

**MACHINE ROOM LESS ELECTRIC
TRACTION ELEVATORS**

1. GENERAL

1.1 Summary

- .1 Section includes: Electric traction passenger elevator(s) as specified. Elevator work includes:
 - .1 Commercial, standard pre-engineered geared traction passenger elevator(s).
 - .2 Elevator car enclosures, hoistway doors and signal equipment.
 - .3 Operation and control systems.
 - .4 Accessibility provisions for physically disabled persons.
 - .5 Equipment, machines, controls, systems and devices as required for safely operating the specified elevator(s) at their rated speed and capacity.
 - .6 Materials and accessories as required for completing the elevator installation.
- .2 Related Sections:
 - .1 Division 3 Sections (by other than elevator provider):
 - .1 Installing inserts, sleeves and anchors in concrete;
 - .2 Providing a waterproof pit.
 - .2 Division 4 Sections (by other than elevator provider):
 - .1 Installing inserts, sleeves and anchors in masonry;
 - .2 Providing a legal and fire rated hoistway.
 - .3 Division 5 Sections (by other than elevator provider):
 - .1 Providing steel framing, auxiliary support steel and divider beams for supporting guide-rail brackets.
 - .2 Providing a 4000-pound capacity removable hoist beam located at the top of the hoistway as shown on layout drawings.
 - .4 Division 9 Sections (by other than elevator provider):
 - .1 Providing elevator car flooring finish at a maximum thickness of 19mm and maximum weight of 200 pounds.

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- .2 Field painting of unfinished and shop primed ferrous metals.
- .5 Division 15 Sections (by other than elevator provider):
 - .1 Heating and ventilating hoistways and machine electrical spaces.
- .6 Division 16 Sections (by other than elevator provider):
 - .1 Providing electrical service to elevators, including fused disconnect switches;
 - .2 Emergency power supply, transfer switches and auxiliary contacts;
 - .3 Heat and smoke sensing devices;
 - .4 Convenience outlets and illumination in machine electrical spaces, pit and hoistway.

1.2 Submittals

- .1 Product data: When requested, submit product data for the following:
 - .1 Elevator car enclosures, fixtures and hoistway entrances.
 - .2 Operation, control, and signal systems.
- .2 Shop drawings:
 - .1 Show equipment arrangement in the machine and electrical spaces, pit and hoistway. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.
 - .2 Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
 - .3 Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.
 - .4 Indicate electrical power requirements, branch circuit protection device recommendations, and location of 3-phase power supply disconnect.
- .3 Color selection: Submit color charts of exposed finishes and materials for selection.
 - .1 When requested, submit samples of exposed finishes and materials selected for the elevator system materials and components.
- .4 Certificates: Inspection and acceptance certificates of elevator system installation.

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- .5 Operation and maintenance data.
 - .1 Include operation and maintenance instructions.

1.3 Quality Assurance

- .1 **Manufacturer Qualifications:** An approved manufacturer regularly engaged in manufacturing, installing, and servicing elevators of the type required for the project.
- .2 **Installer Qualifications:** The elevator(s) shall be installed by the manufacturer's representative.
- .3 **Regulatory Requirements:**
 - .1 ASME A17.1 Safety Code for Elevators and Escalators, CAN/CSA B44 Safety Code for Elevators or as required by the local Building Code;
 - .2 National Building Code;
 - .3 NFPA 70 National Electrical Code;
 - .4 Canadian Electrical Code C22.1;
 - .5 NFPA 80 Fire Doors and Windows;
 - .6 Americans with Disabilities Act - Accessibility Guidelines (ADAAG).
- .4 **Fire-rated entrance assemblies:** Opening protective assemblies including frames, hardware and operation shall comply with ASTM E2074, CAN4-S104 (ULC-S104), UL10 (b), and NFPA Standard 80. Provide entrance assembly units bearing Class B or 2 hour label by a nationally recognized testing laboratory. For Type N entrances, ULC procedure is to cover following codes: National Building Code of Canada, NFPA 80 and Safety Code for Elevators CAN3-B44-M90.
- .5 **Inspection and testing:** Elevator Installer shall obtain and pay for the required inspections, tests, permits and fees for elevator installation. Arrange for inspections and make required tests. Deliver to the owner upon completion and acceptance of elevator work.

