise noted, design all materials to withstand a minimum wind load of 955 PA (20 psf) and as required by the applicable building code, and recommended by the louver manufacturer.
 - .1 Ensure louvre members deflect no more than L/180 of span between supports when subjected to wind load applied horizontally to louver face.
 - .5 Delegated Design Submittals: Furnish complete design calculations and details, fabrication and erection shop drawings and site review for fixed louvers, bearing the seal of a Professional Engineer registered in the Province of the Work, in accordance with applicable Building Code and Contract Documents.

TEN PLUS SPEC NOTE: Delete the following paragraph in its entirety if sustainable design submittals are not required as part of the Project.

TEN PLUS SPEC NOTE: Add and/or remove items below to comply with LEED credits or prerequisites selected for the Project. After meeting the credit requirements, complete the required documentation for each credit.

TEN PLUS SPEC NOTE: Consult the project team's designated LEED Accredited Professional if these or other credits are going to be pursued.

- .4 Sustainable Design Submittals: Coordinate project sustainable design requirements with Section 01 31 63 Sustainability Certification Project Requirements [01353 General LEED Specifications]; in addition, provide information for following specific requirements of this Section:

TEN PLUS SPEC NOTE: The paragraphs below indicate the lowest requirement to obtain each credit, resulting in one credit point. The second option, indicated in [] requires in higher values than option one but allows for an additional credit to be obtained. Edit each paragraph below to suit project requirements.

- .1 MR Credit 4.1[4.2] – Recycled Content:
- .1 **Content:** Use building materials containing recycled content such that the sum of post-consumer recycled content plus 1/2 of the pre-consumer content is at least 10%[20%], based on cost, of the total value of the materials in the Project. The recycled content value of a material assembly is determined by weight.
- .2 **Compliance Requirement:** Submit product cut sheet indicating post consumer and pre-consumer recycled content contained in products proposed for this project.
- .2 MR Credit 5.1[5.2] – Regional Materials:
- .1 **Content:** Use building materials or products extracted, harvested, recovered and processed within 800 km (500 miles) of the final manufacturing site, for which a minimum percentage of regional materials used on the project equals 20%[30%].
- .2 **Compliance Requirement:** Submit evidence of delivery service and product data indicating compliance with regional materials extraction and manufacturing requirements.

1.6 CLOSEOUT SUBMITTALS

- .1 Operation and Maintenance Data: Submit manufacturer's written instructions for cleaning solutions, materials and procedures, include name of original installer and contact information in accordance with Section 01 78 23 Operation and Maintenance Data [01780 Closeout Submittals].
- .1 Provide specific warning of any maintenance practice or materials that may damage or disfigure the finished Work.

1.7 QUALITY ASSURANCE

- .1 Qualifications: Provide proof of qualifications when requested by Consultant:
- .1 Manufacturer / Supplier: Obtain materials from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties.
- .2 Installers: Execute Work of this Section using qualified personnel skilled in installation of work of this Section, having a minimum of three (3) years proven experience of installations similar in material, design, and extent to that indicated for this Project.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Delivery: At the time of delivery, visually inspect all materials for damage. Note any damaged boxes, crates, or louver sections on the receiving ticket and immediately report to the shipping company and the material manufacturer.
- .2 Storage: Store louver raised off the ground and cover with a weather proof flame resistant sheeting or tarpaulin.
- .3 Handling:
 - .1 Material shall be handled in accordance with sound material handling practices and in such a way as to minimize racking.
 - .2 Louver sections may be hoisted by attaching straps to the jambs and lifting the section while it is in a vertical position.
 - .3 Louver sections should only be lifted and carried by the jambs. Heads, sills and blades are not to be used for lifting or hoisting louver sections.

1.9 SITE CONDITIONS

- .1 Verify dimensions of actual opening by field measurements before fabrication and indicate measurements on Shop Drawings where fixed louvers are indicated to fit walls and other construction.
- .2 Establish dimensions and proceed with fabricating fixed louvers where field measurements cannot be made without delaying the work; allow for trimming and fitting.

1.10 WARRANTY

- .1 Warrant the work of this section in accordance with General Conditions but for a period of one (1) year and agree to repair or replace faulty materials or work which becomes evident during the warranty period without cost to the Owner and at the Owner's convenience.
- .2 Special Finish Warranty: Submit a written warranty, signed by manufacturer, covering failure of the factory-applied exterior finish on aluminum louvers within the specified warranty period and agreeing to repair finish or replace louvers that show evidence of finish deterioration. Deterioration of finish includes, but is not limited to, colour fade, chalking, cracking, peeling, and loss of film integrity for a period of ten (10) years from date of Substantial Performance.

