

PART 1 GENERAL

1.1 REFERENCE

- .1 Comply with the General Conditions of the Contract, Supplementary General Conditions and the requirements of Division 1.

1.2 RELATED WORK SPECIFIED ELSEWHERE

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|----|-----------------------------|---------------|
| .1 | Miscellaneous Metals | Section 05500 |
| .2 | Rough Carpentry | Section 06100 |
| .3 | Aluminium Doors and Screens | Section 08410 |
| .4 | Finish Hardware | Section 08710 |
| .5 | Final Cleaning | Section 01710 |
| .6 | Firestopping | Section 07270 |

1.3 SCOPE OF WORK INCLUDED

- .1 The following description represents in general, the extent of work with the final determination of exact limits of such work shown on drawings.
- .2 Design, fabricate, supply and install the anodized aluminum curtainwall and prefinished aluminum composite panels, including inner wall insulation, metal/vapour barrier / backpan, operable sash ventilator units and hardware, insect screens required and or specified herein.
- .3 Work includes prefinished aluminum exterior composite panels, and necessary steel framing to support and anchor the exterior systems from the concrete and precast concrete structural framework.
- .4 Seal all joints within this work of this section except where specified otherwise and at abutting joints between this section and work of other sections.
- .5 Be responsible for the design and installation of the strip, fixed, operable and punched windows within the building envelope.
- .6 Receive materials for fire stopping system as supplied by Section 07270 and install fire stopping system as part of Work of this Section.

1.4 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01340.
- .2 Submit shop drawings. Shop drawings shall bear the professional stamp and signature of a Professional Engineer licensed to design structures and registered in the Province of Manitoba.
- .3 Shop drawings shall show all details of work, metal/vapour barrier methods of joining, thickness and finish materials, methods of anchoring, sizes of anchorage, types of sealants, expansion and contraction joint locations and details, thermal break details, glazing details and glazing methods, drainage details and details of other pertinent components of the work, and adjacent constructions to which work of this section shall be attached and seals and connections to adjacent construction.
- .4 Samples:
Submit sample to the consultant for review of assembled mock up showing :
 - .1 2' square area with gasketted ; vision unit / composite panel unit / spandrel glass unit with backpan / tinted vision unit.
 - .2 Sample will be brought to site for reference upon acceptance of appearance of details, jointing, assembly, alignment, finishes and colour by architect.
 - .3 Mock up shall become minimum standard to which balance of work shall match, subject to passing testing.
- .5 Design Calculations:
Submit under seal, calculations prepared by a professional engineers showing the following :
 - .1 Design assumptions regarding loadings related to the Building Code.
 - .2 State which codes and/or CSA specifications or CGSB Standards calculations are based on.
 - .3 Detailed designs of mullions and spandrel panel for typical curtainwall.

- .4 Detailed design of anchorage hardware including, but not limited to, clip angles, washers, anchor bolts, welds and torque pressures.
- .5 State material proposed and their allowable shear and bending stresses.
- .6 The calculations shall be prepared in a clear and comprehensive manner so that they can be easily reviewed. Incomplete or haphazard calculations will be rejected unreviewed.

1.5 WARRANTY

- .1 Provide a Warranty as stipulated in the General Conditions, but for an extended period of two [2] year from the date of final completion and acceptance of the Work. Warranty shall be signed by both manufacturer and installer and shall warrant that work shall remain free of defects in design, materials and workmanship.
- .2 Contractor further agrees upon written notice from owner, to promptly make good such defect, together with any work affected in correcting such defects at the convenience of and without expense to the owner. Damage incurred to curtainwall composite panel units, aluminum sections and glass shall be sourced and individual responsible for damage shall bear costs of repair.
- .3 Warranty shall, without limitation, generally cover the following :
 - .1 The entire curtain wall and skylight supplied and installed shall be weathertight.
 - .2 The entire work will be structurally sound and free from distortion, deflection, and misalignment.
 - .3 The metals and their finishes will not crack, peel, rust, pit, or otherwise corrode, discolour or fade.
 - .4 The metal finishes (aluminum sections and composite aluminum units) will not develop fading or nonconformity of colour and will be free from cracking, chipping, or breaking due to thermal movement of the wall or normal movements of the building structure.

