

SECTION 08 33 23.13

OVERHEAD RAPID COILING DOORS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
1. High-speed, Overhead Rigid Coiling Door assemblies, at interior and exterior applications.
- B. Related Requirements:
1. Refer to Door, Frame and Hardware Schedules, related detail drawings, including jamb, head and thresholds as indicated on Contract Drawings for locations, quantities, and remarks, as well as general provisions of the Contract, General and Supplementary Conditions, and Division 01 which shall apply to the scope of this section.
 2. Related sections may include:
 - a. Section 03 00 00 – Concrete.
 - b. Section 04 22 00 – Concrete Unit Masonry.
 - c. Section 05 10 00 – Structural Metal Framing.
 - d. Section 07 60 00 – Flashing and Sheet Metal.
 - e. Section 08 00 00 – Openings.
 - f. Section 08 71 13 – Automatic Door Operators.
 - g. Section 10 14 00 – Signage.
 - h. Section 10 71 13.23 – Coiling Exterior Shutters (Storm Protection).
 - i. Section 26 00 00 – Electrical.
 - j. Section 28 10 00 – Access Control.
 - k. Section 32 39 00 – Manufactured Site Specialties (Bollards).

1.02 REFERENCES

- A. Abbreviations and Acronyms:
1. HPD – High Performance Door(s).
 2. LOTO – Lockout-Tagout.
 3. ORCD – Overhead Rapid Coiling Door(s).
- B. Definitions:
1. Activation Device – Any device used to initiate operation of the door.
 2. Control Panel – An enclosure that houses electrical controls for the door, also may be referred to herein as a Controller, or Control Box.
 3. Counterbalancing – A method by which the hanging weight of the door curtain is balanced by springs or weights.
 4. Door Opening – The clear open width and height in a host wall.
 5. Hand of Operation – The side on which the door operator is placed, as viewed from the coiling side of the door. It is either right hand (RH) or left hand (LH) operation.
 6. Headroom: Vertical clear space required above the door opening, and below the lowest ceiling obstruction, required for proper installation and operation of the door and its hardware.
 7. Helical Extension Spring – A spring in a counterbalance assembly, used to counterbalance the curtain.
 8. High Performance Door – A power-operated rolling, folding or sliding non-residential door, generally characterized by either 100 or more cycles per day or 40 or more inches per second opening speed, and typically made-to-order and/or designed for higher durability, and/or designed to break away due to equipment impact. High Performance Doors may be referred to herein as Overhead Rapid Coiling Doors.
 9. High Speed Door – A subcategory type of High Performance Door; a non-swing door used primarily to facilitate vehicular access of material transportation, having an automatic closing device, with a minimum average opening rate of 32-inches per second, (0.81 m/s) a minimum closing rate of 24-inches per second, (0.60 m/s). High Speed Doors may be referred to herein as Overhead Rapid Coiling Doors.
 10. Hood – A closure housing that mounts horizontally over the coil brackets, serving as an enclosure for the door header.
 11. Light Curtain (Grid) – An optical safety sensor that consists of a multi-point light-emitting transmitter and a light-receiving detector. If the beams of light are blocked by an obstruction, the sensor signals the operator to stop and/or reverse the door immediately.
 12. Operation Cycle – One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.
 13. Operator: A powered mechanism that opens and closes a door, also may be referred to herein as a Motor.
- C. Reference Standards:
1. ANSI – American National Standards Institute.
 2. ASCE / SEI – American Society of Civil Engineers / Structural Engineering Institute.
 - a. ASCE/SEI Standard 7-10 – Minimum Design Loads for Buildings and Other Structures.
 3. ASHRAE – American Society of Heating, Refrigerating and Air-Conditioning Engineers.
 - a. ANSI/ASHRAE/IES Standard 90.1-2013 – Energy Standard for Buildings Except Low-Rise Residential Buildings.

4. ASTM – American Society for Testing and Materials, International.
 - a. ASTM A653-15 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. ASTM D3363-05 – Standard Test Method for Film Hardness by Pencil Test.
 - c. ASTM E90-09 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss.
 - d. ASTM E283-04 – Standard Test Method for Determining Rate of Air Leakage Through Exterior Doors.
 - e. ASTM E330-14 – Standard Test Method for Structural Performance of Exterior Doors by Uniform Static Air Pressure Difference.
 - f. ASTM E547-00 – Standard Test Method for Water Penetration of Exterior Doors by Cyclic Static Air Pressure Difference.
 - g. ASTM E1971-05 – Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings.
5. DASMA – Door & Access Systems Manufacturers’ Association, International.
 - a. ANSI/DASMA 105-2012 – Test Method for Thermal Transmittance and Air Infiltration of Garage Doors.
 - b. ANSI/DASMA 108-2012 – Standard Method for Testing Sectional Garage Doors and Rolling Doors: Determination of Structural Performance Under Uniform Static Air Pressure Difference.
 - c. ANSI/DASMA 109-2007 – Standard Method for Testing and Rating Sectional Doors: Determination of Life Cycling Performance.
 - d. ANSI/DASMA 115-2012 – Standard Method for Testing Sectional Garage Doors: Determination of Structural Performance Under Missile Impact and Cyclic Wind Pressure.
 - e. DASMA TDS #163 – Garage Door R-Value.
 - f. DASMA TDS #402 – High Performance Door Warning Labels.
6. FBC – Florida Building Code, 5th Edition (2014) Test Protocols.
 - a. TAS 202-94 – Criteria for Testing Impact & Nonimpact Resistant Building Envelope Components Using Uniform Static Air Pressure.
7. IEC – International Electrotechnical Commission.
 - a. ANSI/IEC 60529-2004 – Degrees of Protection Provided by Enclosures (IP Code).
 - 1) IP54, IP66, IP67
8. NEMA - National Electrical Manufacturers Association.
 - a. NEMA 250-2003 – Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 1) NEMA Enclosure Type 4
 - 2) NEMA Enclosure Type 4X
 - b. NEMA MG 1-2009 – Motors and Generators.
 - 1) NEMA Insulation Class A
9. NFPA – National Fire Protection Association.
 - a. NFPA 70: National Electrical Code® (NEC).
10. NFRC – National Fenestration Rating Council, Incorporated.
 - a. ANSI/NFRC 100-2014 – Procedure for Determining Fenestration Product U-factors.
 - b. NFRC 102-2014 – Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.
 - c. ANSI/NFRC 200-2014 – Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
 - d. ANSI/NFRC 400-2014 – Procedure for Determining Fenestration Product Air Leakage.
11. OSHA – Occupational Safety and Health Administration, Standards.
 - a. Title 29 CFR - Code of Federal Regulations 1910.147, The Control of Hazardous Energy (Lockout/Tagout).
 - b. Title 29 CFR - Code of Federal Regulations 1910 Subpart F, Standard for Powered Platforms, Man-lifts, and Vehicle-Mounted Work Platforms.
12. UL – Underwriters Laboratories, Incorporated.
 - a. UL 325 – Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
 - b. UL 508 – Standard for Industrial Control Equipment.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 1. Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
 2. Coordinate Overhead Rapid Coiling Door’s operating controls with specified accessories, and activation devices.
- B. Pre-Installation Meetings:
 1. Schedule a conference to occur not less than 14 days prior to installation commences for all High Performance Doors to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Provide not less than 7 days’ advance notice to attendees, Owner, and Architect.
 2. Conference participants shall include the Contractor, Owner’s Representative, Architect, Door Installer, Manufacturer’s Sales Representative, Electrician, and representatives of other trades affected by installation of Overhead Rapid Coiling Doors.
 3. Conference topics to be discussed shall include:
 - a. A review of Contract Documents and accepted Submittals shall be made and deviations or differences shall be resolved.
 - b. If conflict should exist between what is considered good practice and Contract Documents, these differences shall be defined.