PART 2:PRODUCTS

2.1 MANUFACTURER

- .1 Materials Manufacturer: Louvers and accessories specified herein are manufactured by:

Ten Plus Architectural Products Ltd.
26 - 6535 Millcreek Drive, Mississauga, Ontario, Canada, L5N 2M2
Phone: (866) 884-0717
Email: info@tenplus-online.com
Website: www.tenplus-online.com

2.2 MATERIALS

- .1 Aluminum Extrusions: ASTM B211, Aluminum Alloy 6063-T52.
- .2 Aluminum Sheet: ASTM B209, Aluminum Alloy 6063-T52.
- .3 Fastenings: Provide zinc plated steel or AISI Type 304 stainless steel for screws and fasteners.
- .4 Structural Support: Designed and furnished by louver manufacturer to support wind load of 955 Pa (20 psf), unless otherwise specified.

2.3 FIXED LOUVER SYSTEMS

TEN PLUS SPEC NOTE: Select one or more of the following louver systems depending on Project requirements. Consult with manufacturer for systems which best suit design requirements.

TEN PLUS SPEC NOTE: Consult with the Mechanical Engineer to ensure that system and model selected below provides enough free area of air circulation to allow mechanical equipment to perform efficiently.

TEN PLUS SPEC NOTE: Storm Resistant Louvers are designed to reduce the amount of water entry into the building, obtain a 99.8% effectiveness ratio (Class "A" Rating) when tested with a 13 m/second (29 mph) wind velocity with a 75mm/hr. (3 in./hr.) rainfall rate.

- .1 Storm Resistant Louvers:
 - .1 178mm (7") deep fixed type, storm resistant aluminum louver, with 6063-T52 aluminum alloy extrusion, and as described in the following performance criteria:
 - .1 Certification: Louver AMCA tested, certified and licensed to bear the AMCA seal for the following:
 - .1 Air performance
 - .2 Water penetration
 - .3 Wind driven rain
 - .2 Extrusion Thickness:
 - .1 Head, Sill, Jambs and Mullions: Minimum 2mm (0.080") thick.
 - .2 Blades: Minimum 2mm (0.080") thick.
 - .3 Louver Type: Mullion or continuous line construction
 - .4 Blade Angle: 35°
 - .5 Free Area - 1220mm x 1220mm (4' x 4') unit: 0.75m² (8.03 sq.ft.)
 - .6 Percentage of Free Area: 50.3%
 - .7 Wind Driven Rain Water Penetration Data:
 - .1 Effectiveness Ratio: 99.8% Class "A" Rating) with wind driven at louver face at a velocity of 13 m/s (29 mph), in conjunction with a rainfall rate of 76mm/hr (3" / hr)
 - .8 Air Performance Data:
 - .1 Intake static pressure drop of 32.38 Pa (0.13" H₂O) at the suggested design free area velocity of 2.5 m/s (500 FPM)
 - .2 Volume of air at the suggested free area design velocity 1.90 m³/s (4015 CFM)
 - .9 Basis of Design Product: Model R7355 Storm Resistant Drainable Louver by Ten Plus Architectural Products Ltd.