- .5 The gaskets, sealants and tapes will be free from deterioration or dislocation from sunlight, weather and oxidation. The gasketing shall be free from permanent deformation under load.
- .6 The air vapour barrier will be continuous and meet values stated.
- .7 The low emissivity coating shall be uniform in thickness and uniform in colour throughout each glass unit and from glass unit to glass unit.
- .8 Insulating glass units shall be free from condensation, fogging material obstruction of vision as a result of dust or film formation on the internal glass surfaces by any cause under normal conditions.
- .9 The insulating low emissivity glass units shall not change their mechanical design properties, as specified in this specifications and shall not in any way deteriorate, degrade, delaminate or change their visual appearance.
- .10 The structural glazing system will not relax its bond of glass to metal framing and not damage the insulating glass units.

1.6 PROTECTION

- _____.1 Do not apply mullion snap on caps and trim until the building is closed in, until the roofing is installed and until no possibility of alkaline substances can be washed from the building and building structure onto the curtain wall.
- .2 Store and protect fabricated composite panel units from damage until required for actual building in. Replace damaged units.
- .3 Clean glass as frequently as required to prevent the glass from being etched due to alkaline bearing water.

1.7 DRAWINGS AND SPECIFICATIONS

- _____.1 Drawing are diagrammatic and do not purport to identify or solve specified performance criteria. The work of

this section shall be responsible for installation procedures, movements, pressure fractures, thermal shocks and air/vapour barrier continuity.

- .2 Drawings indicate profiles and configurations required together with relationships to the building structure and other exterior and interior building elements with which work of this section is required to interface.
- .3 Drawings contain details which suggest directions for solving some of the major design requirements. The contractor may use the details and develop them as he deems best to obtain the required design criteria.
- .4 Specification and performance type include minimum requirements. They are not intended to limit the method of achieving the required performance.

PART 2 PRODUCTS

2.1 MANUFACTURER

- .1 It is intended that manufacturer's products listed in this specifications represent basis upon which quality and performance of other qualified manufacturer's products will be compared and shall so meet, rather than to limit the supply of such products to that one manufacturer only.
- .3 Aluminum work shall be provided by one of the following approved manufacturers :
 - 1. Commercial Aluminum
 - 2. Kawneer Company Limited
 - 3. Approved Equal

2.2 MATERIALS

- .1 **General** : material shall be inorganic, resistant to rodents, vermin, mildew, fungus and algae.
- .2 **Aluminum Sections** : Accurately formed, extruded aluminum alloy type AA-6063-T5, or as recommended by the coating manufacturer, with clean sharp straight corners. Rigid polyisocyanurate insulation Type 4 - 1.9 pcf density. Window caps to measure 1" from glazed window surface to out limits of closure cap.
- .3 **Metal Air/ vapour barriers** : [Backpans]

Type A - Galvanized (hidden interior wall surfaces) :
Galvanized steel internally stiffened with channels if required to eliminate oil canning.

- .4 **Shims :** Alcan utility sheet when not in contact with concrete; Stainless steel when in contact with concrete or cementitious substance of thickness required; galvanized steel; or Shore A Durometer 80 neoprene.
5. **Typical Thermal Insulating Glass Units Type GL1A:**
(Upper North and East Exposure)
Factory sealed glazing units as shown. 6mm Evergreen heat strengthened (ext), Krypton Gas between the spacer, film TC88, Krypton Gas between the spacer, 6mm clear heat strengthened (int) overall thickness 1.25". Acceptable product Eco Insulating Glass Inc. Contact Sharon Bogart 905-564-8235.
6. **Typical Thermal Insulating Glass Units Type GL2A**
(Lower North and East Exposure)
Factory sealed glazing units as shown. 6mm Solex green heat strengthened (ext), Krypton gas between spacer, film TC88, Krypton gas between spacer, 6mm clear heat strengthened (int) overall thickness 1.25". Acceptable product Eco Insulating Glass Inc. Contact Sharon Bogart 905-564-8235.
7. **Typical Thermal Insulating Glass Units Type GL1B**
(Upper West and South Exposure)
Note tint applies to garage door top panels.
Factory sealed glazing units as shown. 6mm evergreen heat strengthened (ext), Krypton gas between spacer, film SC75, Krypton gas between spacer, 6mm clear heat strengthened (int) overall thickness 1.25". Acceptable product Eco Insulating Glass Inc. Contact Sharon Bogart 905-564-8235.
8. **Typical Thermal Insulating Glass Units Type GL2B**
(Lower West and South Exposure)
Factory sealed glazing units as shown. 6mm solex heat strengthened (ext), Krypton gas between spacer, film SC75, Krypton gas between spacer, 6mm clear heat strengthened (int) overall thickness 1.25". Acceptable product Eco Insulating Glass Inc. Contact Sharon Bogart 905-564-8235.
9. **Spandrel Dark Green Single Glazed Units Type 3:** 6 mm min. thick heat strengthened spandrel glass with "Opaci-Coat"; colour to be "Harmony Solex 2-743". Locations as shown on drawing. All units to be safety glass.
- .8 **Glazing Accessories :**