- c. Pre-Installation Conference and observation of site conditions shall serve to clarify Contract Documents, application requirements and what work should be completed before installation can begin.
- d. Prepare and submit to all invited parties including those not in attendance, Owner's Representative, Architect a written report of the Pre-Installation Conference. The Report shall be submitted within 3 business days following the conference.

1.04 SUBMITTALS

- A. Product Data:
 1. For each type and size of Overhead Rapid Coiling Door and accessory, include 3 set(s) details of construction relative to materials, dimensions, component connections, profiles and finishes. Provide rough-in diagrams, operating instructions and maintenance information. Include the following:
 - a. Setting Drawings, templates, and installation instructions for built-in or embedded anchor devices.
 - b. Summary of forces and loads on walls and jambs.
 - c. Motors: Show nameplate data and ratings.
 - d. Operation & Maintenance Manual.
- B. Shop Drawings:
 1. Coordinate scheduling of Shop Drawings submittal with submittals for related portions of work.
 2. Take field measurements before preparation of shop drawings and fabrication of doors, where possible to enable proper fitting of the work. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication may delay work.
 3. Include design drawings fully detailing each door assembly; indicate size, clearances, and load diagrams, construction details for head, jambs, and threshold; material types, sizes, shapes, thicknesses, joints and connections; hardware, horsepower, voltage, phase, and hertz; location of control devices and drive units; and all design and detail data for work of other trades affected by the installation of Overhead Rapid Coiling Doors.
 4. Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details and include information for special components and installations not dimensioned or detailed in manufacturer's Product Data Sheets.
 5. Wiring Diagrams: Detail wiring for power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring and components provided by the door manufacturer and those provided by others.
- C. Samples:
 1. Submit 1 set(s) of sample door materials, made available upon request to the owner's representative, and Architect.
 2. Submit selection color samples displaying manufacturer's full range of standard colors and finishes for initial selection by Architect.
 3. Submit actual cross sectional metal door panel samples of colors and finishes available. Samples sizes to be not less than 3" (76mm) x 3" (76mm).
 4. Submit 3 verification samples demonstrating actual materials, finishes, colors and textures of each selected Overhead Rapid Coiling Door model specified. Sample sizes to be 12" (305mm) long, 6" (152mm) x 6" (152mm), or full size as appropriate to materials.
- D. Manufacturers' Instructions:
 1. Overhead Rapid Coiling Door manufacturer shall indicate installation sequences, procedures, adjustments, and alignment procedures in written form.
 2. Submit manufacturers' written installation procedures that shall be the basis for accepting or rejecting actual installation procedures.
 3. In addition to installation methods, and guidelines, manufacturers' information shall include storage and handling requirements, preparation, site care, cleaning, and maintenance instructions and recommendations.
 4. Maintain one copy of manufacturer's installation instructions on-site to be readily available upon request.
- E. Sustainable Design Submittals:
 1. Provide documentation verifying that components, processes, and/or assemblies provided are in compliance with specified requirements; refer to Division 01, upon request.
 2. Submit certification/letter of documentation from manufacturer for products as part of project documentation for verification in Green Building Certification Programs which this project may participate.
 - a. Recycled Content: Indicate percentages by weight or unit of product for post-consumer and pre-consumer recycled content.
 - b. Local/Regional Materials: Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
 - c. Volatile Organic Compounds (VOC) Data: Submit manufacturer's product data for adhesives, coatings, paints. Indicate VOC limits of the product or its components. Submit MSDS highlighting VOC limits.
- F. Qualification Statements:
 1. Submit documentation to demonstrate installer's capabilities and experience working with Overhead Rapid Coiling Doors and accessories.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data:
 1. Follow and comply fully with manufacturer's scheduled maintenance program, including periodic required adjustments, suggested maintenance intervals, and retention of manufacturer's data sheets, and equipment inter-connection diagrams. Submit instructions to be

followed in operating and maintaining components of Overhead Rapid Coiling Doors. Include a copy of instruction in Operation and Maintenance Data Manual. Refer to Division 01.

- B. Warranty Documentation:
 - 1. Include final executed warranty document as approved or accepted by Owner. Include a copy of warranty in Warranties and Bonds Manual. Refer to Division 01. Sign-off documents may be required to authorize product warranties, verify requirements prior to completion of work included in this section.

1.06 QUALITY ASSURANCE

- A. Regulatory Agency Approvals:
 - 1. Listing and labeling shall be provided for electrically operated fixtures specified in this section.
 - 2. The terms "Listed" and "Labeled": as defined in NFPA 70, Article 100.
 - 3. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7. Internationally recognized testing agencies may also be qualified as equivalent per the discretion of the Authority Having Jurisdiction on the Project.
 - 4. Electrical door components shall be minimum UL standard compliant or have demonstrated equivalent compliance product safety standard testing (EN, BS, CSA, DIN, ISO) per manufacturer and acceptance by the Authority Having Jurisdiction.
 - 5. Electrical control devices shall be minimum NEMA Type 4X compliant.
- B. Qualifications:
 - 1. Suppliers: Obtain Overhead Rapid Coiling Doors, including all components and accessories though one source, from a single manufacturer. Use only new doors, components and accessories for this project.
 - 2. VOC Emissions: Provide low or zero VOC (volatile organic compound) off-gassing products. Limit the release of toxic emissions at the project site, especially indoors.
 - 3. Installers: Engage experienced installers having demonstrated successful application on projects of similar scope and complexities for both installation and maintenance of units required for this project. Installers should be trained and authorized by the Overhead Rapid Coiling Door manufacturer to perform the work of this section.
 - a. Field Measurements: Verify field measurements are as indicated on shop drawings prior to beginning fabrication. Verify power supply conforms with overhead rapid coiling door electrical requirements prior to fabrication.
 - b. Coordination: Coordinate the work with installation of electrical power locations, and sizes of conduit.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Verify completeness of shipment upon receipt of materials. Confirm all delivery of all component parts with original shipping manifest.
 - 2. Delivery of materials shall be in original rolls, packages, boxes or crates bearing the manufacturer's name, brand, model number, and installation location.
- B. Storage and Handling Requirements:
 - 1. Store all materials in dry locations with adequate ventilation, free from dust and water, and available for inspection and handling. Handle doors carefully to prevent damage. Remove damaged items that cannot be restored to the acceptance of the Owner's Representative and Architect, and replace with new items.
- C. Packaging Solid Waste Management:
 - 1. Wood Shipping Containers and Crates:
 - a. Verify all door components, parts, signage, labels, manuals and paperwork have been removed, unpacked, and are accounted for from shipping containers prior to processing for recycling or disposal.
 - 2. Minimize waste and divert materials from landfills.
 - 3. Follow the U.S. EPA's solid waste management hierarchy:
 - a. Source Reduction
 - b. Reuse
 - c. Recycling
 - d. Land Disposal
 - e. Combustion/Incineration

1.08 WARRANTY

- A. Manufacturer Warranty:
 - 1. Manufacturer's standard form in which manufacturer and installer agree to repair or replace Overhead Rapid Coiling Door assemblies, components, and accessories that fail in materials or workmanship within specified warrantee periods.
 - 2. Warranty Period: Provide the following:
 - a. Beginning Coverage: The period of warranty shall start from the date of shipment of the product to the customer and shall cover a period as described herein.