1.4 Delivery, Storage and Handling

- .1 Deliver elevator materials, components and equipment in manufacturer's protective packaging.
- .2 Store materials in a dry protected area provided by others. Protect and handle materials in accordance with manufacturer's recommendations to prevent damage, soiling, or deterioration.

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1.5 Project Conditions

.1 Temporary Use:

- .1 User shall provide all necessary protection to prevent damage to each elevator used for construction purposes before Substantial Completion;
- .2 User shall provide temporary enclosures, coverings, guards, barriers and other devices required to protect the elevator car enclosures, hoistway doors and transoms, signal fixtures and related materials, components and finishes from damage;
- .3 Maintenance during use, including cleaning, lubricating, adjusting and callbacks for proper elevator operation shall be performed only by Elevator provider. Cost for all maintenance related activities shall be paid by the user;
- .4 Elevators shall be free of damage or deterioration at time of Substantial Completion. Cost to repair damaged materials and finishes and replace worn or defective components to restore elevators to their original condition shall be borne by the user.

.2 Painting:

- .1 Except as otherwise specified, paint all metal work provided by the elevator manufacturer and installer.
- .2 Provide all ferrous metals installed in the hoistway shop primed with a rust inhibitive primer.

1.6 Maintenance

- .1 Provide maintenance and call back service for a period of twelve (12) months from the date of Substantial Completion. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation.
 - .1 Maintenance work, including emergency call back repair service, shall be performed by trained employees of the elevator contractor during regular working hours.
 - .2 Elevator contractor shall have service office and full time service personnel within a 100-mile radius of the project site.
 - .3 Maintenance period will run conjunctly with the warranty period.

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2. PRODUCTS

2.1 Manufacturer

- .1 Approved Manufacturer: Elevator company approved by the local jurisdiction with a Machine Room Less product. ThyssenKrupp Northern Elevator or approved equal.

2.2 Materials, General

- .1 Colors, patterns and finishes: As selected by the Architect from manufacturer's range of standard colors, patterns, and finishes.

2.3 Hoistway Equipment

- .1 Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded, with a wood sub floor. Fireproofed platform underside.
- .2 Sling: Steel stiles affixed to a steel crosshead and bolster channels with bracing members to remove strain from the car enclosure.
- .3 Guide Rails: Dry, unlubricated steel, fastened to the building with steel brackets.
- .4 Guide Shoes: Non lubricated, sliding type.
- .5 Buffers: Provided in the elevator pit. Mount oil-type car buffers on continuous channels fastened to the elevator guide rails or securely anchored to the pit floor. Provide extensions if required by project conditions. Mount spring type counterweight buffers on continuous channels fastened to the elevator guide rails or securely anchored to the pit floor.
- .6 Machine: Provide an ultra efficient low noise geared traction machine. All bearings are to be sealed to provide low maintenance and freedom of movement. Provide roller and anti-friction metal bearings with adequate means of protection.
 - .1 Drive: Variable Voltage Variable Frequency (VVVF) type.
 - .1 Motor: Totally enclosed, non-ventilated 10 horsepower AC motor with Class F insulation. Motor armature shall be dynamically balanced and supported by ball bearings of ample capacity.
 - .2 Control: Vector controlled pulse-width modulated AC drive. The variable voltage variable frequency drive shall convert the AC power supply using a two step process to a variable voltage variable frequency power supply for use by the hoist motor. Speed control shall be by means of vector control providing independent excitation and torque current. Provide a digital velocity encoder on the motor, giving feedback to the controller on motor speed and position.
 - .2 Brake: Spring applied electric brake, held open by an electro-magnet actuated by the

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controller and designed to make smooth, positive stops. Brake shall be designed to automatically apply in event of interruption of power supply from any cause.