- .1 **Spacer Shims for Glazing** : 40-50 durometer neoprene, cured silicon or EPDM, channel shaped, 3" or 4" long.
- .2 **Setting Blocks** : 5/16" x 4" extruded 70-90 durometer neoprene.
- .3 **Pressure Sensitive Foamed Plastic Tape** : Tesamoll supplied by Casselman Co. Ltd. Toronto.
- .4 **Glazing Splines** : EPDM with Shore A dual durometer of 60, + - 5 and 40. by Tremco or equal.
- .5 **Preshim Glazing Tape** : Preformed, 100 % solids polyisobutylenebutyl, paper release, EPDM shim pad. Acceptable product shall be Polyshim II by Tremco or equal.
- .9 **Screws, Nuts, Washers, Bolts, Clips** : Series 300 stainless steel, hardened aluminum or other non corrosive material. Slip washer, nylon.
- .10 **Thermal Separator (Thermal Break)** : Of a size to conform to the extruded aluminum members, EPDM, neoprene or polyvinylchloride and having a minimum tensile strength of 2000 PSI and minimum 70 plus/minus 5 Durometer A Hardness.
- .11 **Miscellaneous Steel** : CSA G40.21-M81, Grade 300W. hot dipped galvanized after fabrication to CSA G164-M1981.
- .12 **Touch up Primer for Galvanized Steel** : Zinc rich primer, Galvafroid SB Grade - Meadows or equal.
- .13 **Dielectric Separator** : Best Grade, quick drying non staining alkali resistant bituminous paint to CGSB 1-GP-108C, or membrane type to acceptance of consultant.
- .14 **Loose Insulation** : Glass fibre or mineral wool from approved source.
- .15 **Bedding Material** : Loose insulations, glass fibre or mineral wool from an approved source.
- .16 **Curtainwall Insulation** : Glass fiberboard; AF530 by Fiberglas Canada Ltd or equivalent by Roxul- RXL-40 Insulation, 4.5 lb/ft 3 density in sheet sizes of 24" x 48" and in 3 " thickness shown - R 15.

- Loose Insulation** : Compressed glass or mineral fibre, density 3.0 lb/ft³, to meet required U value.
- .17 **Sealant Tape for installation of metal/vapour barriers** : Extruded, ribbon shaped, non drying, non skinning, non oxidizing, reinforced, black polysiobutylene tape of sufficient width and 1/4" thickness minimum, to permit a continuous seal. Tape shall be Tremco 440 Tape manufactured by the Tremco Manufacturing Company or equal.
- .18 **Gun Welded Pins** : Alternative at contractors's option to stick clips, 1/8" dia. galv. steel pins with cup heads of length to suit insulation thickness and suitable for gun shot welding to the metal air vapour barriers.
- .19 **Stick Clips** : Consisting of 1" diameter perforated disc base with integral 1/8" square sharpened pin of moulded polyvinyl chloride. Pin lengths shall suit insulation thickness and clips shall have 1" x 1" galvanized sheet steel retainers punched to lock on pins. Clips shall be Kely Fasteners manufactures by Special Products Division of Dewar Insulations Limited or equal.
- .20 **Insulation Adhesive** : Fire retardant, compatible with fibrous glass and Flintstik 260-08 manufactured by the Bakelite Thermosets Ltd. or equal.
- .21 **Adhesive for Applying Clips** : High strength resilient adhesive having a drying time of 1 to 30 minutes and 24 Hr final set. Adhesive shall be compatible with the specified insulation adhesive, insulation, galvanized steel and poly vinyl chloride.
- .22 **Primer for Adhesives** : As recommended by the adhesive manufacturer for the particular materials to be adhered.
- .23 **Sealants and Backer Rods** : In accordance with requirements of Sealant Section.
- .24 **Glass** : In accordance with requirements of Section 8.
- .25 **Glazing Accessories** : In accordance with requirements of Section 8.

- .26 **Operable Windows and Screens:** Extruded thermally broken anodized aluminium frames and sash c/w aluminium insect screens. Include shielded drainage and pressure equalizing vents as required. Series 526 by Kawneer or Equal. Standard hardware to be zinc plated anderberg friction arms, aluminium underscreen push bars and lock. Securement screens so that they are removeable only from inside with allen head screws. Aluminum Flashing : .051" minimum material in anodized aluminum finish aluminum for all punched windows.

Installer shall have a minimum of five (5) years of experience.