- b. The motor is guaranteed against defects in materials and workmanship for a period of 5 full years (excludes catch system). All other mechanical and electrical components are warranted against defects for a period of 2 full years. Vision panels are warranted against defects for a period of 7 full years. Products with less than a 5/2/7-year warranty will not be accepted. During the warranty period, labor is covered for the first year.
 - c. Missing Parts Claims: Valid for one week, effective from date of delivered receipt of product.
 3. Intended Use: Overhead Rapid Coiling Doors are used to close openings in walls for through-traffic and accelerate the flow of materials, to safely close rooms, to make machines safe and secure, to conserve building systems energy consumption, to improve indoor environmental quality, comfort and control. Any other or further use is regarded as non-intended use.
- B. Extended Correction Period:
1. The Installer's work shall carry a minimum warranty term of one year from completion for craftsmanship, labor, repairs, adjustments and corrections made to the Overhead Rapid Coiling Door upon completion of installation.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers:
1. Subject to compliance with requirements, provide Overhead Rapid Coiling Door assemblies as manufactured by the following:
 - a. Manufacturer List:
 - 1) Hörmann High Performance Doors:
Manufacturer of Overhead Rapid Coiling Doors: Hörmann Flexon LLC.,
Starpointe Business Park, 117 Starpointe Boulevard, Burgettstown, Pennsylvania 15021-9506
Toll Free: (800)-365-3667 / Phone: 724-385-9150
Fax: (724) 385-9151 Attn: Inside Sales
Website: www.hormann-flexon.com / Email: sales2@hormann.us
- B. Products Options:
1. Provide the following as to be considered the basis of design:
 - a. High Performance Door Model: Speed-Guardian™ Complete View Series – Model 5000 CV - 42.
- C. Substitution Limitations:
1. No substitutions or exceptions shall be approved.

2.02 DESCRIPTION

- A. High Performance Doors:
1. Referred to henceforth as Overhead Rapid Coiling Doors; including the following characteristics:
 - a. Opening speed of 40 inches per second (1 m/s) and/or 100 operating cycles per day, minimum.
 - b. Non-residential, electrical powered operation.
 - c. Operators (motors), Activation devices, Control devices, Guide Tracks, Hoods and closures, Accessories, Conduits and wiring from electric circuit disconnect to operator to control device.
- B. Overhead Rapid Coiling Doors:
1. Meeting all of the following three:
 - a. Made-to-order for exact size and custom features.
 - b. Designed to reasonably withstand impact and accommodate convenient on-site repair procedures.
 - c. Designed to sustain heavy usage with minimal maintenance downtime.

2.03 PERFORMANCE / DESIGN CRITERIA

- A. Life Safety Performance Requirements:
1. Overhead Rapid Coiling Doors shall not be considered for a legal means of egress per ICC/IBC Ch.10 Means of Egress.
- B. Fire Resistance Rating Requirements:
1. Overhead Rapid Coiling Doors are non-rated assemblies, and are not laboratory tested to evaluate fire resistant qualities.
- C. Ballistics and Blast Resistance Requirements:
1. Overhead Rapid Coiling Doors are not designed or laboratory tested to evaluate or certify ballistic or blast force resistant qualities.
- D. Design and Configuration Requirements:
1. Construct 'Complete View' Overhead Rapid Coiling Door curtains primarily of aluminum Vision Panels plus one (non-vision/solid) aluminum Bottom Profile Panel with weather seal edge and one (non-vision/solid) top panel. Door Curtain Vision Panels may be optionally configured with Ventilation Panels, or combinations thereof Vision and Ventilation Panels. Design Complete View ORCD within the following door opening size ranges for compliance with approved structural tolerances:

- a. Door openings up-to 12' - 0" (3.65 m) clear width, may be up-to 21' - 4" (6.4 m) clear height (max.).
 - b. Door openings up-to 16' - 0" (4.87 m) clear width, may only be up-to 14' - 0" (4.26 m) clear height.
 - c. Door openings up-to 18' - 0" (5.48 m) clear width (max.), may only be up-to 12' - 0" (3.65 m) clear height.
- E. Structural Performance Requirements:
1. Provide Overhead Rapid Coiling Door assemblies capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of the door components.
 2. Resistance to Wind Load: Uniform pressure (velocity pressure) acting inward (pressure) and outward (suction) of wind acting normal to plane of wall as determined in accordance with ASTM E330-02, FBC-TAS 202-94, or ANSI/DASMA 108-2012, Exposure B:
 - a. Door widths up to 16' - 4" (5.0 m): Class 5 Max., 93 mph (150 km/h), (21.0 psf., or 115 mph / 185 km/h Max.).
 - b. Door widths 16' - 4" to 18' - 0" (5.0 to 5.48 m): Class 4 Max., 83 mph (134 km/h), (15.0 psf., or 100 mph / 161 km/h Max.).
 3. Proven reliable engineering principals may be used to interpolate or extrapolate test results to door sizes not specifically tested.
 4. Windborne Debris Resistance: If required, may be determined in accordance with either ANSI/DASMA 115 or FBC-TAS 201/203.
 5. Seismic Performance Requirements: Overhead Rapid Coiling Doors are to be installed mounted to building structure (steel, masonry, or concrete) and shall withstand the effects of earthquake motions determined according to ASCE 7-10.
 - a. High Performance Doors shall be categorized by ASCE 7-10, Chapter 13, Seismic Design Requirements for Nonstructural Components, and where possible, evaluated in accordance with ICC-ES AC 156, Seismic qualification by testing procedure for certification of seismic analysis.
 - b. Seismic Component Importance Factor: $I_p = 1.0$, unless determined otherwise by occupancy category or Authority Having Jurisdiction.
 6. Vibration Tolerance (external/internal sources): Acceptable values for continuous and impulsive vibration acceleration m/s^2 (1-80 Hz.):
 - a. Continuous Vibration: Preferred 0.04 Z-axis, 0.029 X and Y-axis. Maximum 0.080 Z-axis, 0.058 X and Y-axis.
 - b. Impulsive Vibration: Preferred 0.64 Z-axis, 0.46 X and Y-axis. Maximum 1.28 Z-axis, 0.92 X and Y-axis.
 - c. Intermittent Vibration: Preferred 0.80. Maximum 1.60.
- F. Operation-Speed Requirements:
1. Design Overhead Rapid Coiling Door to perform open cycle operation with a variable rate of speed, no less than 80 in./sec. (2.0 m/s) and close cycle operation at 20 in./sec. (0.5 m/s).
- G. Operation-Cycle Requirements:
1. Design Overhead Rapid Coiling Door materials and workmanship to act for a period of 5 full years minimum, and all other mechanical and electrical components for a period of 2 full years minimum, but not less than 750,000 cycles and for 400 cycles per day. Products not meeting a 5 / 2-year warrantee will not be accepted. Product cycle life may be determined in accordance with ANSI/DASMA 109.
- H. Headroom Dimensional Clearance Requirements:
1. Headroom clearance shall be measured perpendicular from directly above the door head opening, and corresponds to one of three spiral guide sizes manufactured per design height of the door opening:
 - a. Door openings up to 14' - 9" (4.5 m) high, HR = 36- $\frac{1}{4}$ " (920.0 mm).
 - b. Door openings 14' - 9" to 18' - 0" (4.5 to 5.5 m) high, HR = 37- $\frac{5}{8}$ " (956.0 mm).
 - c. Door openings greater than 18' - 0" (5.5 m) high, HR = 41- $\frac{1}{2}$ " (1.0 m).
- I. Thermal Resistance (R-value of Door Section) Requirements:
1. Provide Overhead Rapid Coiling Door panel sections with R-value of no less than 0.23 ($K \times m^2/W$) calculated in accordance with procedures outlined in DASMA TDS-163. Panel Sample: 14' - 0" (4.26 m) long, 9 $\frac{7}{8}$ " (250 mm) tall, 1 $\frac{1}{8}$ " (42 mm) thick, Primary Panel Type: Vision.
- J. Heat Transfer Coefficient (U-value) Requirements:
1. Provide Overhead Rapid Coiling Doors with U-value of the door assembly no greater than 4.41 ($W/m^2 \times K$) calculated in accordance with procedures outlined in either DASMA TDS-105 or NFRC 100/102. Door Sampled: 14' - 0" x 14' - 0" (4.26 x 4.26 m), 16 vision panels, 1 bottom profile panel.
- K. Air Infiltration (Air Leakage) Requirements:
1. Provide Overhead Rapid Coiling Doors with minimum resistance to air permeability (sill, jamb, and header) value 0.6 cfm. / ft.² (12 m³/h/m²), Class 2 at a minimum pressure difference of 50 Pa at a 25 m² (269 ft²) opening per test EN 12427 or ASTM E283 with ANSI/NFRC 400-2014. No air leakage shall be detected between panel joints.
- L. Water Tightness Requirements:
1. Provide Overhead Rapid Coiling Doors with water tightness meeting minimum value of Class 2, with 15 minutes of water spray at a pressure difference of 55 Pa per test EN 12489 or ASTM E547.
- M. Acoustic Insulation Requirements:
1. Provide Overhead Rapid Coiling Doors with minimum through curtain acoustic performance value STC 34, R_w 31 dB; OITC 24, and installed system acoustical performance value STC 34, R_w 31 dB; OITC 20 as per test method ISO 140-3 or ASTM E90.