- .3 Machine Location: Machine shall be located on supporting beams in the overhead.
- .7 Ropes: Hoist ropes constructed of steel of size and number to ensure proper required traction, system loading and wear qualities. Governor ropes constructed of steel.
- .8 Counterweight: Counterbalance each elevator for smooth and economical operation by steel weights contained in a structural steel frame. Counterweight shall equal a complete elevator car plus 40 – 50 percent of the specified capacity.
- .9 Safety and Governor: Car safety shall be mounted on the bottom of the car frame stiles and be operated by a centrifugal speed governor. The governor shall be designed to cut off power to the motor and apply the brake whenever the governor detects an excessive speed condition in the up or down direction.
- .10 Automatic Terminal Limits: Place electric limit switches near the terminal landings. Limit switches shall be designed to cut off the electric current and stop the car if it runs beyond the top or bottom terminal landing.
- .11 Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the floor landings and correct for over or under travel. Self-leveling shall, within its zone, be automatic. The car shall be maintained approximately level with the landing irrespective of its load.

2.4 Hoistway Entrances

- .1 Doors and Frames: Provide complete metal type hoistway entrance doors and frames at each hoistway opening.
 - .1 Manufacturer's standard entrance design consisting of 16 gauge frames with 50mm profile, doors, hangers, hanger supports, fascia plates, integral sight guards, and necessary hardware.
 - .2 Frames to accommodate nominal 200mm masonry wall.
 - .3 Elevator wall interface with hoistway entrance assembly shall comply with elevator manufacturer's requirements.
 - .4 Doors and Frames Finish: Stainless steel #4.
- .2 Interlocks: Equip each hoistway entrance with an approved interlock tested as required by code. Interlock shall be designed to prevent operation of the car away from the landing until the doors are locked in the closed position as defined by code and shall prevent opening the doors at any landing from the corridor side unless the car is at rest at that landing or is in the leveling zone and stopping at that landing.

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- .3 Door Hanger and Tracks: Provide sheave type suspension hangers and tracks for each hoistway sliding door.
 - .1 Sheaves: Polyurethane tires with ball bearings properly sealed.
 - .2 Hangers: Adjustable.
 - .3 Tracks: Formed steel with smooth surface and shaped to conform to the hanger sheaves.
- .4 Hoistway Sills:
 - .1 Entrance Sills: Aluminum

2.5 Car Enclosure

- .1 Car Enclosure:
 - .1 Walls Panels: Raised plastic laminate panels.
 - .2 Canopy Finish: White painted steel.
 - .3 Ceiling Finish: White aluminum eggcrate panels under fluorescent lighting.
 - .4 Cab Columns, Fronts, and Transom Finish: Stainless steel #4.
 - .5 Doors: Horizontal sliding car door reinforced for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a steel track and are guided at the bottom by non-metallic guides.
 - .6 Door Finish: Factory applied prime coat clad with stainless steel #4.
 - .7 Handrail: 1 ½ "(38mm) diameter satin stainless steel #4 finish provided on all non-access walls.
 - .8 Cab Sills: Aluminum
 - .9 Handrail: 1 ½ "(38mm) wide satin stainless steel #4 finish provided on all non-access walls.
 - .10 Ventilation: Single speed exhaust fan mounted in the car canopy.
- .2 Car Top Inspection: Provide a car top inspection station with an "emergency stop" switch inspection / auto switch to make the normal operating devices inoperative and constant pressure "up-down" direction buttons to give the inspector complete control of the elevator.

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2.6 Door Operation

- .1 Door Operation: Provide a door operator designed to operate the car and hoistway doors simultaneously. The door control system shall be closed loop with all electronic and digital operation. The closed loop circuit shall give constant feedback on the position and velocity of the doors. The motor torque shall be constantly adjusted to maintain the correct door speed based on its position and load. All adjustments and setup shall be through a computer based service tool. Door movements shall be electrically cushioned at both limits of travel and the door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing.
 - .1 No Unnecessary Door Operation: Car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as the next car up. If the infrared door protection system detects a person or object while closing, the doors will stop and resume closing after the obstruction has been removed.
 - .2 Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time will be shortened (field programmable setting) when the electronic door protection device is activated.
 - .3 Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel will reverse and the door will reopen to answer the other call.
 - .4 Nudging Operation: The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door movement is obstructed for a field programmable time, a buzzer will sound. When the obstruction is removed, the doors will close at a reduced speed.
 - .5 Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors will recycle closed then open (field adjustable number of times) to try and correct the fault.
 - .6 Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors will recycle open then close (field adjustable number of times) to try and correct the fault.
- .2 Door Protection Device: Provide a door protection system using a 40 microprocessor controlled infra-red light curtain system with a minimum of 24 sending and receiving LED's. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

