*SPEC NOTE: This Master Specification Section includes NORBEC SPEC NOTES for information purposes and to assist the editor in making appropriate decisions. NORBEC SPEC NOTES always immediately precede 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.*

*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 NORBEC SPEC NOTES in the final copy of the Specification.*

*SPEC NOTE: This Specification includes materials and installation procedures for “NOREX-H” and “NOREX-L” Insulated Metal Panels; Preformed, steel-faced, insulated architectural wall panels with a polyisocyanurate foam core. NOREX Panels are available in different textures and colours, allowing for creative design contrasts within the same building elevation.*

*SPEC NOTE: NOREX Panels are intended for exterior or interior use, in both horizontal and vertical configurations (NOREX-H) and vertical configuration only (NOREX-L), and can be profiled to bend at corners, providing a continuous look to the panel. This Specification should be adapted to suit the requirements of individual projects.*

*SPEC NOTE: This Section specifies environmentally responsible material choices. The inclusion of recycled content provides efficient use of natural resources and diverts materials from the waste system.*

*SPEC NOTE: The NOREX Panel materials are produced from a minimum of 20% "Pre-Consumer" waste materials, and 32% of the post-industrial waste from the manufacturing of the panel is recycled back into the manufacturing process.*

*SPEC NOTE: NOREX Panels contains a maximum of 49 g/L of VOCs, and can provide a product-specific EPD (Type III), which are valued as 1 whole product out of the 20 required for the purpose of achieving the Environmental Product Declaration Credit, offered in LEED v4 (BD+C) & (ID+C).*

1. GENERAL
	1. general requirements
		1. The General Conditions, the Supplementary Conditions, the Instructions to Bidders and Division 1 General Requirements shall be read in conjunction with and govern this section.
		2. The Specification shall be read as a whole by all parties concerned. Each Section may contain more or less than the complete work of any trade. The Contractor is solely responsible to make clear to the Subcontractors the extent of their work.
	2. summary
		1. Supply and install the following:
			1. Preformed, steel-faced, insulated architectural wall panels with polyisocyanurate foam core.
			2. Accessories including fasteners, perimeter trim and penetration treatments.

*SPEC NOTE: Edit the following paragraph to reflect related requirements for this Section.*

* 1. RELATED requirements
		1. Section 05 40 00: Cold Formed Metal Framing
		2. Section 05 50 00: Metal Fabrications
		3. Section 06 10 00: Rough Carpentry
		4. Section 07 62 00: Sheet Metal Flashing and Trim
		5. Section 07 92 00: Joint Sealants
		6. Section 08 34 13: Cold Storage Doors
		7. Section 08 34 13.16: Sliding Cold Storage Doors
		8. Section 09 29 00: Gypsum Board
		9. Section 42 20 00: Process Cooling Equipment
	2. REFERENCE Standards
		1. American Architectural Manufacturers Association (AAMA)
			1. AAMA 501.1: Water Penetration of Exterior Wall by Dynamic Air Pressure.
			2. AAMA 501.2: Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems.
		2. American Society of Civil Engineers (ASCE)
			1. ASCE 7: Minimum Design Loads for Buildings and Other Structures.
		3. ASTM International
			1. ASTM A755: Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products
			2. ASTM A792: Standard Specification for Steel Sheet, 55 percent Aluminum-Zinc Alloy-Coated by the Hot–Dip Process
			3. ASTM A924: Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
			4. ASTM B117: Standard Practice for Operating Salt Spray (Fog) Apparatus
			5. ASTM C273: Standard Test Method for Shear Properties of Sandwich Core Materials.
			6. ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
			7. ASTM C1363: Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
			8. ASTM D522: Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings
			9. ASTM D523: Standard Test Method for Specular Gloss
			10. ASTM D714: Standard Test Method for Evaluating Degree of Blistering of Paints
			11. ASTM D968: Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
			12. ASTM D1308: Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
			13. ASTM D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics
			14. ASTM D1622: Standard Test Method for Apparent Density of Rigid Cellular Plastics
			15. ASTM D1623: Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
			16. ASTM D1654: Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
			17. ASTM D1929: Standard Test Method for Determining Ignition Temperature of Plastics
			18. ASTM D2126: Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
			19. ASTM D2244: Standard practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
			20. ASTM D2247: Standard Practice for Testing Water Resistance of Coatings in 100 percent Relative Humidity
			21. ASTM D2794: Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
			22. ASTM D3359: Standard Test Methods for Measuring Adhesion by Tape Test
			23. ASTM D3363: Standard Test Method for Film Hardness by Pencil Test
			24. ASTM D4145: Standard Test Method for Coating Flexibility of Prepainted Sheet
			25. ASTM D4214: Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
			26. ASTM D5894: Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV Condensation Cabinet)
			27. ASTM D6226: Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
			28. ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
			29. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials
			30. ASTM E90: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
			31. ASTM E283: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
			32. ASTM E330: Structural Performance of Exterior Walls by Uniform Static Air Pressure Difference
			33. ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
			34. ASTM E413: Classification for Rating Sound Insulation
			35. ASTM G153: Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
			36. ASTM G154: Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
		4. National Fire Protection Agency (NFPA)
			1. NFPA 259: Standard Test Method for Potential Heat of Building Materials.
			2. NFPA 285: Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.
			3. NFPA 286: Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.
		5. UL Canada (ULC) Approvals:
			1. CAN/ULC-S101: Standard Methods of Fire Endurance Tests of Building Construction and Materials
			2. CAN/ULC-S102: Standard Method of Test for Surface Building Characteristics of Building Materials and Assemblies
			3. CAN/ULC-S126: Standard Method of Test for Fire Spread Under Roof-Deck Assemblies
			4. CAN/ULC-S134: Standard Method of Fire Test of Exterior Wall Assemblies
			5. CAN/ULC-S138: Standard Method of Test for Fire Growth of Insulated Building Panels in a Full-Scale Room Configuration
			6. CAN/ULC-S741: Standard for air barrier materials
			7. CAN/ULC-S742: Standard for air barrier assemblies
			8. CAN/ULC-S770: Long term thermal resistance - LTTR
			9. CAN/ULC-S102:
		6. Factory Mutual (FM):
			1. FM Approvals-4880: Class 1 Fire Rating of Building Panels or Interior Finish Materials
			2. FM Approvals-4881: Class 1 Exterior Wall Systems
	3. ADMINISTRATIve REQUIREMENTS
		1. Coordination: Coordinate site dimensions affecting work of other Sections and provide data, dimensions and components installed by other Sections in sufficient time for installation of products specified in this Section.
			1. Coordinate sizes and locations of framing, blocking, furring, and reinforcements provided by work that is specified in other Sections, ensuring their completeness before starting work of this Section.
		2. Pre-Construction Meeting: Arrange a preconstruction meeting in accordance with
		[Division 01][Section 01 31 19 Project Meetings], attended by [Contractors] [Construction Manager], Consultant, and the panel [Subcontractor] [Trade Contractor] to discuss:
			1. Installation requirements;
			2. Coordination of structural support requirements in relation to insulated wall panel system;
			3. Installation of any separate air/water barriers, and treatment of fenestration;
			4. Special surface effects and finishing;
			5. Coordination of work with adjacent finishes and wall assemblies;
			6. Protection of finishes; and
			7. Acceptability of substrates and quality of materials being used for the project.
	4. SUBMITTALS
		1. Provide submittals as indicated in [Division 01] [Section 01 33 00 Submittal Procedures].
		2. Action Submittals: Provide the following submittals before starting work of this Section:
			1. Product Data: Manufacturer's data sheets on each product to be used, including:
				1. Detailed technical data for materials, fabrication, and installation, including anchors, hardware, fasteners, and accessories.
				2. Storage and handling requirements and recommendations.
				3. Installation instructions.
			2. Samples:
				1. Submit 305 mm x 305mm (12” x 12”) panel sample indicating panel finish and profile, supplied by the manufacturer.
				2. Submit colour swatches from the manufacturer with specified finish, complete with label identifying the following:

Series name;

Colour;

Manufacturers colour code;

Sample thickness; and

Applied finish.

* + - 1. Shop Drawings: Submit detailed drawings and panel analysis showing the following:
				1. Profile;
				2. Gauge of both exterior and interior sheet;
				3. Location, layout and dimensions of panels;
				4. Location and type of fasteners;
				5. Indicate loads and calculations of maximum deflection at supports;
				6. Shape and method of attachment of all trim;
				7. Indicate details and special conditions at half scale;
				8. Locations and type of sealants;
				9. Coordination Drawings: Provide elevation drawings and building sections which show panels in relationship to required locations for structural support. Include panel details and details showing attachment to structural support.
				10. Other details as may be required for a weathertight installation.
				11. Prepare Shop Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the place where the Project is located.
		1. Information Submittals:
			1. Design and Performance Data: Indicate panel profile characteristics and dimensions, and structural properties of assembled panels.
			2. Installation Data: Manufacturer's special installation requirements, including special handling criteria, installation sequence, and cleaning procedures.
			3. Test and Evaluation Reports:

*SPEC NOTE: Refer to the NOREX Results of Deflection Tests According to ASTM E72; Published by NORBEC, for load tables prior to determining span and thickness of the Panel Design.*

* + - * 1. Provide panel calculations to verify panels will withstand the design wind loads indicated without detrimental effects or deflection exceeding L/180 (wall application), L/240 (roof application), and L/360 (brick veneer), as per ASTM E72.
				2. Include effects of thermal differential between the exterior and interior panel facings and resistance to fastener pullout.
				3. Third-Party Testing and Certification:

Upon request, manufacturer shall provide a certified letter from a third-party testing agency, stating the system specified in this Section is in compliance with the specific testing requirements identified in the request.

* 1. QUALITY ASSURANCE
		1. Manufacturer / Supplier Qualifications:
			1. Having a minimum of ten (10) years experience in the production of insulated wall panels. Manufacturer shall demonstrate past experience with examples of projects of similar type and exposure, with a record of successful in-service performance.
			2. Have adequate financing, equipment, plant and skilled personnel to detail, fabricate and erect the work of this Section as required by the Specifications and Drawings.
		2. Erector Qualifications:
			1. Installers shall be authorized by the manufacturer and the work shall be supervised by a person having a minimum of five (5) years experience installing insulated wall panels on similar type and size projects.

*SPEC NOTE: Mock-ups establish quality of the work for the materials indicated in this Section. Delete the following paragraph if the scope of work in this Section is minimal and a mock-up is not required.*

* 1. Mock-Up:
		1. Construct mock-ups to demonstrate constructability, coordination of trades, and sequencing of Work; and to ensure materials, components, subassemblies, assemblies, and interfaces integrate into a system complying with indicated performance and aesthetic requirements.
		2. Build integrated mock-ups using products, installers and construction methods that will be used in completed construction of this Section.
		3. Coordinate installation of materials and products specified in other Sections of the Project Manual, that are required to be integrated into mock-ups of this Section, to provide a complete system.
		4. The Work of integrated exterior mock-ups includes, but is not limited to, the following:
			1. Substrate support framing and/or sheathing;
			2. Air and weather barriers;
			3. Thermal insulation;
			4. Through-wall flashing;
			5. Flashing and sheet metal trim;
			6. Joint sealants;
			7. Insulated metal wall panels; and
			8. Adjacent wall facades that require tie-in with this Section.
		5. Provide and document modifications to construction details and interfaces between components and systems required to properly sequence the Work, or to pass performance testing requirements.
			1. Obtain Consultant’s approval for all modifications prior to proceeding with work.