- N. Visible Transmittance Requirements:
1. Provide Overhead Rapid Coiling Doors that include vision panels with a minimum allowance of visible light transmitted at 0.91 (T_{vis}) calculated in accordance with procedures outlined in ANSI/ NFRC 200-2014.
- O. Solar Heat Gain Coefficient Requirements:
1. Provide Overhead Rapid Coiling Doors that include vision panels with a minimum resistance to solar heat gain of 0.75 (SHGC) calculated in accordance with procedures outlined in ANSI/ NFRC 200-2014.
- P. Safety Performance Requirements:
1. Provide Overhead Rapid Coiling Door assemblies with Light Curtain systems, to be housed inside of guide tracks, and shall allow the door to close normally but shall reverse the door if any obstruction breaks the light beam grid. Fully comply with UL 325, Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems. Products not including this technology will not be accepted.
- Q. Control Device Requirements:
1. Provide Overhead Rapid Coiling Door Assemblies capable of plug-and-play or Smart Start™ electrical connections to simplify installation. Fully comply with UL 508, Standard for Industrial Control Equipment. Products not including this design feature will not be accepted.

2.04 OPERATION

- A. Operators:
1. Electric Door Operators, Drive System:
 - a. Coordinate wiring requirements and electrical characteristics of motors, control panels and activation devices with building electrical system.
 - b. Comply with standards for NEMA Type 3 / IEC IP54 enclosures, NEMA MG-1 Class A insulated systems, and NFPA 70, Class 2 Control Circuits.
 - c. Provide the following as to be considered the basis of design:
 - 1) Manufacturer: GfA Elektromaten GmbH & Co. KG, Series: "Safedrive" Elektromaten SI, Type / Model: SG 85F / SI 19.85
 - d. Performance / Design Criteria:
 - 1) Output Torque: 1690 lb.-ft. In. (190 Nm).
 - 2) Output Speed: 85 rpm.
 - 3) Built-in, anti-fallback safety brake device integrated with operator worm gear.
 - 4) Emergency Manual Operation: Hand chain operator (standard).
 - 5) Digital Limit DES: Absolute encoder, no adjustment required after a power interruption event.
 - 6) Mounting: Floating foot (standard).
 2. Electrical Disconnect Equipment:
 - a. Provide one Electrical Disconnect Device (switch) for each Overhead Rapid Coiling Door installed.
 - b. Electrical Disconnect Equipment is separate from the door product and is not provided by the Overhead Rapid Coiling Door manufacturer.
 - c. Install at no further than a maximum of 100'-0" (30.5 m) run-of-wire from the door serviced; 12-gauge wire must be installed for remote installation applications.
 - d. Provide the following power service to the Electrical Disconnect Device:
 - 1) Recommended: 3-Phase (Wye), 440vAC-480vAC, and up to 600vAC with transformer, 60Hz, 20A (alternatively 208vAC-240vAC, 60Hz, 20A).
or
 - 2) 1-Phase (Wye), 230vAC-240vAC, 60Hz, 20A.
 - 3) Fuse: 20A, Class K.
- B. Controls:
1. Door Control Devices:
 - a. Provide one manufacturer's supplied Door Control Device per overhead rapid coiling door. Controller to include all opening and closing logic, and all safety related logic.
 - b. Regulatory: UL / cUL listing is required.
 - c. Type: 5 kW variable frequency drive (VFD), fully programmable controller.
 - d. Product Options:

Provide one of the following type as to be considered the basis of design:

 - 1) Control Panel: (Standard equipment) Three-Phase Model: Hörmann AK500FUE-1 Smart Start™ NXT.
Housing (W x H x D): 11-5/8" x 5-3/4" x 8-1/8" (295 x 400 x 208 mm).
Polyester powder coat paint, baked-on steel, Color RAL 7035 Light Grey, all surfaces (Standard), alternatively, Stainless Steel, polished.
NEMA Type 4X / IP66 compliant, UL/cUL listed.
or
 - 2) Control Panel: Single-Phase Model: Hörmann BK150FUE-1 Smart Start™ NXT.
Housing (W x H x D): 11-7/8" x 19-3/4" x 7-7/8" (300 x 500 x 200 mm).

Acrylonitrile Butadiene Styrene (ABS) thermoplastic, Color RAL 7015 Slate Grey, all surfaces.
NEMA Type 3 / IP54 compliant, (not UL listed).