2.3 FINISHING

- _____.1 Clear anodized aluminum window mullions - Kawneer Standard No 17 Finish or equal.
- .2 Exposed screw heads of fastenings shall be countersunk oval head phillips drive finished to match the surrounding aluminum in acrylic baked enamel. Identify these locations to Architect prior to execution.

PART 3 EXECUTION

3.1 DESIGN: GENERAL

- _____.1 Have work of this section designed by a professional engineer licensed to design structures in the Province of Manitoba.
- .2 Comply with requirements of the Manitoba Building Code, and the National Building Code of Canada and regulations of authorities having jurisdiction, which shall be minimum requirements, except where stricter requirements are specified in this section.
- .3 Follow profiles shapes, perimeter sizes and arrangements of components as shown and specified herein.
- .4 Design glazing systems and framing to prevent thermal shock and pressure fracture damage to glass.

- .5 Glass when in place shall have a consistent, uniform appearance. Colours of all heat absorbing and tinted glass vision units shall be the same to the consultant's acceptance. Distortions of glass units installed in the vertical plane shall be to the absolute minimum to the consultant's acceptance.
- .6 The metal faces of panels, flashing, caps, bases and soffits shall be visually flat under all lighting conditions to limitations specified hereafter.
- .7 The colour and sheen of the thermoset acrylic dry film enamel shall be uniform and consistent with each component and from component to component.
- .8 Glazing gaskets and sealants on the inside of the glass units shall be the conductive type and shall be installed in a manner to ensure interior building heat is conducted through the metal framing, mullions and sills, through the gaskets and sealants to the glass edge while maintaining the air seal. Ensure that no voids between glass edges and the gaskets and sealants occur.
- .9 Locate sealants, gaskets, air / vapour seals, thermal separations, drainage slots and holes as shown and specified in this section as required to obtain the design requirements. Ensure components and assemblies drain to the building exterior.
- .10 Design, assemble and secure work in a manner that will keep any stresses on sealants within the sealant manufacturer's recommended working range within the factors of safety specified.
- .11 The vertical and horizontal mullion caps shall be continuous full height and length of window units and vertical caps shall butt to horizontal mullion caps and trims.
- .12 The pressure plates shall be broken to the dimensions of the glass panes. Pressure plates and glass retainers shall be designed to place uniform pressure on glass, to prevent distorting glass. Jointing of pressure plates need not necessarily follow snap on cap locations.

- .13 The grain and extruding direction or rolling direction of the horizontal mullions caps, trims, flashing, bases, sills and soffits shall be horizontal and in the same direction. The paint finish on the composite panels shall be applied in the same direction as the grain and extruding direction of the metal.
- .14 The grain and extruding or rolling direction of the vertical mullion caps and aluminum composite panels shall be in the up direction. The grain and extruding or rolling direction of the horizontal mullion caps shall be in the horizontal direction.
- .15 Accurately shape mullion and cover caps at intersecting joints to obtain hairline joints, just wide enough to permit thermal expansion and contraction.
- .16 Fabricate mullions to sections not less than one storey high.
- .17 Conceal securement devices unless otherwise specified.
- .18 Design work to facilitate replacement of components.
- .19 Provide accessories and trims required and necessary to complete work.

3.2 DESIGN: EXTERIOR PRESSURES

- 1. Design loads as calculated using wind velocity pressures for suction, impact and gusting as established by the Manitoba Building Code and the National Building Code as referenced herein, with a probability factor of 1 in 10 years.

3.3 DESIGN: STRUCTURAL

- .1 Design work to withstand within acceptable deflection limitations, its own weight, forces applied by the movements of the building structure and attached adjacent components, and the maximum design loads due to the pressure and suction of the wind, snow, ice, rain and hail.
- .2 Design work to accommodate within its components, expansion and contraction due to cyclic temperature changes, shrinkage, moisture changes, creep in component materials, movement due to differential settlement and any combination thereof, to prevent

buckling, hoisting, distortions, misalignment, joint seal failures, noise, undue stress on securement devices and components and any other damage.