- .10 Description:
- .1 Louver assembly is Storm Resistant, sight proof and designed to collect wind driven rain and expel it to the exterior of the building through horizontal gutters, vertical gutters and the sill pan assembly.
 - .2 Heads, sills, jambs and mullions to be one piece extruded aluminum members with integral caulking slots.
 - .3 Front blade to be continuous line type construction with joints at maximum 3048mm (10') centers.
 - .4 Back blades to be mullion type construction with mullions located at maximum 1524mm (5') centers. Blade profile shall have integral draining gutters to carry water to the vertical gutters on the lateral mullions and jambs.
 - .5 Sill pans assemblies shall consist of minimum 1.5mm (0.060") formed aluminum shapes. Provide minimum 52mm (2") vertical returns behind louvre or blank off panel assembly and end dams.
- .2 127mm (5") deep fixed type, storm resistant aluminum louver, with 6063-T52 aluminum alloy extrusion, and as described in the following performance criteria:
- .1 Certification: Louver AMCA tested, certified and licensed to bear the AMCA seal for the following:
 - .1 Air performance
 - .2 Water penetration
 - .3 Wind driven rain
 - .2 Extrusion Thickness:
 - .1 Head, Sill, Jambs and Mullions: Minimum 2mm (0.080") thick.
 - .2 Blades: Minimum 1.77mm (0.070") thick.
 - .3 Louver Type: Mullion construction
 - .4 Blade Angle: 45°
 - .5 Free Area - 1220mm x 1220mm (4' x 4') unit: 0.70m² (7.54 sq.ft.)
 - .6 Percentage of Free Area: 47.1%
 - .7 Wind Driven Rain Water Penetration Data:
 - .1 Effectiveness Ratio: 99.8% (Class "A" Rating) with wind driven at louver face at a velocity of 13 m/s (29 mph), in conjunction with a rainfall rate of 76mm/hr (3" / hr)
 - .8 Air Performance Data:
 - .1 Intake static pressure drop of 24.91 Pa (0.10" H₂O) at the suggested design free area velocity of 2.5 m/s (500 FPM)
 - .2 Volume of air at the suggested free area design velocity 1.78 m³/s (3770 CFM)
 - .9 Basis of Design Product: Model R5455 Storm Resistant Drainable Louver by Ten Plus Architectural Products Ltd.
 - .10 Description:
 - .1 Louver assembly is Storm Resistant, sight proof and designed to collect wind driven rain and expel it to the exterior of the building through

- horizontal gutters, vertical gutters and the sill pan assembly.
- .2 Heads, sills, jambs and mullions to be one piece extruded aluminum members with integral caulking slots.
- .3 Blades to be mullion type construction with mullions located at maximum 1524mm (5') centers. Blade profile shall have integral draining gutters to carry water to the vertical gutters on the lateral mullions and jambs.
- .4 Sill pans assemblies shall consist of minimum 1.5mm (0.060") formed aluminum shapes. Provide minimum 52mm (2") vertical returns behind louvre or blank off panel assembly and end dams.

TEN PLUS SPEC NOTE: Drainable Louvers are designed to eliminate cascading of water on the blades of tall louvers, therefore reducing the potential of water penetration.

TEN PLUS SPEC NOTE: Drainable Louvers are designed to be used with vertical mullions which divert water collected in the horizontal gutters down and away from the louver system. Without vertical mullions water may pool in the gutters and will increase the risk of water penetration. Consult with the manufacturer prior to selecting a Drainable Louver if vertical mullions are not included in the design.

- .2 Drainable Louvers:
 - .1 152mm (6") deep fixed type, drainable aluminum louver, with 6063-T52 aluminum alloy extrusion, and as described in the following performance criteria:
 - .1 Performance Rating Standard: AMCA Standard 500L
 - .2 Certification: Louver AMCA tested, certified and licensed to bear the AMCA seal for the following:
 - .1 Air performance
 - .2 Water penetration
 - .3 Extrusion Thickness:
 - .1 Head, Sill, Jambs and Mullions: Minimum 2mm (0.080") thick.
 - .2 Blades: Minimum 2.3mm (0.090") thick.
 - .4 Louver Type: Mullion or continuous line construction
 - .5 Blade Angle: 40°
 - .6 Free Area - 1220mm x 1220mm (4' x 4') unit: 0.81m² (8.72 sq.ft.)
 - .7 Percentage of Free Area: 54.5%
 - .8 Air Performance Data:
 - .1 Intake static pressure drop of 11.46 Pa (0.046" H₂O) at the suggested design free area velocity of 2.5 m/s (500 FPM)
 - .2 Volume of air at the suggested free area design velocity 2.06 m³/s (4360 CFM)
 - .9 Basis of Design Product: Model D6403 Drainable Louver by Ten Plus Architectural Products Ltd.
 - .10 Description:
 - .1 Louver assembly consists of drainable blades designed to collect rain water and expel it to the exterior of the building through horizontal gutters, vertical gutters and the sill pan assembly.
 - .2 Heads, sills, jambs and mullions to be one piece extruded aluminum members with integral caulking slots.
 - .3 Blades to be mullion type construction with mullions located at maximum 1524mm (5') centers. Blade profile shall have integral