- e. Functions: Adjustable automatic closing timer, programmable limit switch, tamper-proof cycle counter, quick-connect, plug-&-play wired connections, color-coded wiring distribution block accepting activation and protection device wiring, factory predrilled holes for main power cabling feed-through at bottom of enclosure.
- f. Factory pre-wire Control Panel for on-site installation with Electric Door Operator.
- g. Supply Voltage (from Electrical Disconnect Device):
 - 1) Recommended: 3-Phase (Wye Systems Only), 440vAC-480vAC, and up to 600vAC with transformer, 60Hz, 20A (alternatively 208vAC-240vAC, 60Hz, 20A).
 - or
 - 2) 1-Phase (Wye Systems Only), 230vAC-240vAC, 60Hz, 20A.
- h. Installation: Upright, vertical orientation only, using wall bracket on back of housing. Mount at no further than a maximum direct visual radius of 15ft. (4.5m) from the associated Electrical Disconnect Device. Control Panels may be mounted recessed / flush optionally, see Drawings and Door and Hardware Schedule for coordination.
 - 1) Control Panel Weight: 16 lbs. (7.25 kg).
 - 2) Ambient Air Temperature: -4°F to 158°F (-20°C to 70°C). Humidity: Up to 80% non-condensing.
 - 3) Coordinate a permanent label system among each Overhead Rapid Coiling Door, its control panel, and the electrical disconnect device in clearly legible, printed text upon installation. Labels should be resistant to deterioration, dirt accumulation and exposure to moisture. Place labels on, or immediately adjacent to equipment in a readily visible location.
- i. Triple Push Button Control Station (Recommended Equipment): Momentary contact 3 button activation control with push buttons labeled 'OPEN', 'STOP', and 'CLOSE' as located remotely from the door Control Panel. Quantities, selection and mounting to be as indicated on Drawings and Door and Hardware Schedules. NOTE: Control Panel front keypad must not be used to normally activate the Overhead Rapid Coiling Door. Doing so may cause damages which void the Control Panel manufacturer warranty.
 - 1) No external junction boxes shall be required for installation of additional activation equipment or other accessory devices.
 - 2) Provide additional unit controls whereas indicated on Door and Hardware Schedules.
- j. Encoder: Control Panel shall use an Encoder to regulate travel limits.
 - 1) Door limits to be adjustable without the use of tools from floor level at the Control Panel.
 - 2) Doors using mechanical limits switches or doors that require tools to set the limits will not be accepted.
- k. Operation Interface:
 - 1) Language interface shall be English for delivery unless noted otherwise in the Contract Documents or reviewed submittals.
 - 2) Include self-monitoring and self-diagnostic features and dot-matrix vacuum fluorescent display to provide quick and straightforward information.
 - 3) The controller shall include front panel mounted items; open and close push buttons, emergency stop push button, reset buttons and integrated hazardous energy controls (lockout-tagout power disconnect feature).
 - 4) USB Port: Door control devices shall include additional ports on the control board for future expansion and firmware upgrades. Include industrial grade USB port and portable 4 GB USB storage device (flash drive) for downloading door maintenance and monitoring logs, rated for ambient temperatures 32°F to 158°F (0°C to 70°C). Continuously monitor activities and operations of door for a minimum of three (3) years encrypted data including, errors, faults, with date and time stamps. Control devices not meeting the diagnostic capabilities will not be acceptable for substitution.
- l. Exclusions:
 - 1) Control Panels that require a portable computer unit, additional components or other devices for programming and/or troubleshooting will not be accepted.
 - 2) Control Panels requiring an expansion board for additional input / output features will not be acceptable.
 - 3) Doors with contactor boxes will not be accepted.
 - 4) Control Panels requiring additional parts for voltage changes in the field shall not be acceptable.
 - 5) 3-phase Control Panels not minimally compliant with NEMA Type 4X / IP66 standards shall not be accepted.
 - 6) 3-phase Control Panels are required to be available from manufacturer with an optional stainless steel enclosure, conformant to NEMA Type 4X / IP66 standards (for clean environments).
- 2. Activation Devices:
 - a. Object Detection: Provide the following activations (per door, see Door and Hardware Schedules for locations, quantities and types).
 - b. Mount actuating control devices in compliance with any applicable accessibility codes and regulations in the jurisdiction having authority, including any required audible alarms and visual indicator lights.
 - c. Object detection and door activation shall be a radar motion and presence sensor system and shall include standoff mounting brackets, and associated radar remote controls.
 - d. Manufacturer recommends touchless activation device by Hörmann, model: 'Scanprotect' Motion / Presence Sensor (Laser). See paragraph 2.08 Accessories, of this section, also related specification Section 08 71 13 Automatic Door Operators, and manufacturer's product data sheet for further detail.
 - e. Overhead Rapid Coiling Doors to be ready to receive compatible security radio frequency (RF) access card reading devices. Refer to Door and Hardware schedule, Drawings for locations, quantities, types. Refer to Section 28 10 00 – Access Control, and related specification sections for further detail.

- C. Operation Sequences:
1. Interlock Connection: A protocol sequence of operation between two Overhead Rapid Coiling Doors in a series, whereby the first door opens to allow access to an interstitial space, then closes before the second door in the series will open, thus providing securely controlled access between two separated environments. Each ORCD Control Panel is wired in tandem using a normally OPEN input to activate when the opposite door is NOT in a CLOSED position.
 2. Drive unit shall be electrically operated, and equipped with a minimum 3-phase variable speed direct-drive motor of continuous duty and have positive brake release for manual override operation. The motor and gearbox shall be designed for high cycle operation. Door position shall be controlled by top and bottom limit switch. Basic operation features manual disengagement buttons to place door in manual operation mode. A safety disengagement push button shall be included with the disengagement mechanism. Drive assembly shall include back up safety top and bottom limits. Other basic operating features shall include inverter for soft start and stopping, automatic closing timer, emergency stop, one actuating push button.
 3. Coordinate alternative actuation means by motion / presence detector or pull cord per Door and Hardware Schedule (standard: push button).
 4. Start-up Requirements:
 - a. Follow manufacturer's written instructions regarding installation prerequisites, electrical diagrams, and initial start-up and adjustment procedures. Operate each door in its 'Test Mode' for no less than 50 cycles to confirm proper functioning. Troubleshoot any faults, LCD error messages, warnings or impediments not able to be resolved with manufacturer's technical support prior to turn-over.
 - b. Main drive shaft assembly shall be spin tested. Ball bearings to be permanently lubricated type with drive shaft keyed directly into unitized motor/gearbox.
 - c. Speed: Opening speed shall be up to 80-inches per second (2.0 m/s) for Speed-Guardian™ 5000 CV 42, unless otherwise acceptable to the commissioning party.
 5. Emergency Operation / Disconnect Device:
 - a. Emergency operation shall be via manual disconnect of power to the motor and chain hoist for manual opening of the door. Hand crank operation will not be acceptable. Provide hand-operated disconnect or mechanism for automatically engaging sprocket-chain operator and releasing brake for emergency manual operation while disconnecting motor, without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

2.05 MATERIALS

- A. Guide Tracks:
1. Fabricated jamb guides to be constructed with manufacturer's standard heavy-duty materials arranged to meet the specified performance criteria; allowing door panels to operate smoothly as follows:
 - a. Continuous, vertical oriented Guide Tracks must be a one-piece design with removable front covers and the following dimensions: 12- $\frac{5}{8}$ " (320.0 mm) wide x 12- $\frac{1}{8}$ " (308.0 mm) projection.
 - b. Guide Tracks must be self-supporting, 11-gauge hot-dipped galvanized G90 (0.9 oz./ft²) steel and include a light grid built in up to 8'- 0" (2.4 m) high. Front covers shall be 16-gauge hot-dipped galvanized G90 (0.9 oz./ft²) steel. Lighter gauge Guide Tracks will not be accepted.
 - c. Exterior Mounted doors to include full roll and motor cover (Hood) to be made of galvanized steel, finish to match Guide Tracks.
 - d. Provide Guide Tracks with rubber weather strips to seal against interior and exterior faces of door curtain.
- B. Entrapment Protection Equipment: Light Curtain System
1. Entrapment Protection Equipment shall comply with the intent, and practices of UL 325 Standard for Safety, Door, Drapery, Gate, Louver, and Window Operators and Systems.
 2. Safety Systems: Provide the following without exception:
 - a. In-Line Light Curtain System: 8'- 0" (2.4 m) tall, built into guide tracks. Light curtain systems shall consist of a self-contained transmitter and receiver detector. The transmitter and receiver are positioned on opposite sides of the door opening, in-plane with the door curtain. Accommodate door opening widths from 3'- 0" (0.9 m) up to 32'- 0" (9.75 m). House detectors in an IP67 (occasional submersion) rated, weather resistant aluminum profile. Space light beams at 1 $\frac{3}{4}$ " (45.0 mm) equal and parallel intervals.
 - b. The light curtain system shall be installed inside of guide tracks and allow the door to close normally but stop motion immediately, then reverse the door if any object breaks the light beam grid. Photoelectric sensors and electric reversing edges shall not be accepted as primary entrapment protection equipment.
 - c. Product Options:

Provide the following as to be considered the basis of design:

 - 1) Light Curtain System: (Standard equipment) Telco Sensors, Model: SGT /R 1-200 Space-Guard™ SG 1, as provided by door manufacturer with the Overhead Rapid Coiling Door.
- C. Door Headers, Spiral Guides, Drive Shaft Support and Bearing Mechanisms:
1. Headers: Provide the following Header assemblies:
 - a. Spiral Guides (2): Provide one non-contact galvanized spiral panel guide per each jamb. Panel wheel guides shall be aluminum.
 - b. Spiral Mounting Brackets (2): Provide one galvanized steel spiral mounting bracket per each jamb.
 - c. Top/Bottom Spiral Supports: Provide one top and one bottom 11-gauge galvanized steel spiral support channel(s).