*SPEC NOTE: Panels supplied for Mock-ups are “Project Panels”, and therefore should remain part of the Work once workmanship, quality control measures, and finishes have been approved.*

*SPEC NOTE: If Mock-ups are required on the Project, the following three subparagraphs shall remain.*

* + 1. Phase Mock-up installation in accordance with Installing Contractor, General Contractor, Panel Manufacturer’s Representative and Consultant.
		2. Do not proceed with remaining work until workmanship, colour, and texture are approved by Consultant.
		3. Retain approved mock-ups constructed in place if not fully incorporated into the Work.
	1. DELIVERY, STORAGE, AND HANDLING
		1. Delivery: At the time of delivery, visually inspect all materials for damage. Note any damaged to materials on the bill of shipping and immediately report to the shipping company and the material manufacturer.
			1. Remove damaged materials from the site immediately.
		2. Storage:
			1. Store materials as recommended by manufacturer and conforming to applicable safety regulatory agencies. Refer to all applicable data including but not limited to Safe Use Instruction Sheets, Product Data sheets, product labels, and specific instructions for personal protection.
			2. Store materials in original packaging, on a dry, level, firm, and clean surface. Stack no more than two bundles high. Provide a slight slope of bundle to allow moisture run-off, cover and ventilate to allow air to circulate and moisture to escape.
			3. Protect panels from accelerated weathering if stored beyond one (1) month by removing or venting sheet plastic shipping wrap; cover panels with woven fabric tarpaulins.
			4. Store adhesives and sealants at temperatures of 5 deg C (41 deg F) and above to facilitate handling.
			5. Store materials away from contaminating sources, fertilizers, chemical products or corrosive substances.
			6. Stack and store flashings and metal trim to prevent creasing, twisting, scratching and other damage.
		3. Handling: Material shall be handled in accordance with sound material handling practices and in accordance with manufacturer's written instructions.
	2. SEQUENCING
		1. Ensure that locating templates and other information required for installation of products of this Section are furnished to affected trades in time to prevent interruption of construction progress.
		2. Ensure that products of this Section are supplied to affected trades in time to prevent interruption of construction progress.
	3. site CONDITIONS
		1. Field Measurements:
			1. Verify dimensions for installation by field measurements prior to fabrication and indicate measurements on Shop Drawings.
			2. If field measurements cannot be made without delaying the Work, establish dimensions and fabricate units without field measurements. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.
		2. Substrate Conditions: Install materials outlined in this Section after completion of work by other Sections is complete, and has been reviewed for completeness prior to covering by installing work of this Section.
	4. WARRANTY
		1. General: Panels showing such defects as indicated in this subparagraph, will be replaced or made good, together with all work of other trades damaged during removal of insulated metal panels, at no expense to the building owner.
		2. Limited Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or workmanship within specified warranty period. Items covered by the warranty include structural performance, bond integrity, deflection and buckling.

*SPEC NOTE: The manufacturer offers a standard five-year warranty. Ten years extended warranties can be selected, if required, at additional expense. Select one of the following warranty options below and delete the option not required.*

* + - 1. Warranty Period: Five (5) years from date of Substantial Completion.
			2. Extended Warranty: Ten (10) years from date of Substantial Completion.

*SPEC NOTE: Finish Warranties are commonly offered by manufacturers supplying coated metal, to ensure that the panel finish remains the same to the human eye. Finish warranties differ in length and coverage, depending on the finish system that is selected in Paragraph 2.5 below.*

*SPEC NOTE: The following subparagraph shall remain on all Projects.*

* + 1. Finish Warranty: Standard form in which manufacturer agrees to repair or replace metal panels that evidence deterioration of surface finish, as indicated in Paragraph 2.5 below.
1. PRODUCTS
	1. MANUFACTURER
		1. Basis-of-Design Products: Products named in this Section were used as the basis-of-design for the project; additional manufacturers offering similar products may be incorporated into the work of this Section provided they meet the performance requirements established by the named products, and provided they submit requests for substitution in accordance with [Division 01][Section 01 33 00 Submittal Procedures].
		2. Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section and as established by the Basis-of-Design Materials, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:
			1. NORBEC Architectural Inc.
			97 Rue de Vaudreuil, Boucherville (Quebec), J4B 1K7
			Phone:1-877-667-2321
	2. description
		1. Composite panel system consisting of interior and exterior preformed, interlocking steel panels with poured in place polyisocyanurate foam core.
			1. Panel decompression cavity and evacuation channel to drain water infiltration to exterior.
			2. Concealed anchorage system, designed to minimize thermal bridging.

*SPEC NOTE: Select one of the following joint systems below, and delete the option not required on the Project.*

*SPEC NOTE: NORBEC applies butyl seal bead in factory to ensure bead placement, thickness, and continuity. This practice separates NORBEC from other manufacturers, who “site-install” weather seals using site labour. NORBEC is able to offer special weather tightness warranties that other manufacturers are unable to provide, due to their manufacturing process and factory quality control measures.*

*SPEC NOTE: The offset joint system offers a “pressure equalized rainscreen” joint design, allowing for drainage of the panel joint, which is offered with the NOREX-L Panel.*

* + - 1. Pre-form steel panel lateral edges with [offset] [straight] joint system with factory-applied butyl seal on both interior and exterior panel joints.

*SPEC NOTE: Select one of the following panel configurations below, and delete the option not required on the Project. Horizontal joints add an architectural design element to the elevation.*

* + - 1. [Full height panels with no horizontal joints] [Horizontal joints with concealed fasteners].
	1. performance criteria
		1. Components: Design and size to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of panel as calculated.
			1. Structural Performance: Design loads and maximum deflections to ASTM E72.
			2. Design anchors to support a capacity of 1200lbs for 3mm (1/8”) girt thickness.
			3. Maximum Allowable Deflection of Wall Panels: 1/180 of span or 15 mm (5/8”), under maximum design loads.