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2.7 Car Operating Station

- .1 Car Operating Station: Provide a stainless steel #4 main car control containing the devices required for specific operation including:
 - .1 Door open, door close and alarm buttons;
 - .2 Keyed emergency stop switch;
 - .3 Floor buttons which illuminate when a call is registered and will remain illuminated until the call is answered;
 - .4 Raised floor indications and handicap symbols meeting ADA requirements located immediately to the left of the floor buttons and fully integrated in the module design;
 - .5 Fire service features in accordance with the applicable Code requirements.
- .2 Position Indicator: Provide a 2-inch dot matrix position indicator mounted in the control panel for optimum viewing. As the car travels, its position in the hoistway shall be indicated by the illumination of the alpha/numeric character corresponding to the landing, which the elevator is stopped or passing.
- .3 Emergency Light: Provide an emergency light and capacity plate. Emergency light shall illuminate automatically upon loss of the building's normal power supply.
- .4 Emergency Communications System: Provide an emergency communications device in the car operating panel complying with local Codes.
- .5 Other accessories provided:
 - .1 Single speed fan/light switch;
 - .2 Hoistway accessible switch;
- .6 Car Door Mounted Car Riding Lantern: Provide a stainless steel #4 car-riding lantern in the cab jamb. When illuminated, the lantern will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop while the doors are not in the closed position. The lantern shall remain illuminated until the doors are closed.
- .7 Provide where required.
- .8 Independent car service: Provide independent service function in controller and switch for this function in the car operating panel.

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2.8 Control Systems

- .1 Controller: The elevator control system shall be microprocessor based. The system shall operate in real time, continuously analyzing the car(s) changing position, condition, and workload. Controller and operational circuits including the drive system shall be digital. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and single direction push buttons at terminal landings.
 - .1 Momentary pressing of one or more buttons shall dispatch the car to the designated landings in the order in which the landings are reached by the car, irrespective of the sequence in which the buttons are pressed. Each landing call shall be canceled when answered.
 - .2 When the car is traveling in the up direction, it shall stop at all floors for which car buttons or "up" hall buttons have been pressed. The car shall not stop at floors where "down" buttons have been pressed, unless the stop for that floor has been registered by a car button or unless the down call is at the highest floor for which any buttons have been pressed. Pressing the "up" button when the car is traveling in the down direction shall not intercept the travel unless the stop for that floor has been registered by a car button or unless the up call is the lowest for which any button has been pressed.
 - .3 When the car has responded to its highest or lowest stop, and stops are registered for the opposite direction, its direction of travel shall reverse automatically and it shall then answer the calls registered for that direction. If both up and down calls are registered at an intermediate floor, only the call corresponding to the direction of car travel shall be canceled upon the stopping of the car at the landing.
 - .4 A car that is stopping for the last hall call in the preference direction and that hall call is for the opposite direction with no onward car calls, shall reverse preference when the selector position advances to the landing at which the car is committed to stop. A car that is stopping for the last hall call in the preference direction, and that hall call is for the same direction, shall hold its preference until the door is almost closed allowing time for a passenger to register an onward car call which will maintain the preference. If no car call is registered before the door is almost closed, the car will lose its preference and shall be available to accept calls in either direction.
- .2 Motion Control: The drive control system shall be dual-loop feedback system based primarily on car position. The velocity profile shall be calculated by the microprocessor control system producing a smooth and accurate stop. The velocity encoder shall permit continuous comparison of machine speed to velocity profile and to actual car speed. This accurate position/velocity feedback shall permit a fast and accurate control of acceleration and retardation.

2.9 Hall Stations

- .1 Hall Stations: Buttons shall illuminate to indicate a call has been registered at that floor for

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the indicated direction. Faceplates shall be satin stainless steel #4 finish. Provide one set of risers.

- .1 Each terminal station shall contain one illuminating push button.
- .2 Each intermediate station shall consist of two illuminating push buttons, one for the up direction and one for the down direction.
- .2 Floor Identification Plates: Provide door jamb plates at each floor. Jamb plates shall comply with requirements and B-44 Appendix E.