- d. Motor Bracket: One motor bracket at the operator side of the door shall be provided.
 - e. Drive Shaft: Provide one drive shaft, to be fabricated of galvanized cold rolled steel, 1-½" (38.0 mm) diameter.
 - f. Drive Shaft Support: Doors up to an opening width of 11'- 6" (3.5 m) and to 16'- 5" (5.0 m) shall have one drive shaft support. Doors greater than 16'- 5" (5.0 m) shall have two drive shaft supports spaced at equal thirds across the door opening width. Drive Shaft Support(s) are installed on the interior face of the host wall at the door head 28"- 30" (711-762 mm) above the door opening. Adequate structural support must be provided at the host wall in this location.
- D. Counterbalance Assemblies:
1. Provide the following manufacturer's standard assemblies:
 - a. Oil tempered helical extension springs, housed in guide tracks supporting the curtain with a deflection not exceeding 0.03-inch per foot of width (0.07 cm per meter).
 - b. Springs shall assist motor in operation of door.
 - c. Door may require up to eight counter-balance springs, up to two nylon straps, and up to two pulleys, based upon the design of each door opening size.
 - d. Doors using torsion springs for counterbalance or doors with springs located within a barrel sleeve will not be accepted.
- E. Weather Seals:
1. Provide the following manufacturer's standard assemblies:
 - a. Twin rubber seals within the guide tracks.
 - b. Non-contact lintel seal shall be provided for the full width of the top of the door. Substitutions will not be accepted.
 - c. Provide a rubber, field serviceable seal for the Bottom Profile Panel of the door to ensure close fit with uneven thresholds and floors.
- F. Door Panels:
1. Refer to Drawings including Floor Plans, Sections, Elevations, Detail Drawings, Door and Hardware Schedules for basis of design, intended panel configurations, types, options, and remarks.
 2. Fabricate Overhead Rapid Coiling Door panels of heavy-duty materials, designed to withstand wind loading indicated, in a continuous length for width of each door opening (without splices). Unless otherwise indicated provide panel material thickness recommended by door manufacturer for performance, size, and type of door indicated, as follows:
 3. Primary Panel Type:
 - a. Vision Panel(s): Interlocking flat-faced, double-pane, hollow extruded aluminum framed vision panels. Overall Panel Dimensions: 1-⅝-inches (42.0 mm) thick, 10-inches (260.0 mm) high. Double-Pane Acrylic Windows: 1-inch (26.0 mm) thick. Assemble windows with ⅞-inch (22 mm) air space between panes using hollow profile aluminum window spacers made weather-tight with silicone sealant. Panel Frame Members: 30-gauge, extruded anodized aluminum profiles (verticals and horizontals). Include neoprene rubber thermal break at panel joints (tops). Vision Panels to be designed such that individual windows may be maintained and replaced separately without need for removing the entire Vision Panel from the door curtain assembly. Standard Window Finish: Clear colorless. Optional Window Finishes: Tinted: Smoke-Grey or Obscure White. Provide Vision Panels to be configured in door curtain as indicated on Drawings, and Door and Hardware Schedules.
 - 1) Abrasion Resistant Acrylic Vision Sheet(s): Single-side coated, optical mar resistant (MR), colorless acrylic sheet. 7-inches (180 mm) high, 0.08-inch (2.0 mm) thick. Duratec® polyester hi-gloss, clear coating at faces 1 and 4.
 4. Optional Types (refer to Drawings for design intent per door type):
 - a. Ventilation Panel(s): Interlocking flat-faced, double-walled, hollow extruded aluminum framed ventilation panels. Overall Panel Dimensions: 1-⅝-inches (42.0 mm) thick, 10-inches (260.0 mm) high. Double-Walled Perforated Aluminum Windows: 1-inch (26.0 mm) thick. Assemble perforated windows with ⅞-inch (22 mm) air space between walls using hollow profile aluminum spacers. Panel Frame Members: 30-gauge, extruded anodized aluminum profiles (verticals and horizontals). Include neoprene rubber thermal break at panel joints (tops). Ventilation Panels to be designed such that individual perforated windows may be maintained and replaced separately without need for removing the entire Ventilation Panel from the door curtain assembly. Standard Finish: Clear anodized. Optional Finishes: Color as selected by Architect from manufacturer's standard color range, RAL Classic color system. Provide Ventilation Panels to be configured in door curtain as indicated on Drawings, and Door and Hardware Schedules.
 - 1) Perforated Aluminum Sheet(s): 5052-H32 Aluminum, mill finish. 7-inches (180 mm) high, 0.08-inch (2.0 mm) thick. Perforation pattern to be ½-inch (12.7 mm) square grid, punch pressed. Pattern to allow for minimum 56.3% open area per sheet.
 5. Other Types (included standard):
 - a. Bottom Profile: Interlocking flat-faced, hollow extruded aluminum panel, 1-⅝-inches (42.0 mm) overall thick, 10-inches (260.0 mm) high. Materials to be minimum 30-gauge thick, clear anodized, with internal cross bracing supports. Include neoprene rubber thermal break at top panel joint. Provide a 1-⅝-inches (42.0 mm) thick, 3-½-inches (90.0 mm) high, replaceable, self-adjusting, continuous, compressible gasket loop of flexible EPDM weatherproofing material. Do not provide fail-safe type automatic reversing edge mechanism in bottom profile. Bottom Profile finishes to coordinate with Primary Panel Type finishes.
 - 1) Sloped Bottom Profiles: Consult manufacturer for applications with custom Bottom Panel lower-edge angles conforming to sloped threshold conditions. Additional entrapment protection safety features are required (Photoelectric Sensor).
 6. Intermediate Panel Connectors:
 - a. Provide PVC Intermediate Panel Connectors to control gap spacing and sag between panels, to be spaced according to manufacturer's set intervals at interior face of door. Standard Color: Light Grey.

2.06 FABRICATION

- A. Factory Assembly:
 - 1. Do not fabricate doors until all specified submittal materials have been reviewed, processed, and returned by the Architect.
- B. Safety Labeling:
 - 1. 'High Performance Door Warning Label' Affix to one guide track vertically at a readable height, (5-foot) (1.5 m) above the bottom of track, to the interior side of the door. Safety labeling shall provide users of the product with helpful safety information. Labels shall conform to ANSI – Z535 regarding standards for content and format of product safety labeling. It is important to recognize that, in accordance with the aforementioned standards, the word “WARNING” on an orange background indicates serious injury or death could occur from the hazard stated on the label. Product safety labels should be periodically cleaned as necessary to maintain good legibility for safe viewing distance. Replace labels no longer meeting legibility requirements. Use DASMA created labels, thereby warning of hazards associated with an Overhead Rapid Coiling Door. A list of instructions shall be given on the label pertaining to safe operation. Refer to DASMA technical data sheet # 402 for complete information.

2.07 FINISHES

- A. General:
 - 1. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.
 - 2. All components of Overhead Rapid Coiling Doors shall be factory finished.
- B. Appearance of Finished Work:
 - 1. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples submitted. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples submitted and are assembled or installed to minimize contrast.
- C. Finishing System:
 - 1. Toxicity: Solvent coating systems are not permitted. Electroplated coating systems are not permitted.
 - 2. Anti-Corrosive Paint: Comply with Green Seal, GS-11 Standard for Paints, Coatings, Stains, and Sealers, 2nd Ed.
 - 3. Finish for steel overhead rapid coiling doors (shop finish) to be hot-dipped galvanized G90 (0.9 oz./ft²) steel, standard.
 - a. Optional Color Finishes:
 - 1) Guide Tracks, Spiral Guides, Brackets, Chain Guards, Hat Profiles: include phosphate treatment with baked-on polyester powder coat paint, minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D3363 pencil hardness: H or better. Color as selected by Architect from manufacturer’s standard color range, RAL Classic color system.
 - 2) Door Panels, (including vision and perforated types): Include two-component, low gloss coating with baked-on polyurethane enamel paint, minimum 1.8 mils (0.045 mm) thickness; ASTM D3363 pencil hardness: H or better. Color as selected by Architect from manufacturer’s standard color range, RAL Classic color system.