*SPEC NOTE: Delete the following two paragraphs if not required on the Project.*

* + - 1. Maximum Allowable Deflection of Roof or Ceiling Panels: 1/240 of span under maximum design loads.
			2. Maximum Allowable Deflection of Wall Panels Covered by Brick Facing: 1/360 of span under maximum design loads.
		1. Performance of Panel System:
			1. Flame Spread/Smoke Developed Performance: To CAN/ULC-S102; Flame Spread: 20; Smoke Developed: 95.
			2. Meeting CAN/ULC S-101; S102; S-126; S-134 and S-138.
			3. Thermal Resistance of Panel: Based on ASTM C518 and ASTM C1363; Test @ mean temperature of 75 deg F.
				1. RSI 1.29 / 25.4mm
				2. R-7.5 / per inch.
			4. Long Term Thermal Resistance (LTTR): Exceeding CAN/ULC-S704-11.
				1. 5 year LTTR per thickness:

50 mm thick: LTTR of 2.4 m2.°K/W

100 mm thick: LTTR of 5.2 m2.°K/W

* + - 1. Dimensions tolerances @ 25°C:
				1. Panel width tolerance:

1080 mm ± 2 mm

* + - * 1. Panel thickness tolerance:

2” to 4”: ± 2 mm

5”: ± 2.5 mm

6”: ± 3 mm

* + - 1. Movement: Accommodate movement within system without causing damage to system, components, or deterioration of seals due to the following:
				1. Movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; deflection of structural support framing, shortening of building concrete structural columns, and creep of concrete structural members.
			2. Tolerances: Accommodate tolerances of building structural framing.
			3. Products: Provide continuity of thermal barrier at building enclosure elements, in conjunction with thermal insulating materials specified in Division 07.
			4. Vapour Retarder: Provide continuity of vapour retarder at building enclosure elements in conjunction with vapour retarders specified in [Division 07][Section 07 26 00].
			5. Air Seal: Provide continuity of air barrier at building enclosure elements in conjunction with air seal materials specified in [Division 07][Section 07 27 00].
	1. MATERIALS

*SPEC NOTE: Select the following Subparagraph 2.4.1 if NOREX-H by NORBEC Architectural Inc. is the Basis of Design for this Project.*

*SPEC NOTE: NOREX-H offers flexibility in design, but doesn’t offer a pressure equalized joint within the system.*

*SPEC NOTE: Contact your NORBEC Technical Representative for design options, to see the possibilities that NOREX-H Architectural Panel can offer.*

* + 1. Architectural Wall Panel Assembly:
			1. Basis of Design Materials: NOREX-H by NORBEC Architectural Inc.

*SPEC NOTE: Select only the options below that apply for the Project and delete all items not required on this Project.*

*SPEC NOTE: NOREX-H allows mounting configurations in both horizontal and vertical directions, and different configurations can be specified on the same elevation.*

* + - 1. Mounting Configuration: [Horizontal][Vertical] mounting.
			2. Width: [610mm (24”)][762mm (30”)][ 914mm (36”)][1055mm (41-1/2”)]
			3. Thickness: [75mm (3”)][100mm (4”)]
			4. Length: Minimum: 7’; Maximum: 52’
			5. Panel Core: Poured-in expanding polyisocyanurate (ISO) foam core, as indicated below.
			6. Joint System: Manufacturer’s standard pressure equalized rainscreen joint, complete with interior and exterior butyl seals, as identified in paragraph 2.2 Description above.
			7. Exterior Face of Panel:
				1. Material:

Steel coil material shall be commercial grade, meeting ASTM A653/A653M Z275, G90 Galvanized steel.

*SPEC NOTE: NOREX-H exterior panel skin comes in 22 gauge only.*

Gauge: 22 gauge (0.0285”)

* + - * 1. Standard Panel Exterior Finish:

*SPEC NOTE: Select one of the following options, and delete items not required on this Project.
SPEC NOTE: Embossed finish is a special order and will have a longer lead time.*

Smooth

Embossed

* + - * 1. Standard Panel Exterior Profile:

*SPEC NOTE: Select one of the following options, and delete items not required on this Project.
SPEC NOTE: Fluted Profile is only available on panels sandwiching a polyisocyanurate insulated core.
SPEC NOTE: Micro-ribbed Profile is not available in all colour coatings. Consult the Coatings and Finishes for IMP Colour Guide, dated March 2022.*

Silkline (Striated)

Micro-ribbed

Fluted

*SPEC NOTE: Select one of the following finishing options, and delete items not required on this Project.
SPEC NOTE: Coating systems are further defined below in Paragraph 2.5 Panel Finish Characteristics.*

* + - * 1. Exterior Paint Finish Colour: [As indicated in the Coatings and Finishes for IMP Colour Guide, published by NORBEC; Colour Name; SRI Value][As indicated in Section 09 06 05 Product and Finish Schedule.][As selected by Consultant from manufacturer's full product range.][As indicated in the Exterior Finish Schedule on the Drawings.]
			1. Interior Face of Panel:
				1. Material:

Steel coil material shall be commercial grade, meeting ASTM A653/A653M Z275, G90 Galvanized steel.

*SPEC NOTE: Select one of the following interior steel panel skin gauges.*

*SPEC NOTE: 26 gauge is standard thickness for NOREX-H.*

Gauge: [26 gauge 0.019”)][22 gauge (0.0285”)].