- draining gutter to carry water to the vertical gutters on the lateral mullions and jambs.
- .4 Sill pans assemblies shall consist of minimum 1.5mm (0.060") formed aluminum shapes. Provide minimum 52mm (2") vertical returns behind louvre or blank off panel assembly and end dams.
- .2 102mm (4") deep fixed type, drainable aluminum louver, with 6063-T52 aluminum alloy extrusion, and as described in the following performance criteria:
- .1 Performance Rating Standard: AMCA Standard 500L
- .2 Certification: Louver AMCA tested, certified and licensed to bear the AMCA seal for the following:
- .1 Air performance
- .2 Water penetration
- .3 Extrusion Thickness:
- .1 Head, Sill, Jambs and Mullions: Minimum 2mm (0.080") thick.
- .2 Blades: Minimum 2mm (0.080") thick.
- .4 Louver Type: Mullion or continuous line construction
- .5 Blade Angle: 49°
- .6 Free Area - 1220mm x 1220mm (4' x 4') unit: 0.714m² (7.68 sq.ft.)
- .7 Percentage of Free Area: 48.5%
- .8 Air Performance Data:
- .1 Intake static pressure drop of 11.96 Pa (0.048" H₂O) at the suggested design free area velocity of 2.5 m/s (500 FPM)
- .2 Volume of air at the suggested free area design velocity 1.81 m³/s (3840 CFM)
- .9 Basis of Design Product: Model D4493 Drainable Louver by Ten Plus Architectural Products Ltd.
- .10 Description:
- .1 Louver assembly consists of drainable blades designed to collect rain water and expel it to the exterior of the building through horizontal gutters, vertical gutters and the sill pan assembly.
- .2 Heads, sills, jambs and mullions to be one piece extruded aluminum members with integral caulking slots.
- .3 Blades to be mullion type construction with mullions located at maximum 1524mm (5') centers. Blade profile shall have integral draining gutter to carry water to the vertical gutters on the lateral mullions and jambs.
- .4 Sill pans assemblies shall consist of minimum 1.5mm (0.060") formed aluminum shapes. Provide minimum 52mm (2") vertical returns behind louvre or blank off panel assembly and end dams.

TEN PLUS SPEC NOTE: Stormproof Louvers are designed for all purpose general project applications. Minimal water penetration is expected and considered in the mechanical system design.

TEN PLUS SPEC NOTE: Consult with the Mechanical Engineer prior to selecting this louver system to ensure that measures have been taken to drain water which enters through the louver during heavy rainfall and high wind events.

- .3 Stormproof Louvers:
 - .1 152mm (6") deep fixed type, stormproof aluminum louver, with 6063-T52 aluminum alloy extrusion, and as described in the following performance criteria:
 - .1 Performance Rating Standard: AMCA Standard 500L
 - .2 Certification: Louver AMCA tested, certified and licensed to bear the AMCA seal for the following:
 - .1 Air performance
 - .2 Water penetration
 - .3 Extrusion Thickness:
 - .1 Head, Sill, Jambs and Mullions: Minimum 2mm (0.080") thick.
 - .2 Blades: Minimum 2.3mm (0.090") thick.
 - .4 Louver Type: Mullion or continuous line construction
 - .5 Blade Angle: 45°
 - .6 Free Area - 1220mm x 1220mm (4' x 4') unit: 0.70m² (7.53 sq.ft.)
 - .7 Percentage of Free Area: 47.1%
 - .8 Air Performance Data:
 - .1 Intake static pressure drop of 11.21 Pa (0.045" H₂O) at the suggested design free area velocity of 2.5 m/s (500 FPM)
 - .2 Volume of air at the suggested free area design velocity 1.78 m³/s (3765 CFM)
 - .9 Basis of Design Product: Model H6451 Stormproof Louver by Ten Plus Architectural Products Ltd.
 - .10 Description:
 - .1 Louver assembly consists of storm blades designed prevent water from creeping up the blade and deflecting it away from the louvre opening.
 - .2 Heads, sills, jambs and mullions to be one piece extruded aluminum members with integral caulking slots.
 - .3 Blades to be mullion type or continuous line construction with vertical mullions or recessed, structural supports located at maximum 1524mm (5') centers.
 - .4 Sill flashing shall consist of minimum 1.5mm (0.060") formed aluminum shape with a minimum 52mm (2") vertical return behind louvre or blank off panel assembly.
 - .2 102mm (4") deep fixed type, stormproof aluminum louver, with 6063-T52 aluminum alloy extrusion, and as described in the following performance criteria:
 - .1 Performance Rating Standard: AMCA Standard 500L
 - .2 Certification: Louver AMCA tested, certified and licensed to bear the AMCA seal for the following:
 - .1 Air performance
 - .2 Water penetration