- .3 Design work to accommodate expansion and contraction between this work and work of other sections and the building structure due to cyclic temperature changes, to prevent damages, twisting, distortion, misalignment, buckling, noise, undue stress on components and securement devices to work of this section, work of other sections and the building structure.
- .4 Work shall accommodate, by means of expansion/contraction provisions, any movements within the building structure and adjacent construction caused by short and long term structural movements, creep, column shortening, deflection, torsion, sway and racking. Expansion / contraction provisions shall ensure no damages, distortion, misalignment of work of this section, the building structure, adjacent construction and connections occur and shall ensure the thermal, vapour barrier, air infiltration / exfiltration and water and weather tightness requirements are maintained.
- ____.5 Design connections for work of this section to building structure and adjacent construction to take into account peculiarities as may be found on the project.
- .6 Design work and its connection to the building structure and adjacent construction to ensure no possibility of weakening, loosening, fracturing occurs due to vibrations from any source.
- .7 Change of building structural column lengths due to temperature variations during construction and afterwards, and short and long term creep shall be taken into consideration when designing work.
- .8 Design the wall and base panels, soffits and their connections so they remain flat and free of distortion and so forces imposed by building movement, cladding movement and movement induced by temperature change do not cause distortions, bow twist and racking deflection of panels shall be determined by visual flatness requirements specified in Para. 1.9.8.
- .9 Design light gauge aluminum structural members in accordance with CAN3-S157-M83.

.10 Elastic deflection limits for mullions and members; a maximum of $L/360$ on the vertical axis. Elastic deflection limits for vertical and horizontal members; a maximum of $L/240$ measured perpendicular to face of building. Deflection limits shall be such that the integrity of the glass and air seals are maintained at design loading. Permanent deformation of members due to applied loads are not permitted. Design sill assemblies to sustain a concentrated load of 300 lb at any point, and all assemblies to resist window washing equipment applied load of 600 lb in any direction at the top of the parapet where suspension cables will bear on cap flashing assembly.

_____.11 Sheet metal air/vapour barriers shall not deflect under design loads sufficient to cause noise, breaking joint seals or to cause them to touch other components of work of this section and building structure, and shall be maintained within greater of $1/2"$ or the elastic limits of $L/360$ maximum and so that compression of the fire stopping is not less than 25 % at any time.

Design, Fabricate and erect supplementary framing as required to support the air vapour barriers such that the completed installation meets the specified design requirements.

.12 Anchors, fasteners and braces shall be structurally stressed not more than 80 % of the allowable stress when maximum load conditions are applied.

.13 Use a safety factor for glass to the statistical probability of failure, permitting a maximum of 8 glass lites per 1000 to break during building's life.

.14 State moment of inertia of mullions in shop drawings.

.15 Provide additional supports, stiffeners and girts as required to meet requirements of these specifications.

3.4 DESIGN: BUILDING MOVEMENTS

_____.1 Design work to accommodate the tolerance requirements permitted of the structure and the thermal, seismic and live load movements of the building structure as stipulated in section 3.

3.5 DESIGN: TOLERANCES

- _____ .1 Design and install Work straight, plumb and true in plane and alignment within erection tolerances for frame assemblies as follows :
 - .1 Vertical position :_ plus/minus 1/8"
 - .2 Horizontal position : _____ plus/minus 1/8"
 - .3 Racking on face : maximum 1/4"
 - .4 Racking in elevation : nil.

- .2 Deviation from true plumb over full height of building ; maximum 1/4".

- .3 Deviation from true straightness in plane over full length of each building face; maximum 1/4".

- _____ .4 Tolerances of relationship of individual components shall be as follows :
 - _____ .1 Member to member , maximum 1/64"

 - .2 Joint width, mullion snap on cap to mullion snap on cap; maximum 1/16". Each joint shall be uniform width.

 - .3 Joint width between soffits and base and sill panels; maximum 1/8" and of uniform width. Do not apply sealants to joints between panels.

 - .4 Tolerances shall not be cumulative.

 - .5 Flatness of panel : short length distortion ripples, edge distortions, oil canning telegraphing of fasteners will not be permitted. Make provision to allow for differential thermal expansion between the stiffeners, recessed slots and the exposed metal of the curtain wall system to take place without noise and without buckling of surface.

 - .6 Dimensional tolerances of outer dimensions of panels shall not exceed 1/32" plus or minus in 4' measured at any point.

3.6 DESIGN: THERMAL

- .1 Thermally break frame members. Provide thermal breaks between exterior and interior components and sufficient metal on interior side of glass to provide total absence of condensation on interior metal surfaces under maintained design conditions at relative humidity of 30 %.
- .2 Design frames so that edges of inner pane of insulating glass units do not fall more than 8 degrees C below the temperature of the centre of the inner pane.