* + - * 1. Standard Panel Interior Finish:

*SPEC NOTE: Select one of the following options, and delete items not required on this Project.
SPEC NOTE: Embossed finish is a special order and will have a longer lead time.*

Smooth

Embossed

* + - * 1. Standard Panel Interior Profile:

*SPEC NOTE: Select one of the following options, and delete items not required on this Project.
SPEC NOTE: Fluted Profile is only available on panels sandwiching a polyisocyanurate insulated core.*

Silkline (Striated)

Fluted

* + - * 1. Interior Paint Finish Colour: [As indicated in the Coatings and Finishes for IMP Colour Guide, published by NORBEC; Colour Name; SRI Value][As indicated in Section 09 06 05 Product and Finish Schedule.][As selected by Consultant from manufacturer's full product range.][As indicated in the Exterior Finish Schedule on the Drawings.]

*SPEC NOTE: Select the following Subparagraph 2.4.2 if NOREX-L by NORBEC Architectural Inc. is the Basis of Design for this Project.*

*SPEC NOTE: NOREX-L offers panel thickness of up to 8”, complete with a pressure equalized joint within the system, but only allows for vertical orientation of the panel.*

*SPEC NOTE: Contact your NORBEC Technical Representative for design options, to see the possibilities that NOREX-L Architectural Panel can offer.*

* + 1. Vertical Architectural Wall Panel Assembly :
			1. Basis of Design Materials: NOREX-L by NORBEC Architectural Inc.
			2. Mounting Configuration: Vertical mounting.

*SPEC NOTE: Select only the options below that apply for the Project and delete all items not required on this Project.*

* + - 1. Width: [610mm (24”)][762mm (30”)][ 914mm (36”)][1080mm (42-1/2”)]
			2. Thickness: [50mm (2”)][75mm (3”)][100mm (4”)][125mm (5”)][150mm (6”)][200mm (8”)]
			3. Length: Minimum: 7’; Maximum: 52’
			4. Panel Core: Poured-in expanding polyisocyanurate (ISO) foam core, as indicated below.
			5. Joint System: Manufacturer’s standard pressure equalized rainscreen joint, complete with interior and exterior butyl seals, as identified in paragraph 2.2 Description above.
			6. Exterior Face of Panel:
				1. Material:

Steel coil material shall be commercial grade, meeting ASTM A653/A653M Z275, G90 Galvanized steel.

*SPEC NOTE: Select one of the following exterior steel panel skin gauges below.*

*SPEC NOTE: 26 gauge is standard thickness for NOREX-L.*

Gauge: [26 gauge 0.019”)][22 gauge (0.0285”)].

* + - * 1. Standard Panel Exterior Finish:

*SPEC NOTE: Select one of the following options, and delete items not required on this Project.
SPEC NOTE: Embossed finish is a special order and will have a longer lead time.*

Smooth

Embossed

* + - * 1. Standard Panel Exterior Profile:

*SPEC NOTE: Select one of the following options, and delete items not required on this Project.
SPEC NOTE: Fluted Profile is only available on panels sandwiching a polyisocyanurate insulated core.
SPEC NOTE: Micro-ribbed Profile is not available in all colour coatings. Consult the Coatings and Finishes for IMP Colour Guide, dated March 2022.*

Silkline (Striated)

Micro-ribbed

Fluted

*SPEC NOTE: Select one of the following finishing options, and delete items not required on this Project.
SPEC NOTE: Coating systems are further defined below in Paragraph 2.5 Panel Finish Characteristics.*

* + - * 1. Exterior Paint Finish Colour: [As indicated in the Coatings and Finishes for IMP Colour Guide, published by NORBEC; Colour Name; SRI Value][As indicated in Section 09 06 05 Product and Finish Schedule.][As selected by Consultant from manufacturer's full product range.][As indicated in the Exterior Finish Schedule on the Drawings.]
			1. Interior Face of Panel:
				1. Material:

Steel coil material shall be commercial grade, meeting ASTM A653/A653M Z275, G90 Galvanized steel.

*SPEC NOTE: Select one of the following interior steel panel skin gauges below.
SPEC NOTE: 26 gauge is standard thickness for NOREX-L.*

Gauge: [26 gauge 0.019”)][22 gauge (0.0285”)].

* + - * 1. Standard Panel Interior Finish:

*SPEC NOTE: Select one of the following options, and delete items not required on this Project.
SPEC NOTE: Embossed finish is a special order and will have a longer lead time.*

Smooth

Embossed

* + - * 1. Standard Panel Interior Profile:

*SPEC NOTE: Select one of the following options, and delete items not required on this Project.
SPEC NOTE: Fluted Profile is only available on panels sandwiching a polyisocyanurate insulated core.*

Silkline (Striated)

Fluted

* + - * 1. Interior Paint Finish Colour: [As indicated in the Coatings and Finishes for IMP Colour Guide, published by NORBEC; Colour Name; SRI Value][As indicated in Section 09 06 05 Product and Finish Schedule.][As selected by Consultant from manufacturer's full product range.][As indicated in the Exterior Finish Schedule on the Drawings.]
		1. Insulation Core: Poured-in expanding polyisocyanurate (ISO) foam core, ASTM C591 Type IV, CFC and HCFC free, compliant with Montreal Protocol and Clean Air Act, with the following minimum physical properties:

*SPEC NOTE: Select the panel thickness required on the Project, and delete options not required.*

*SPEC NOTE: NOREX-H Panel only comes in the following thicknesses: 3”, and 4”.
Select the insulation core thickness that matches the panel thickness indicated above.*