- .3 Extrusion Thickness:
 - .1 Head, Sill, Jambs and Mullions: Minimum 2mm (0.080") thick.
 - .2 Blades: Minimum 2mm (0.080") thick.
- .4 Louver Type: Mullion or continuous line construction
- .5 Blade Angle: 45°
- .6 Free Area - 1220mm x 1220mm (4' x 4') unit: 0.755m² (8.12 sq.ft.)
- .7 Percentage of Free Area: 51.0%
- .8 Air Performance Data:
 - .1 Intake static pressure drop of 11.71 Pa (0.047" H₂O) at the suggested design free area velocity of 2.5 m/s (500 FPM)
 - .2 Volume of air at the suggested free area design velocity 1.92 m³/s (4060 CFM)
- .9 Basis of Design Product: Model H4451 Stormproof Louver by Ten Plus Architectural Products Ltd.
- .10 Description:
 - .1 Louver assembly consists of storm blades designed prevent water from creeping up the blade and deflecting it away from the louvre opening.
 - .2 Heads, sills, jambs and mullions to be one piece extruded aluminum members with integral caulking slots.
 - .3 Blades to be mullion type or continuous line construction with vertical mullions or recessed, structural supports located at maximum 1524mm (5') centers.
 - .4 Sill flashing shall consist of minimum 1.5mm (0.060") formed aluminum shape with a minimum 52mm (2") vertical return behind louvre or blank off panel assembly.
- .3 51mm (2") deep fixed type, stormproof aluminum louver, with 6063-T52 aluminum alloy extrusion, and as described in the following performance criteria:
 - .1 Extrusion Thickness:
 - .1 Head, Sill, Jambs and Mullions: Minimum 1.57mm (0.062") thick.
 - .2 Blades: Minimum 1.57mm (0.062") thick.
 - .2 Louver Type: Mullion or continuous line construction
 - .3 Blade Angle: 45°
 - .4 Free Area - 1220mm x 1220mm (4' x 4') unit: 0.639m² (6.78 sq.ft.)
 - .5 Percentage of Free Area: 43.0%
 - .6 Basis of Design Product: Model H2451 Stormproof Louver by Ten Plus Architectural Products Ltd.
 - .7 Description:
 - .1 Louver assembly consists of storm blades designed prevent water from creeping up the blade and deflecting it away from the louvre opening.
 - .2 Heads, sills, jambs and mullions to be one piece extruded aluminum members with integral caulking slots.
 - .3 Blades to be mullion type or continuous line construction with vertical mullions or recessed, structural supports located at maximum 1524mm (5') centers.
 - .4 Sill flashing shall consist of minimum 1.5mm (0.060") formed

aluminum shape with a minimum 52mm (2") vertical return behind louver or blank off panel assembly.

TEN PLUS SPEC NOTE: Straight Blade Louvers are designed for appearance characteristics of the blades. Minimal water penetration is expected and considered in the mechanical system design.

TEN PLUS SPEC NOTE: Consult with the Mechanical Engineer prior to selecting this louver system to ensure that measures have been taken to drain water which enters through the louver during heavy rainfall and high wind events.

- .4 Straight Blade Louvers:
 - .1 152mm (6") deep fixed type, straight blade aluminum louver, with 6063-T52 aluminum alloy extrusion, and as described in the following performance criteria:
 - .1 Extrusion Thickness:
 - .1 Head, Sill, Jambs and Mullions: Minimum 2mm (0.080") thick.
 - .2 Blades: Minimum 2.3mm (0.090") thick.
 - .2 Louver Type: Mullion or continuous line construction
 - .3 Blade Angle: 45°
 - .4 Free Area - 1220mm x 1220mm (4' x 4') unit: 0.692m² (7.44 sq.ft.)
 - .5 Percentage of Free Area: 46.5%
 - .6 Basis of Design Product: Model S6452 Straight Blade Louver by Ten Plus Architectural Products Ltd.
 - .7 Description:
 - .1 Louver assembly consists of straight blades designed to deflect water away from the louver opening.
 - .2 Heads, sills, jambs and mullions to be one piece extruded aluminum members with integral caulking slots.
 - .3 Blades to be mullion type or continuous line construction with vertical mullions or recessed, structural supports located at maximum 1524mm (5') centers.
 - .4 Sill flashing shall consist of minimum 1.5mm (0.060") formed aluminum shape with a minimum 52mm (2") vertical return behind louver or blank off panel assembly.

TEN PLUS SPEC NOTE: Sight Proof Louvers are designed for applications where the requirement is to eliminate sight lines beyond the face of the louver.

TEN PLUS SPEC NOTE: Sight Proof Louvers are also commonly used in transformer vaults or other applications where the louvers are required to be tamperproof.