3.7 DESIGN: WATER AND MOISTURE

- .1 In designing and engineering the work, the following principles shall be followed :
 - .1 Make provision to drain to the exterior face of the assembly any water entering at joints and any condensation occurring within the curtain wall construction while maintaining the air seal between interior and exterior. Drain holes shall be adequate to drain all water.
 - .2 At design conditions, no water penetration to the interior side of the wall assembly shall occur.
 - .3 Design, fabricate and install the assembly to be watertight to the interior under the exterior design conditions in combination with movements occurring due to loads imposed.
- .2 Frames shall provide pressure equalization to glazing pockets at vision and spandrel panels. The curtain wall system shall be self draining with framing components to the curtain wall assembly profiled to drain off any moisture to the exterior. Screen all drainage ports to the exterior.
- .3 A vapour barrier consistent with the rain screen principle shall be continuously installed at the inner frame perimeter as an integral part of the curtain wall system design to provide a complete and impervious air and vapour barrier.

3.8 DESIGN: AIR

- .1 Air infiltration and air exfiltration through the curtain wall system shall not exceed 0.04m cfm/sf at 6.24 lb/sf static pressure.
- .2 Allow for mechanically induced air pressure of 5.22 lb/sf at the building interior.
- .3 No detectable drafts are permitted.
- .4 Operable windows shall meet or exceed A3, B3, and D2 classifications in accordance with CAN3-A440-M84.

3.9 DESIGN: SOUND

- .1 Provide complete installation free from noise, rattles, wind whistles, or noise due to thermal and structural movement.

3.10 DESIGN: AIR / VAPOUR BARRIER

- .1 The definition of the air vapour barrier for the purpose of these specifications is a continuous membrane including joints of membrane adjacent construction which retards or prevents the rate of penetration of moisture laden air and the diffusion of water vapour through it at the air infiltration rates previously given.
- .2 Design and reinforce rigid air/vapour barriers to withstand acceptable deflection limitations, their own weight, the insulation weight and the design loads.

3.11 DESIGN: RAIN SCREEN PRINCIPLE

- .1 Design work in accordance with rain screen principles established and advocated by the National Research Council of Canada.
- .2 All voids between the assembly components as well as those between components and the structure shall have :
 - .1 Gaskets, baffles, overlaps and seals as required to provide a barrier " Rain Screen " to effectively prevent excessive rain water entry into any of the cavities but allow pressure equalization.

- .2 Non-permeable air seals as required to exclude the entry of interior building air into the vertical skin cavities.
- .3 Such provisions in the form of openings between cavities and the building exterior of sufficient cross sections to provide adequate pressure equalization. In addition, all openings shall be effectively baffled against direct rain water entry.
- .4 Air seals placed to eliminate any contact between interior humid air and a cold surface and ice build up on such surfaces during cold weather.
- .5 Vertical cavities sealed horizontally at 24' maximum to prevent stack effect, corners of building sealed vertically, at each column sealed vertically and within glazed pocket at centre head of each insulating glass unit.

3.12 DESIGN: WINTER CONDITIONS

- _____.1 Temperature :
22 degrees C interior and - 18 degrees C exterior
- .2 Relative Humidity :
30 % RH at 2 degrees C and below

3.13 DESIGN: SUMMER CONDITIONS

- _____.1 Temperature :
24 degrees C interior and 32 degrees C exterior
- .2 Relative Humidity :
50 % RH.

3.14 DESIGN: NUMERICAL VALUES

- _____.1 Numerical values required except where specified otherwise, shall be as determined by the test procedures or standards listed below :

Requirement	Test
Air Leakage through curtainwall	ASTM E283-73
Structural performance of curtainwall	ASTM E330-79
Water penetration through curtainwall	ASTM E331-70
Water absorption	ASTM C272-53
Linear thermal coefficient	ASTMD696-79
Thermal conductivity	ASTM C177-76
Permeability	ASTM E96-80 Procedure E
Resistance to permanent set	ASTM A395-80 Method B
Elongation	ASTM D412-83
Ozone resistance	ASTM D1149-81
Tensile strength	ASTM D412-83
Hardness Shore A	ASTM D2240-81

3.15 FABRICATION

- _____.1 Insofar as practical, execute fittings and assembly in the shop with the various parts or assemblies ready for erection on site.
- .2 Take field measurements and levels required to verify or supplement those shown for the proper layout and installation of work. Co-ordinate dimensional tolerances in adjacent building elements and confirm prior to placement of work. Commencement of installation floor by floor shall be construed as acceptance of building conditions. Curtain wall shall not deviate from tolerances specified.
- .3 Extrude members to the maximum outside profiles shown. Wall thickness of extrusions shall be adjusted as required to meet the design requirements. Frames which are to receive insulating glass units and aluminum composite panel units shall have a continuous thermal break.
- .4 Accurately machine file and fit rigidly; frame together all joints, corners and mitres. Match components carefully to produce perfect continuity of line and design. Make joints toward the exterior weathertight. Metals in contact shall have hairline joints.