* + - 1. Thickness: [75 mm (3”)] [102 (4”)] [127 (5”)] [152 mm (6”)].
			2. Core is minimum 88 percent closed cell when tested in accordance with ASTM D6226
			3. Foam has a density of 2.3 to 2.6 pounds per cubic foot when tested in accordance with ASTM D1622
			4. U-Value (R-Value): As indicated above in paragraph 2.3.2 Performance of Panel System.
			5. Compressive Stress when tested in accordance with ASTM D1621:
				1. Parallel to Rise: minimum of 23 psi
				2. Perpendicular to Rise: 23 psi
			6. Shear Stress: Minimum of 25 psi when tested in accordance with ASTM C273
			7. Tensile Stress: Minimum of 19 psi when tested in accordance with ASTM D1623
			8. Dimensional stability when tested in accordance with ASTM D2126:
				1. High Temperature Aging at 158 deg. F and 97% plus relative humidity for 28 days: less than 6 percent volume change
				2. High Temperature Aging at 200 deg. F and ambient humidity for 28 days: less than 4 percent volume change
				3. Low Temperature Aging at -10 deg. F and ambient humidity at 28 days: less than 1 percent volume change
	1. Panel finish characteristics
		1. Panel Finish Characteristics:
			1. Gloss: 15 plus or minus 5 measured at 60 degree angle tested in accordance with ASTM D523.
			2. Pencil Hardness: HB-H minimum tested in accordance with ASTM D3363.
			3. Flexibility, T-Bend: 1-2T bend with no adhesion loss when tested in accordance with ASTM D4145.
			4. Flexibility, Mandrel: No cracking when bent 180 degree around a 1/8 mandrel as tested in accordance with ASTM D522.
			5. Adhesion: No adhesion loss tested in accordance with ASTM D3359.
			6. Reverse Impact: No cracking or adhesion loss when impacted 3000 x inches of metal thickness (lb-in), tested in accordance with ASTM D2794.
			7. Abrasion Resistance: Nominal 65 liters of falling sand to expose 5/32” diameter of metal substrate when tested in accordance with ASTM D968.
			8. Graffiti Resistance: Minimal effect.
			9. Acid Pollutant Resistance: No effect when subjected to 30 percent sulfuric acid for 18 hours, or 10 percent muriatic acid for 15 minutes when tested in accordance with ASTM D1308.
			10. Salt Fog Resistance: Passes 1000 hours, when tested in accordance with ASTM B117 (5 percent salt fog @ 95 deg. F).
			11. Cyclic Salt Fog and UV Exposure: Passes 2016 hours when tested in accordance with ASTM D5894.
			12. Humidity Resistance: Passes 1500 hours at 100 percent relative humidity and 95 deg. F, with a test rating of 10 when tested in accordance with ASTM D2247, and D714.
			13. Colour Retention: Passes 5000 hours when tested in accordance with ASTM G153 and G154.
			14. Chalk Resistance: Maximum chalk is a rating of 8 when tested in accordance with ASTM D4214, Method A.
			15. Colour Tolerances: Maximum of 5∆E Hunter units on panels when tested in accordance with ASTM D2244.

*SPEC NOTE: It is highly recommended to consult the Coatings and Finishes for IMP Colour Guide, published by NORBEC and dated March 2022, prior to editing the following paragraphs .2, .3 and .4 of this Section below.*

*SPEC NOTE: Gauge thickness of the metal may change due to colour selection. Not all colours, finishes and/or profiles are offered in all gauges of steel that the manufacturer offers. Check with the Colour Guide prior to selecting panel colours for the Project.*

* + 1. Coating System:
			1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
			2. Pre-treat aluminum after fabrication and apply primer and finish coats in strict accordance with coating manufacturer's written instructions. All base metal furnished before painting shall conform to ASTM A653/A653M or
			ASTM A792/A792M, unless otherwise stated by the coating manufacturer.
			3. Film integrity:
				1. During the prescribed duration after application, the paint film shall have no evidence of cracking, flaking or checking to an extent that is apparent on ordinary outdoor visual observations.
			4. Chalking:
				1. Within the prescribed duration after application, the degree of chalking will not exceed rating #8 for vertical and nonvertical applications when measured per ASTM D4214, Method A.
			5. Colour Change:
				1. Within the prescribed duration after application, the change in colour will not be greater than five colour units for vertical and non-vertical applications. Colour measurements are to be made per ASTM D2244 and only on clean surfaces after removing surface deposits and chalk per ASTM D3964. Colour change is measured using any accepted colour spectrophotometer designed to produce reflectance readings in the Tristimulus Filter System on X, Y and Z based on the CIE values of illuminant C and measured in Hunter L, a and b units.

*SPEC NOTE: SMP coatings are designed for wall panel and roofing applications, but is not recommended for aggressive atmospheric exposures. SMP coatings offer a 40-year film integrity, and 30-year chalking and colour fade warranties.*

* + - 1. Silicone Modified Polyester (SMP) Finish:
				1. Designed for sidewall (vertical) applications and roofing (non-vertical) applications for the construction and manufacturing industry.
				2. Dry Film Thickness:

The exposed surface shall have a dry film thickness of 25μm ± 3μm (1.0 ± 0.1 mils).

The unexposed or reverse side shall have a dry film thickness which will vary in accordance with the panel manufacturer’s requirements.

* + - * 1. Basis of Design Materials: Perspectra Plus Series by ArcelorMittal Dofasco Inc., or approved equivalent.

*SPEC NOTE: 2-coat systems are designed for wall panel and roofing applications, that are more demanding for aesthetic performance. 2-coat systems offer 20-year film integrity, chalking and colour change warranties. This coating option is the most commonly used.*

* + - 1. 2 Coat Fluoropolymer (PVDF) Coating:
				1. Manufacturer's standard 2 coat, thermo-cured system consisting of specially formulated inhibitive primer and colour topcoat.
				2. Dry Film Thickness:

The exposed surface shall have a minimum topcoat dry film thickness of 18 microns (0.7 mils) and 5 microns (0.2 mils) primer.

The unexposed (reverse) side shall have a dry film thickness which will vary in accordance with customer requirements.

* + - * 1. Basis of Design Materials: Pre-Coat 10000 Series by ArcelorMittal Dofasco Inc., or approved equivalent.