- .5 Sight Proof Louvers:
 - .1 102mm (4") deep fixed type, sight proof aluminum louver, with 6063-T52 aluminum alloy extrusion, and as described in the following performance criteria:
 - .1 Extrusion Thickness:
 - .1 Head, Sill, Jambs and Mullions: Minimum 2mm (0.080") thick.
 - .2 Blades: Minimum 2mm (0.080") thick.
 - .2 Louver Type: Mullion or continuous line construction
 - .3 Blade Angle: 45°
 - .4 Free Area - 1220mm x 1220mm (4' x 4') unit: 0.372m² (4.00 sq.ft.)
 - .5 Percentage of Free Area: 25.0%

- .6 Basis of Design Product: Model V4454 Sight Proof Blade by Ten Plus Architectural Products Ltd.
- .7 Description:
 - .1 Louver assembly consists of sight proof blades designed to cut off sight lines beyond the back of the louver.
 - .2 Heads, sills, jambs and mullions to be one piece extruded aluminum members with integral caulking slots.
 - .3 Blades to be mullion type or continuous line construction with vertical mullions or recessed, structural supports located at maximum 1524mm (5') centers.
 - .4 Sill pans assemblies shall consist of minimum 1.27mm (0.050") formed aluminum shapes. Provide minimum 52mm (2") vertical returns behind louver or blank off panel assembly and end dams.
- .6 Vision Screens:
 - .1 102mm (4") deep, inverted blade vision screen, with 6063-T52 aluminum alloy extrusion, and as described in the following performance criteria:
 - .1 Extrusion Thickness:
 - .1 Head, Sill, Jambs and Mullions: Minimum 2mm (0.080") thick.
 - .2 Blades: Minimum 2mm (0.080") thick.
 - .2 Louver Type: Mullion or continuous line construction
 - .3 Blade Angle: 52°
 - .4 Free Area - 1220mm x 1220mm (4' x 4') unit: 0.639m² (6.88 sq.ft.)
 - .5 Percentage of Free Area: 43.3%
 - .6 Basis of Design Product: Model S4522 inverted blade Vision Screen by Ten Plus Architectural Products Ltd.
 - .7 Description:
 - .1 Vision Screen assembly consists of straight blades designed to cut off sight lines beyond the back of the screen.
 - .2 Heads, sills, (if required) jambs and mullions to be one piece extruded aluminum members with integral caulking slots.
 - .3 Blades to be mullion type or continuous line construction with vertical mullions or recessed, structural supports located at maximum 1524mm (5') centers.
- .7 Thinline Louver
 - .1 32mm (1 1/4") deep, straight blade with 6063-T52 aluminum alloy extrusion, and as described in the following performance criteria:
 - .1 Extrusion Thickness:
 - .1 Head, Sill, Jambs and Mullions: Minimum 1.6mm (0.063") thick.
 - .2 Blades: Minimum 1.6mm (0.063") thick.
 - .2 Louver Type: Mullion or continuous line construction
 - .3 Blade Angle: 30°
 - .4 Free Area - 1220mm x 1220mm (4' x 4') unit: 0.922m² (9.92 sq.ft.)
 - .5 Percentage of Free Area: 62.0%
 - .6 Basis of Design Product: Model T1300 Thinline louver by Ten Plus Architectural Products Ltd.

.7 Description:

- .1 Louver assembly consists of straight designed to maximize free area at smaller louvre openings where water entry is not a consideration.
- .2 Heads, sills, jambs and mullions to be one piece extruded aluminum members.
- .3 Blades to be mullion or continuous line construction with recessed, structural ribs located at maximum 406mm (16") centers.

2.4 ACCESSORIES

- .1 Sill Flashing: Provide sill flashing of same material and finish as adjacent louver, as approved by the Consultant.
- .2 Structural Support:
 - .1 Louver Support: Designed and furnished by louver manufacturer to support wind load of 955 Pa (20 psf), unless others specified.
 - .2 Support Angle: Louver openings that are greater than 1524mm (5') wide and greater than 3658mm (12') high, require horizontal girt at mid span, as indicated in Section 05 50 00 Metal Fabrications [05500].
- .3 Bird Screens:

TEN PLUS SPEC NOTE: Select one of the following options below and delete the remaining options not required on the project. The following options have been placed in order from inexpensive to more expensive.

TEN PLUS SPEC NOTE: Option 1 is the standard option bird screen, offering durability at an inexpensive budget cost. Select Option 2 or Option 3 if that is the design preference.