Location of exposed joints shall be subject to the acceptance of the consultant.

- .5 Grain of sheet and directions of finish for flashing and composite panel units on the building shall be the same direction. Make panels free of machine marks.
- .6 Make panels flat so they don't have to be forced into position to obtain alignment with adjacent panels and members. Provide stiffeners and wind bracing.
- .7 Weld aluminum where required with inert metal arc and equipment methods recommended by the Aluminum Co. of Canada. Do not mar surface finishes with welds in back of exposed aluminum or galvanized sheet metal (backpan). Do not deform the exposed metal and finish in any way by welding.
- .8 Weld steel where required, in accordance with CSA W59-1987. Welded joints shall be of adequate strength and durability with jointing tight and flush. Welder shall be fully qualified by the Canadian Welding Bureau. Where it is necessary to weld components already galvanized, remove galvanizing for 2" around weld and paint over welds where galvanizing as removed with zinc rich paint.
- .9 Reinforce (as required) all frames with concealed galvanized and zinc chromate coated steel sections as necessary to meet the specified design requirements. All reinforcing shall be securely anchored to horizontal and vertical members by positive mechanical means.
- .10 Provide steel brackets and support framing to fasten frames in place in openings. Provide slotted connections as required to accommodate deflection of opening components.
- .11 Seal hairline joints at junctions of frame members. Gun inject sealant from inside ensuring a continuous seal of the joint. Ensure that bead in the glazing space does not impair seating of glazing materials. Remove excess sealant which is forced onto face of frame assembly. All metal to metal joints which require sealing to maintain weather tightness shall be designed and assembled with a ribbon of sealant which shall be compressed by approximately 50 % of its original thickness when the joints are secured.

- .12 Where frame members are lapped, the faces exposed to the weather shall be in full, tight contact. Allow minimal clearance for snap on components.
- .13 Fabricate frame systems complete with mullions, head and sill frames, spigots, and plugs for horizontals, spline gaskets, thermal break pressure plates, filler pieces, 1" deep snap on caps, and other necessary components.
- .14 Where mullions are extended and connected to the underside of the building structure above, provide slotted connections to accommodate structural deflection.
- .15 Nuts, bolts, clips, screws and other means of fastening shall be concealed in the finished work.
- .16 Means of anchoring frames shall have sufficient adjustment to permit correct and accurate alignment, and made weathertight in a manner not restricting the thermal movement.

3.16 FABRICATION - SPANDREL PANEL CONSTRUCTION

- _____.1 Fabricate spandrel panel system complete to profiles and sizes shown, and to visual flatness tolerances previously specified.
- .2 Systems shall be designed and fabricated using non cumulative, concealed attachment methods.
- .3 Include solid rolled framing, furring, brackets, clips, hangers and incidental components as required for secure fastening and provide weathertight installation including non corrosive fasteners.
- .4 Provide for condensation and innerwall drainage at sill members and other shapes which would otherwise tend to trap water.

3.17 FABRICATION - HOT ROLLED STEEL FRAMING

- _____.1 Fabricate (if required structurally) necessary hot rolled, hot dipped galvanizing framing and support members and non-corrosive anchorage members required to support curtainwall for the exterior of the building.

- .2 Work in this category also include HSS members and systems which project curtain wall out from face of concrete structure.
- .3 Framing members shall be welded construction, hot dipped galvanized and designed for welding to weld plates supplied under Section 3 - casting into concrete.

3.18 FABRICATION - METAL / AIR / VAPOUR BARRIER

- _____.1 Brake form barriers from sheet metal (aluminum and galvanized) to permit assembly using self tapping screws, and attachment using power tools.
- .2 Make provision in air barrier design to accommodate movement resulting from thermal change and from structural deflection.
- .3 Form edges to 45 degrees to permit peripheral and joint sealing.
- .4 Cut, fit and form metal air/vapour barriers as required to accommodate conflicting framing connections, mechanical and electrical appurtances and other obstructions.
- .5 Metal air/vapour barriers shall be self supporting.

3.19 PREPARATION

- _____.1 Take field measurements from actual structure and verify prior to commencement of fabrication.
- .2 Remove dust and loose material from floor recess pocket.

3.20 INSTALLATION - FRAMING

- .1 Have installation inspected and certified by engineer who designed work of this Section and was responsible for preparation of shop drawings.
- .2. Erect work plumb and true and in proper alignment and relationship to established lines and grades, and within tolerance specified.