*SPEC NOTE: 4-coat systems are designed for extreme weather conditions or where performance of the finish is high priority. 4-coat systems offer a 40-year film integrity, caulking and colour change warranty. This coating option is most expensive and is more commonly used where salt spray is an issue, or where extreme weather conditions can be a factor on the materials for the Project.*

* + - 1. 4-Coat Fluoropolymer “Collections” Thermo-setting Enamel:
				1. Metallic/Elite Series 4-coat paint systems are designed for sidewall and roofing applications in the construction market that are the most demanding for aesthetic performance; Metallics for fat architectural panels, and Elite for accent applications.
				2. Dry Film Thickness:

The exposed surface shall have a minimum dry film thickness of 5 microns (0.2 mils) primer, 18 microns (0.7 mils) barrier coat, 15 microns (0.6 mils) colour/metallic topcoat and 11 microns (0.45 mils) clear coat.

The unexposed (reverse) side shall have a dry film thickness which will vary in accordance with customer requirements.

* + - * 1. Basis of Design Materials: Pre-Coat Metallic/Elite Series by ArcelorMittal Dofasco Inc., or approved equivalent.
			1. Steel (Concealed):
				1. Hot-dip galvanized in accordance with CAN/CSA-G164, with minimum coating of 2 oz./sq.ft., or zinc rich paint.
			2. Isolate where necessary to prevent electrolysis due to dissimilar metal-to-metal contact or metal-to-masonry and concrete contact.  Use bituminous paint, butyl tape or other approved divorcing material.
	1. accessories
		1. Panel Supports and Anchorages:
			1. Steel sheet, hot-dip galvanized to ASTM A653/A653M, 2 mm (14 gauge), to dimensions and profiles indicated.
		2. Perimeter Trim and Penetration Treatments:
			1. Fabricated perimeter trim, penetration treatments and metal flashing: Shall be same gauge, material and coating colour as exterior face of insulated metal wall panel.
		3. Metal Flashings, Closures:
			1. Steel sheet, hot-dip galvanized to ASTM A653/A653M, 0.053 mm (26 gauge), to dimensions and profiles indicated.

*SPEC NOTE: Select one of the following options below.*

* + - 1. Colour: [Matching adjacent wall panel colour, as approved by the Consultant][As selected from manufacturer’s standard colour range][As indicated in the Exterior Finish Schedule on the Drawings].
		1. Fasteners: Manufacturer's standard type to suit application; zinc coated.
			1. Exterior Finishing Screws: Self-fastening/self-drilling, #9 x 25 mm (1”), zinc- coated steel screws with rubber washer and head color to match panels.
			2. Interior Finishing Screws: Self-fastening/self-drilling steel #8 x 19 mm (3/4”) zinc-coated screws with head color to match panels.
			3. Structural Screws: Self-fastening/self-drilling TEK #1/4-28 zinc-coated steel screws; Length adapted to panel thickness.
			4. Anchor Bolts and Nuts: ASME B18.2.2, SAE Gr. 5, minimum 6.6 mm (0.26”) diameter.
		2. Flashings, Sealants and Paints:
			1. Flexible Flashing: Air-barrier type; modified bitumen sheet laminated to protective polyethylene film, self-adhering, 1 mm. (0.040”) thick; Primer as recommended by flexible flashing manufacturer.
				1. Basis of Design Materials: Blueskin SA by Henry Company, or approved equivalent.
			2. Panel Sealant (concealed joint): Synthetic butyl, elastomeric, solvent-free, non-skinning, and compatible with steel surfaces, to CGSB-19-GP-14 M.
				1. Basis of Design Materials: SikaLastomer-511 by Sika Canada, or approved equivalent.
			3. Flashing Sealant: Exterior type, weather-resistant, compatible with surfaces to be sealed. Elastomeric with chemical polymerization, moisture curing, to CAN/CGSB-19.13; Colour to match panels.
				1. Basis of Design Materials: DuraLink 50 by Chemlink, or approved equivalent.

*SPEC NOTE: Edit the following paragraph if the Project doesn’t require CFIA approval.*

* + - 1. Interior Sealant: CAN/CGSB-19.13, silicone based mastic [approved by CFIA for use in buildings with food processing/handling facilities]; Colour to match panels.
				1. Basis of Design Materials: Adseal 4550 Series by Adfast, or approved equivalent.
			2. Joint Backup: Polyethylene, urethane, neoprene or vinyl compressible closed-cell foam, compatible with primers and sealants. Oversize 30% to 50% to suit joint width.
			3. Air Sealant Foam: CAN/ULC-S710.1, Bead applied, gun foam, one-component polyurethane sealant.
				1. Flame spread: 25; Smoke developed rating: 50; As tested to CAN/ULC-S102.
				2. Basis of Design Materials: Adfoam Pro 1875 Foam Sealant by Adfast, or approved equivalent.
			4. Field Touch-up Paint: As recommended by panel manufacturer.
			5. Bituminous Paint: As recommended by panel manufacturer.
	1. PANEL FABRICATION

*SPEC NOTE: Keep the following paragraph when vertical panel orientation is selected on the Project.*

* + 1. Fabricate panels utilizing pressurized-equalized rain screen fabrication.
		2. Form sections true to shape, accurate in size, square, and free from distortion or defects.
		3. Form pieces in longest practicable lengths.
		4. Inject steel sheet cavities with polyisocyanurate foam.
		5. Factory seal exposed foam with plastic film to eliminate water infiltration and prevent loss of insulating gas.