- .1 12mm (1/2") opening, 1.13mm (0.044") re-galvanized steel wire mesh, in a extruded aluminum frame. Removable screen frame to be independent to louver assembly, attaching to the interior face of the louver, providing continuous coverage.
- .2 12mm (1/2") opening, 1.27mm (0.050") thick aluminum expanded metal mesh in an extruded aluminum frame. Removable screen frame to be independent to louver assembly, attaching to the interior face of the louver, providing continuous coverage.
- .3 12mm (1/2") opening, 1.6mm (0.063") diameter aluminum wire intercrimp screen in a extruded aluminum frame. Removable screen frame to be independent to louver assembly, attaching to the interior face of the louver, providing continuous coverage.

- .4 Insect Screens:
 - .1 Supply manufacturer's standard aluminum mesh insect screen, secured in an aluminum frame. Removable screen frame to be independent to louver assembly, attaching to the interior face of the louver, providing continuous coverage.

- .5 Blank-Off Panels:

TEN PLUS SPEC NOTE: Select one of the following options below and delete the option not required on the project.

TEN PLUS SPEC NOTE: Select Option 1 if insulated blank-off panels are required on the project. It is common practice to use insulated blank-off panels when installing blank-off panels into exterior walls. Select Option 2 if insulated blank-off panels are not required on the project.

- .1 Insulated Blank-off Panels:
 - .1 Aluminum faced prefinished insulated blank-off panels, consisting of 51mm (2") thick semi rigid, mineral wool core insulation, having an R value of R-4/1". Ensure insulation is continuous and applied around all penetrations and building elements.
 - .2 Facing Panels: 1mm (0.040") thick aluminum formed sheets. Seal all perimeters and joints between insulated panels with a neoprene gasket or caulked with an approved material to prevent air infiltration.
 - .3 Finish:
 - .1 Exterior face sheet: Finished to match adjacent louver.
 - .2 Interior face sheet: Mill finish.
- .2 Non-Insulated Blank-off Panels:
 - .1 Facing Panels: 1mm (0.040") thick aluminum sheet blank-off panel.
 - .2 Finish:
 - .1 Exterior face sheet: Finished to match adjacent louver.
 - .2 Interior face sheet: Mill finish.

2.5 FABRICATION

- .1 Fabricate as required for optimum performance with respect to water penetration, strength, durability and uniform appearance.
- .2 Fabricate louvers to outside dimensions indicated, with allowance of 10mm (3/8") on each side for sealant joints. Coordinate size, location and placement of units, with installer, prior to fabrication.
- .3 Fabricate louvers to minimize field adjustments, splicing, mechanical joints and field assembly of units. Assemble units in shop to greatest extent possible and disassemble as necessary for shipping and handling.
- .4 Clearly mark units for assembly and coordinated installation. Include vertical structural supports, where required.
- .5 Where, required provide vertical mullions of type and spacing indicated but not greater than 1524mm (5') o/c. Mechanically assemble louvers using stainless steel or zinc plated steel fasteners recommended by manufacturer.
- .6 Provide supports, anchors and accessories required for a complete assembly.

2.6 FINISHES

TEN PLUS SPEC NOTE: Select one of the following finishing options below and delete the finishes not required for the project.

TEN PLUS SPEC NOTE: Use Class I finish in high pollution or corrosion areas. Use Class II finish as the standard finish and for all interior finishing requirements.

- .1 Clear Anodized Finish:
 - .1 Class I Finish: Architectural Class I, clear coating 0.018mm (0.0007") or thicker in accordance with AAMA 611.
 - .2 Class II Finish: Architectural Class II, clear coating 0.010mm (0.0004") or thicker in accordance with AAMA 611.

TEN PLUS SPEC NOTE: Use Class I finish as the standard finish for coloured anodized finishes. Class II is an economical option but will display weathering sooner.

TEN PLUS SPEC NOTE: Standard coloured finishes include Bronze and Black Anodized Finish.

- .2 Coloured Anodized Finish:
 - .1 Class I Finish: Architectural Class I, electrolytically deposited colour coating 0.018mm (0.0007") or thicker in accordance with AAMA 611.
 - .2 Colour: As selected by the Consultant from the manufacturer's standard colour offering.

TEN PLUS SPEC NOTE: 3 Coat PVDF Coating has a higher performance life offering long term resistance to colour fade. 2 Coat PVDF Coating is the standard high performance organic finish, offering good weathering resistance at an economical price when compared to the 3 coating system.