2.08 ACCESSORIES

- A. General:
 - 1. Refer to Drawings including Floor Plans, Sections, Elevations, Detail Drawings, Door Schedules for basis of design for accessories, intended configurations, types, options, and remarks for Overhead Rapid Coiling Door accessories.
- B. Activations Cable:
 - 1. M8 4-pin Male Plug quick connect cable-end fittings and 49’ - 2” (15.0 m) long, 4-wire PVC cable. Connects Manual Operated Actuator Device to Overhead Rapid Coiling Door Distributor Cable at door head.
- C. Adhesives for Site Installation:
 - 1. Toxicity/Indoor Environmental Quality – Comply with applicable regulations regarding toxic and hazardous materials, Green Seal GS-36 Standard for Commercial Adhesives.
- D. Fasteners (not supplied by door manufacturer):
 - 1. Recycled Content: Fabricated from 100 percent re-melted steel. Fasteners and bolts shall have a hot-dip galvanized protective coating.
- E. Hood (Motor and Spiral Enclosure):
 - 1. Form to entirely enclose coiled curtain panels and operating mechanism at opening head and act as weather stop (exterior). Contour to suit end brackets to which Hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface mounted Hoods and fascia for any portion between jamb mounting projecting beyond the wall face. Provide intermediate support brackets as required to prevent sag.
 - 2. Fabricate Hoods of hot-dipped galvanized G90 (0.9 oz./ft²) steel sheet, complying with ASTM A653, and not less than 0.06-inch thick.
 - 3. Shape as indicated on Drawings. See Door and Hardware Schedule for locations, quantities, and sizes. Coordinate finishes, including non-standard paint color selections for the Hood with other door component finishes, as approved by the Architect prior to fabrication.

- a. Optional Color Finish: Include phosphate treatment with baked-on polyester powder coat paint, minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D3363 pencil hardness: H or better. Color as selected by Architect from manufacturer's standard color range, RAL Classic color system.
- F. Manually Operated Push Buttons, Pull Cord Actuators:
1. Single Push Button: MMTC Inc. – 1BX, Exterior Control Station. 4 ½" x 4" x 2 ½" (115 x 102 x 64 mm) (L x W x D) Aluminum surface mounted enclosure, NEMA Type 4 rated. One button control. Normally open. Button: 125/250vAC, 6A.
 2. Double Push Button: MMTC Inc. – 2BX, Exterior Control Station. 4 ½" x 4" x 2 ½" (115 x 102 x 64 mm) (L x W x D) Aluminum surface mounted enclosure, NEMA Type 4 rated. Vertically aligned, two button control. 'Open': Normally open, 'Close': Normally open. Button: 125/250vAC, 6A.
 3. Triple Push Button: MMTC Inc. – 3BX, Exterior Control Station. 4 ½" x 4" x 2 ½" (115 x 102 x 64 mm) (L x W x D) Aluminum surface mounted enclosure, NEMA Type 4 rated. Triangular pattern, three button control. 'Open': Normally open, 'Close': Normally open, 'Stop': Normally closed. Button: 125/250vAC, 6A.
 4. Mushroom Push Button: MMTC Inc. – 1MHD, Mushroom Head Control. 3 ½" x 3 ½" x 3" (89 x 89 x 77 mm) (L x W x D) Aluminum surface mounted enclosure, NEMA Type 4 rated. Momentary contact, Red push button. Normally open & Normally closed. Button: Double pole contacts, 240vAC, 3A.
 5. Pull Cord Actuator (Open Only and Open/Close): MMTC Inc. – CPM-1, Exterior Ceiling Pull Switch. 4" x 3 ¾" x 2 ½" (102 x 96 x 64 mm) (L x W x H) Aluminum surface mounted enclosure, NEMA Type 4 rated. Plastic handle with nylon cord lanyard attached to rotating and pivoting cam to accommodate angle of pull. Single pole-single throw (SPST) 125vAC, 15A.
- G. Remote Control Devices:
1. Remote Control Unit (door control activation device): BEA Inc. – '900 MHZ Wireless Family', Long range, frequency hopping, 908 - 918 MHz compact wireless transmitters & receiver. Wireless activation for the Overhead Rapid Coiling Door control. Handheld transmitter: 10TD900HH1, 2, or 3 (button options) 2 ¾" x 1 ½" x ½" (70 x 38 x 13 mm) (L x W x D). Receiver module 10RD900, (installed internal to Control Panel). Up to 75 transmitter units available per receiver module.
 2. Remote Sensor Adjustment Receiver (use with touchless actuators only): BEA Inc. – 10REMOTE, Universal Remote Control. Infrared hand-held digital, transmitter / receiver system used to assist in set-up and adjustment of activation sensors for the overhead Rapid Coiling Door. Ability to remotely change sensor pattern size, detection mode, learn time, sensitivity, as well as lock/unlock sensor settings.
- H. Safety Equipment:
1. 24-Hour Timer (On / Off): IDEC Inc. – RTE-P1AD24, Multi-Function Timer. 1 ½" x 1 ½" x 3" (38 x 38 x 77 mm) (L x W x D) 8-pin multi-mode power triggered Analog Timer. 10 timing functions, with 'On' and 'Timing Out' LED indicators for setting operational hours and limits for the Overhead Rapid Coiling Door. Aluminum surface mounted enclosure. IP40 rated. Supply Voltage: 24vAC, 6.5A.
 2. Emergency Stop Mushroom Push Button: MMTC Inc. – 1MHL, Exterior Mushroom Head Control w/ Maintained Contact. 3 ½" x 2 ¾" x 2 ½" (89 x 70 x 64 mm) (L x W x D) Aluminum surface mounted enclosure. NEMA Type 4 rated. Latching contact, Red push button with 'EMERGENCY STOP' white lettered text. Normally open. Button: Double pole contacts, 240vAC, 3A.
 3. Induction Loop: FEIG Electronics, Inc. – TST SVEK1-1, Vehicle Loop Detector Module Card. 3" x 1 ¾" x ¾" (77 x 45 x 19 mm) (L x W x D) Plug-in circuit board module for Hörmann AK500FUE-1 Smart Start™ NXT Control Panel. Electromagnetic detection system for vehicle presence indicators as a means of automatic door activation permanently embedded in roadway or floor slab. Supply Voltage: 24vDC. Use with EMX Industries, Inc. – 'Lite Preformed Loops' PR-XX, Vehicle Detection Loop Wiring. ¼" (6.35 mm) dia. TPE tubing with integral lightning protection. Suitable for saw cut concrete, poured concrete, asphalt paving. Loop Dimensions: 2'-0" x 6'-0" to 8'-0" x 12'-0" (0.6 x 1.8 m to 2.4 x 3.6 m). Lead-in-Wire: 50 ft. (15.2 m) PVC jacket. Operating Temperatures: -4°F to 194°F (-20°C to 90°C).
 4. Photoelectric Sensor (Photo Eye): Banner Engineering Corp. – QS18, All Purpose Photoelectric Sensor. 1 ½" x ¾" x 1" (38 x 19 x 26 mm) (L x W x D) ABS/Acrylic, Yellow enclosure. Infrared laser entrapment protection sensor consisting of an emitter, single beam of light, and receiver installed external to the jamb-side face of each guide track. When the beam is interrupted a detection signal is sent to stop the operation of the door. NEMA Type 6 rated. Supply Voltage: 10-30vDC, 25mA.
 5. Stack Light: Banner Engineering Corp. – CL50YXX2ALSPQ-85100, Column Light: 1-color sealed loud audible w/ flash input. 2" x 2" dia. X 6 ½" (51 x 51 x 165 mm) (L x W x H) ABS/PC surface mounted enclosure. Illuminated beacon with visual and audible signaling to indicate caution of operation sequences by the overhead rapid coiling door. Indicator color: Yellow, Audible alarm intensity: 92dB. NEMA Type 6, 18-30vDC, 7A.
 6. Traffic Light: Tri Lite Inc. – SG30-115RG-LED, Stop-Go Loading Dock Safety Light Set (two units). 11 ½" x 6 ½" x 3 ¾" (292 x 165 x 96 mm) (L x W x D) Safety yellow polypropylene housing with 4 ½" (115 mm) lens diameter. Vertically oriented direct-view LED traffic signal to control the flow of traffic through the door. Red and green indicators only. UL Listed, 115vAC, 0.06A.
- I. Secure Access Devices:
1. Integration of security equipment, devices, and technology to control, limit, or monitor access via Overhead Rapid Coiling Doors shall be at the responsibility of a third-party supplier and cannot be supplied, supported or warranted by the Overhead Rapid Coiling Door manufacturer. Specifications regarding these requirements should be referenced at Section 28 10 00 – Access Control.
- J. Touchless Actuators:
1. Touchless Activation Switch (Hand Wave, Wall Plate): BEA Inc. – MS09, Microwave Touchless Actuator. 3 ¼" x 3" x 2" (83 x 77 x 51 mm) (L x W x D) ABS/Polycarbonate, White enclosure, (optional stainless steel). Bidirectional K-band microwave Doppler radar motion detection. Surface or flush mount. NEMA Type 4 rated. Detection zone adjustable from 4-24 inches. 12-24 vAC, 1A.