*SPEC NOTE: The following paragraph identifies the application of sealant is during production, prior to packaging.*

* + 1. Apply butyl sealant to interior and exterior overlaps during production to provide a continuous and uniform bead of sealant, to achieve air tightness.
		2. Factory finish sheets to paint manufacturer’s standards, as indicated below.
		3. Panel Joints:
			1. Fabricated for offset
		4. Fabrication Tolerances:
			1. Length: ±6mm (1/4")
			2. Width: ±6mm (1/4")
			3. Depth (overall): ±6mm (1/4")
			4. Warp: ±1.5mm per 305mm (1/16" per 12")
	1. Source quality control
		1. Conduct periodic verification of assembly, panel pull-off tests, and check for uniform distribution of adhesion between insulation and steel sheets during lamination.
1. EXECUTION
	1. EXAMINATION
		1. Verification of Conditions:
			1. Examine substrates to receive work and surrounding adjacent surfaces for conditions affecting installation. Coordinate with related sections to ensure proper dimensions are maintained.
			2. Verify site dimensions by accurate field measurements, true and level, so that work will be accurately designed, fabricated and fitted to the structure.
			3. Verify that framing members and structural alignment are within recommended tolerances and ready to receive panel system.
			4. Verify that concrete or masonry structure has attained minimum design compressive strength.
		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.
	2. PREPARATION
		1. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
		2. Perform additional preparation procedures as required by manufacturer's instructions.
		3. Examine individual panels upon removing from the bundle; notify manufacturer of panel defects. Do not install defective panels.
	3. INSTALLATION
		1. General:
			1. Install composite metal panel system on walls [and soffits] to manufacturer's written instructions.
			2. Protect panel surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.
			3. Permanently fasten panel system to structural supports; Aligned, level, and plumb, within specified tolerances.
			4. Attach panels to structure without restricting movement caused by design loads and expansion and contraction of assembly.
			5. Seal panels weather tight to adjacent wall assemblies, and ensure complete continuity of building envelope air barrier, vapour retarder, thermal insulation and rainscreen.
			6. Coordinate weather tight seal at roof, floor and at junctions with other wall construction.
			7. Attach flexible flashings to foundations as indicated.

*SPEC NOTE: Delete the following paragraph where there is no expansion or control joints required on the Project.*

*SPEC NOTE: Control joints are determined on a Project-by-Project basis, as the manufacturer will design with the limited amount of Control Joints.*

*SPEC NOTE: Providing the Panel Manufacturer with an Architectural Drawing package within the Construction Documentation Development, allows the flexibility to design the panel system with the fewest amount of Control Joints, prior to Tendering. The following key factors will influence the need for Control Joints within a metal panel system: Building orientation, building height, structural support frequency, panel colour and textured finish of exterior panel skin, steel thickness, and panel thickness.*

* + - 1. Provide [expansion] [control] joints in locations identified on the systems Shop Drawings, as provided by the panel manufacturer.
			2. Trim panels with flashings; weep holes, transition sheets, flexible flashings and gap-filling insulation to attain specified system performance.
			3. Provide weep holes and vents at each panel joint to drain water infiltrating the system, to the exterior of building.
			4. Provide exposed and concealed flashings with exterior minimum positive 1:12 slope; Surfaces to remain free of stagnant water.
			5. Minimize thermal bridging with insulation to prevent direct conduction through envelope.
			6. Do not leave metal sheet flanges unfolded or exposed. Minimize site cutting.
			7. Protect exposed surfaces of cuts with paint to match panel colour. Ensure site cuts are same quality as shop cuts.
		1. Erection Tolerances for Structural Support:
			1. Unless otherwise specified, steel structural support must be erected in accordance with CSA S16.
			2. Tolerance on structural support flatness: 6 mm in 3 m (¼” in 10’) in all directions.
			3. Tolerance on flatness for the structural support contact area with the panel: 1.5 mm in 150 mm (1/16” in 6”).
			4. A survey of the structural support flatness must be done prior to installation.
		2. Edification Tolerances:
			1. Width of interior reveal between panel: 5 mm ± 1,5 mm (3/16” ± 1/16”).
			2. Tolerance on vertical alignment: 5mm in 6 m (3/16” in 20’)
			3. Tolerance on panel flatness: 6 mm in 3 m (¼” in 10’) in all directions.
			4. Tolerance on oil canning and other surface aesthetic issues:
				1. 1 mm in 400 mm (5/128” in 15-¾”).
				2. Each panel must be individually inspected prior to installation.
	1. CLEANING
		1. Progress Cleaning: Leave work area clean at the end of each work day, ensuring safe movement of passing pedestrians.
			1. Remove excess sealant with solvent recommended by manufacturer.
			2. Clean installation of residue and remove unused materials and products. Remove site cuttings from finish surfaces.
			3. Touch-up, repair or replace metal panels and trim that have been damaged.
		2. Final Cleaning: At completion of installation, clean all surfaces so they are free of foreign matter using cleaners recommended by panel manufacturer. Do not use cleaning materials or processes that could change the appearance of exposed finishes.
			1. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.
			2. After panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
		3. Waste Management: Coordinate 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.
	2. PROTECTION
		1. Protect installed products until completion of project.
		2. Clean all exposed surfaces of wall panels and touch-up, repair or replace damaged products before Substantial Completion. Do not use abrasive cleaners.
	3. schedules

*SPEC NOTE: The following article will assist in preparing a schedule when panel design, colour, or dimensions vary for the project.*

*SPEC NOTE: The following schedule is an EXAMPLE only. Edit the paragraphs below to create a schedule for the components specified in this section.*

* + 1. North Elevation:
			1. [Panel name (and abbreviation if provided); panel thickness; panel orientation, profile, texture, coating system, colour, and any other information that will aid in identifying the panel system of choice.]
		2. East Elevation:
			1. [Panel name (and abbreviation if provided); panel thickness; panel orientation, profile, texture, coating system, colour, and any other information that will aid in identifying the panel system of choice.]
		3. South Elevation:
			1. [Panel name (and abbreviation if provided); panel thickness; panel orientation, profile, texture, coating system, colour, and any other information that will aid in identifying the panel system of choice.]
		4. West Elevation:
			1. [Panel name (and abbreviation if provided); panel thickness; panel orientation, profile, texture, coating system, colour, and any other information that will aid in identifying the panel system of choice.]

END OF SECTION