3. WARRANTY

- .1 Warranty: Elevator contractor warrants to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 12 months from date of Substantial Completion. This warranty is only applicable upon:
 - .1 The provision of Elevator provider maintenance;
 - .2 Immediate notification of items claimed under warranty and returned for inspection. At no time will the elevator contractor assume any responsibility on warranted items or for other instances unless it has been consulted and it has provided the written approval for proceeding with any corrections or alterations to the equipment;
 - .3 The supplier being the sole authority as to whether or not a component is to be warranted;
 - .4 The supplier reserving the right to alter its warranty policy from time to time as it sees fit.
- .2 Warranty: Elevator contractor will not warrant:
 - .1 Equipment lost, stolen or damaged in shipment unless negligently packaged and crated by the supplier;
 - .2 Equipment which is claimed to be missing, scratched or dented unless reported within ten (10) working days of receipt of said goods and such damage or missing equipment not being the result of inappropriate handling by a common carrier or site receiving personnel;
 - .3 Costs of labor, discovery, transportation, delay due to the non-operation of the elevator or any other costs except listed in this document.

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4. EXECUTION

4.1 Examination

- .1 Before starting elevator installation, inspect hoistway, hoistway openings, pits and machine rooms, as constructed, verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- .2 Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

4.2 Installation

- .1 Install elevator systems components and coordinate installation of hoistway wall construction.
 - .1 Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1 or CSA B44, manufacturer's installation instructions and approved shop drawings.
 - .2 Comply with the National Electrical Code for electrical work required during installation.
- .2 Perform work with competent, skilled workmen under the direct control and supervision of the elevator manufacturer's experienced foreman.
- .3 Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports, and bracing including all setting templates and diagrams for placement.
- .4 Welded construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualification of welding operators.
- .5 Coordination: Coordinate elevator work with the work of other trades for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.
- .6 Install machinery, guides, controls, car and all equipment and accessories to provide a quiet, smoothly operating installation, free from side sway, oscillation or vibration.
- .7 Sound isolation: Mount rotating and vibrating elevator equipment and components on vibration-absorption mounts, designed to effectively prevent the transmission of vibrations to the structure, and eliminate sources of structure-borne noise from the elevator system.

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- .8 Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of doors and frames with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.
- .9 Erect hoistway sills, headers, and frames before erection of rough walls and doors; erect fascia and toe guards after rough walls finished. Set sill units accurately aligned with the finished floor line at landings.

4.3 Field Quality Control

- .1 Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required and recommended by Code and governing regulations or agencies. Perform other tests, if any, as required by governing regulations or agencies.
- .2 Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times tests are to be performed on the elevator.

4.4 Adjusting

- .1 Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.

4.5 Cleaning

- .1 Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided.
- .2 At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoistway. Remove trash and debris.

4.6 Protection

- .1 At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

4.7 Demonstration

- .1 Instruct Owner's personnel in proper use and operations of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies.
- .2 Make a final check of each elevator operation, with Owner's personnel present, immediately

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before date of substantial completion. Determine that control systems and operating devices are functioning properly.

4.8 Elevator and Schedule

- .1 Time Geared
 - .1 Elevator Model and Type: TIME Geared Traction.
 - .2 Rated Capacity: 3500 lbs.
 - .3 Rated Speed: 61m per minute.
 - .4 Operation System: ThyssenKrupp Elevator – TC3200T
 - .5 Travel: 8.33m.
 - .6 Openings:
 - .1 Front: (1)
 - .2 Rear: None
 - .7 Clear Car Inside and Hoistway entrance:
Clear Inside Car: 1560mm wide by 2032mm deep.
Entrance Opening: 1050mm wide by 2125mm height (Door to be on narrow side).
Hoistway size: 2105mm wide by 2615mm deep.
 - .8 Overhead: 4620mm
 - .9 Pit Depth: minimum 890mm.
 - .10 Door Type: One speed single slide.
 - .11 Door Operation: Closed loop linear operation.
 - .12 Power Characteristics: 208 or 600 volts, 3 Phase, 60 Hz.

END OF SECTION