- _____.3 All devices for anchoring the frame assemblies to the building structure shall have sufficient adjustment to permit correct, accurate alignment. After alignment, rivet, weld or positively lock anchorage devices to prevent movement other than those designed for expansion and contraction.
- .4 Site located fixings to the in - situ structure shall be an approved material. Perform drilling of concrete as required to install fixings. Bear cost of repair satisfactory to consultant, of concrete chipped by drilling or fixing operation.
- .5 Group components with finish so that those which relate most closely to one another, with regard to colour shall be installed adjacent to one another.____
- _____.6 Coordinate work with roof installer who is responsible for parapet to ensure continuity of air/vapour barrier.
- .7 Provide continuity of thermal and air/vapour barriers with adjacent thermal and air/vapour barrier systems.
 - .1 Gun apply a continuous 1/4" bead of sealant to all joints and barrier junctions with adjacent construction. Liberally butter screw fastenings with sealant.
 - .2 Apply insulation to the cold-in-winter side of the metal air/vapour barriers erected. Cut insulation slightly oversize as required to ensure tight butt joints.
 - .3 Adhere stick clips to barrier 12" o.c. at 12" both ways. Support clips in place until adhesive has set unless welded clips are used.
 - .4 Press insulation boards firmly into barrier impaling them on clips without bending clips. Butt insulation boards tightly. Install retainers to clips, and clip off excess length of spindles.
- .8 Protect exterior finish surfaces by installing cover caps, plates and aluminum composite panel units when building is closed in.
- .9 Install all structural steel framing and supports where required to support work from building structure.

- .10. Ensure air tight seal at air/vapour barrier penetrations for mechanical and electrical services.
- .11 Co-ordinate work with work of other sections. Co-operate fully (reference to roofing contractor).

3.21 INSTALLATION - GLAZING

- .1 Review Section 8800 - Glass and Glazing for complete description of glazed units.
- .2 Install glazed units in dual durometer glazing gaskets, embedded into serrated aluminum gasket pockets.
- .3 Glazing shall be in accordance with IGMAC system recommendations using glazing gaskets to exterior and interior with heel bead to perimeter of each glass panel. Preshim tape may be substituted. Note operable windows with interior crank operation and bound screen.
- .4 Do not make splices in sill gaskets. Insert semi rigid part gaskets into aluminum frame so that soft part forms tight seal against glass.
- .5 Install two setting blocks in each light at quarter points of glass.
- .6 Using glazing tools and methods recommended by gasket manufacturer. Comply with cutting length formulae, bevel and notch cuts.
- .7 Handle and install glass units in accordance with manufacturer's instructions. Prevent nicks, abrasion and other damage likely to develop stresses on edges.

3.22 INSTALLATION - SEALANT AND WEATHER SEALS

- .1 Ensure that ambient and surface temperatures are above 5 degrees C and joint conditions are suitable for the materials to be installed.
- .2 Make surfaces to be sealed, sound, dry, free from dirt, water, frost, loose scale, corrosion, asphalt, paints or other contaminants which may adversely affect the performance of the sealing materials.
- .3 Perform cleaning of contact surfaces to the extent required to achieve acceptable joint surfaces.

3.24 CLEANING PROCEDURES

- _____.1 Blast Cleaning : sandblast or iron sheet blast surfaces requiring heavy cleaning to bright metal. Remove loose matter by compressed air.
- .2 Solvent Cleaning : clean with solvent applied by spray or brush. Wipe with clean wiping cloth. Remove paints with paint remover and wipe with solvent. Remove residue.

3.25 APPLICATION

- _____.1 Joints and space which are to receive sealing compound shall in no case be less than 1/2" deep; nor shall they be less than 1/4" wide no more than 3/4" wide.
- .2 Fill joints to within 3/8" of the surface with backup rod.
- .3 Mask areas adjacent to the joints required. **Prevent contamination of adjacent surfaces. Remove masking promptly after the joint has been completed.**
- .4 Before priming immediately before installation of sealant.
- .5 Follow stringently material requirements of, techniques and methods outline in Section 7.
- .6 Apply weather seals to all junction lines between work of this section , and dissimilar materials furnished under separate section.

3.26 CLEANING

- _____.1 Remove as work progresses, all corrosive and foreign materials which may set or become difficult to remove at time of final cleaning or which may damage surface finish of members. Inspect and clean as often as required to ensure cleanliness.
- .2 Wash exposed metal surfaces with a cleaning solution approved by manufacturers of glass and aluminum(s)

- .3 At completion of work, remove protective coatings, clean all glass, aluminum, and remove surplus compounds and sealant material. Clean down silicone beads within 30 days of their applications using ME and clean cloths. Replace or make good all defective or damaged work at no expense to owner.
- .4 Final cleaning by others in accordance with Division 1.

END OF SECTION