- .3 High Performance Organic Finish:
 - .1 2 Coat PVDF Coating: AA-C12 Chemical Finish, cleaned with inhibited chemicals; C40 Chemical Finish, conversion coating; R1x Organic Coating, manufacturer's standard 2 coat, thermo-cured system consisting of specially formulated inhibitive primer and fluoropolymer colour topcoat containing not less than 70% PVDF resin by weight; prepare, pre-treat, and apply coating to exposed metal surfaces in accordance with AAMA 2605 and with coating and resin manufacturers' written instructions.
 - .1 Colour: As selected by the Consultant from the manufacturer's standard colour offering.
 - .2 Basis of Design Material: PPG Duranar by PPG Industries.
 - .2 3 Coat PVDF Coating: AA-C12 Chemical Finish, cleaned with inhibited chemicals; C40 Chemical Finish, conversion coating; R1x Organic Coating, manufacturer's standard 3 coat, thermo-cured system consisting of specially formulated inhibitive primer, fluoropolymer colour coat, and clear fluoropolymer topcoat, with both colour coat and clear topcoat containing not less than 70% PVDF resin by weight; prepare, pre-treat, and apply coating to exposed metal surfaces in accordance with AAMA 2605 and with coating and resin manufacturers' written instructions.
 - .1 Colour: As selected by the Consultant from the manufacturer's standard colour offering.
 - .2 Basis of Design Material: PPG Duranar XL by PPG Industries.

TEN PLUS SPEC NOTE: More economical than high performance organic coatings and are not as resistant to light degradation. Colour pigments chalk in exterior applications and should only be used for interior applications.

- .4 Acrylic Enamel Finish:
 - .1 1 Coat Acrylic Extrusion Coating: AA-C12 Chemical Finish, cleaned with inhibited chemicals; C40 Chemical Finish, conversion coating; Rx Acrylic Coating, manufacturer's standard single coat factory spray applied acrylic coating; prepare, pre-treat and apply coating to exposed metal surfaces to 0.020mm (0.00078") or thicker in accordance with AAMA 2603 and with coating manufacturer's written instructions.
 - .1 Colour: As selected by the Consultant from the manufacturer's standard colour offering.
 - .2 Basis of Design Material: PPG Duracron by PPG Industries.
- .5 Exposed Steel Finishing:
 - .1 Shop Primer for Ferrous Metal: Organic zinc rich primer, ready for finish painting by Section 09 90 00 [09900].

PART 3:EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions:
 - .1 Examine openings to receive work and surrounding adjacent surfaces for conditions affecting installation. Coordinate with related sections providing openings to ensure proper dimensions are maintained.
 - .2 Verify dimensions of supporting structure by accurate field measurements so that work will be accurately designed, fabricated and fitted to the structure.
- .2 Notify Contractor in writing of any conditions that are not acceptable.
- .3 Proceed with installation after verification and correction of surface conditions acceptable to manufacturer.

3.2 INSTALLATION

- .1 Comply with manufacturer's instructions and recommendations for installation of the work, as shown on approved Shop Drawings.
- .2 Anchor louvers to the building substructure as indicated on Shop Drawings and architectural drawings.
- .3 Erection Tolerances:
 - .1 Maximum variation from plane or location shown on the approved shop drawings 3mm in 3048mm (1/8" in 10').
 - .2 Erection tolerances shall prevail under both load and no load conditions.

- .4 Cut and trim component parts during erection only with the approval of the manufacturer, and in accordance with the manufacturer' recommendations. Restore finish completely.
- .5 Remove and replace members where cutting and trimming has impaired the strength or appearance of the assembly.
- .6 Set units level, plumb and true to line, with uniform, tight joints to adjacent work.
- .7 Provide necessary fastenings, anchors, clip angles, sills and sill flashings required to complete the installation.

3.3 PROTECTION

- .1 Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

3.4 CLEANING

- .1 Progress Cleaning: Leave work area clean at the end of each work day, ensuring safe movement of passing pedestrians.
- .2 Final Cleaning: At completion of installation, clean all surfaces so they are free of foreign matter using cleaners recommended by material manufacturer.
- .3 Restore louvers and accessory components damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by the Consultant, remove and replace damaged systems with new at no additional cost to the Owner.
- .4 Waste Management: Co-ordinate recycling of waste materials and packaging at appropriate facility, diverting waste from landfill. Certified installer shall be responsible for ensuring waste management efforts are practiced.

END OF SECTION 08 91 19 [10219].