2. Motion Sensor: BEA Inc. – Falcon, Motion Sensor, 4 ¼” x 6 ½” x 3 ¾” (108 x 165 x 96 mm) (L x W x H) ABS/Polycarbonate, Black enclosure. Bidirectional K-band microwave Doppler radar motion detection for touchless activation for Overhead Rapid Coiling Doors. Surface mount, indoor/outdoor, centered above door head, Height: 16 ft. (4.8 m) Tilt angle: 30°. Detection zone: 13 ft. x 16 ft. (3.9 x 4.8 m) @ 16 ft. (4.8 m) NEMA Type 4 rated. 12-24vAC, 1A. Multiple sensors may be required for wide door openings.
3. Presence Sensor: BEA Inc. – IS40P, Presence Sensor, 5” x 4” x 3 ¼” (127 x 102 x 96 mm) (L x W x H) ABS/Polycarbonate, Black enclosure. 40 Active infrared presence detection spots for touchless activation of Overhead Rapid Coiling Doors. Surface mount, indoor/outdoor, centered above door head, Height: 16 ft. (4.8 m) Tilt angle: 30°. Detection zone: 10 ft. x 10 ft. (3.0 x 3.0 m) @ 16 ft. (4.8 m) NEMA Type 4 rated. 12-24vAC, 1A. Multiple sensors may be required for wide door openings.
4. Motion / Presence Sensor: (recommended) Hörmann – ‘Scanprotect’, Laser Scanner (EN 60950-1:2005), 8” x 3 ¾” x 2 ¾” (204 x 96 x 70 mm) (L x W x H) ASA/Polycarbonate, Black enclosure. IR LASER-based, time-of-flight, range finding detection sensor for touchless activation of Overhead Rapid Coiling Doors. Surface mount, indoor/outdoor, centered above door head, Height: 16 ft. (4.8 m) Detection zone: seven curtains per sensor line (7), Width: 1 x installation height x Depth: 1.2 x installation height. NEMA Type 4X rated. Supply voltage: 12-30vDC. Multiple sensors may be required for wide door openings. Scanprotect sensors can be wired in series (daisy-chained). Scanprotect sensors are configurable at the door’s control panel.
5. Motion / Presence Sensor: BEA Inc. – LZR-i30, Laser Scanner (EN 12453 Typ. E), 5” x 6” x 4” (127 x 153 x 102 mm) (L x W x H) ASA/Polycarbonate, Black enclosure. IR LASER-based, time-of-flight, range finding detection sensor for touchless activation of Overhead Rapid Coiling Doors. Surface mount, indoor/outdoor, centered above door head, Height: 16 ft. (4.8 m) Detection zone: four curtains per sensor line (4), 30 ft. x 30 ft. (9.1 x 9.1 m) NEMA Type 4 rated. 12-35vDC, 8mA. Multiple sensors may be required for wide door openings. LZR-i30 sensors cannot be wired in series. LZR-i30 sensors are not configurable at the door’s control panel and require separate remote unit for configuration from the ground.

PART 3 – EXECUTION

3.01 INSTALLERS

- A. Selection and Qualification of Personnel:
 1. Appoint only qualified and trained personnel. Responsibilities regarding operation, maintenance, and repair must be clearly stipulated to ensure maximum safety.
 2. Work on the electrical components may only be carried out by electrical specialists and only in the de-energized state (main switch at OFF and main cable disconnected) in accordance with the electrical regulations.
 3. Installer shall be the responsible party for ensuring the installation of the Overhead Rapid Coiling Door and its accessories comply with building codes, laws, standards and inspections per the Authority Having Jurisdiction.
 4. All work on the Overhead Rapid Coiling Door (such as maintenance or cleaning work, as well as inspections) may only be performed during an operational shutdown with door in a de-energized state. Use lockout-tagout procedures when not working inside the Control Panel.

3.02 EXAMINATION

- A. Verification of Conditions:
 1. The doorway opening should be square and plumb in order to achieve the best possible installation.
 2. The floor between the door jambs (threshold) should be level. If not, address this condition when positioning the guide tracks.
 3. Areas immediately adjacent to the door opening must be free of intrusion from pipes, electrical conduit, building structural members, and other obstructions.
 4. Field verify host wall strength at doorway opening for compliance with movement tolerances of framework during the opening and closing cycles of the Overhead Rapid Coiling Door. In some cases, it may be necessary to structurally reinforce the doorway in order to support the weight of the door. The installer must make this determination. If there are any questions concerning reinforcement of the doorway, the installer should notify the proper channels of authority on the job site, the Architect and the manufacturer.
 5. Receiving and Handling: Check to see that the number of packages matches with that shown on the Bill of Lading when receiving shipment of the Overhead Rapid Coiling Door. Any damage to crates or packaging material should be noted on the shipping receipt. Exterior damage may indicate interior damage. Uncrate and inspect the unit for shipping damage, missing parts and, if necessary, prepare freight claims against the freight carrier for any damage discovered.
- B. Pre-installation Testing:

Check the size of the Overhead Rapid Coiling Door against the size of the door opening before beginning the actual installation.

3.03 PREPARATION

- A. Coordination:
 1. Coordinate installation of Overhead Rapid Coiling Doors with other trades prior to commencement of work. Examine the conditions under which the doors are to be installed and do not proceed with the work until unsatisfactory conditions have been corrected.
 2. Before commencing work, the assigned installer personnel must read and become familiarized with the manufacturer’s written instructions for installation, operating, and maintenance.

- B. Surface Preparation:
 - 1. Exterior doorway openings should be weatherproofed, flashed, and ready to receive finishes prior to commencing installation.
 - 2. Secure loose, sagging, or excess substrate materials. Repair or replace damaged substrate materials as soon as identified and hold installation procedures until repairs are complete.
- C. Demolition / Removal:
 - 1. Overhead Rapid Coiling Doors must be installed directly to the structure of the doorway opening. Remove and discard any finish materials which directly interfere with installation prior to execution of new work. Take due care to not cause unnecessary or excessive damage to adjacent materials or finishes as result of the work.

3.04 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's detailed written instructions for the installation of Overhead Rapid Coiling Doors.
 - 2. Take precautionary measures to verify the site conditions are safe for work.
 - 3. Installation of Overhead Rapid Coiling Doors may require the use of powered platforms, man-lifts, and vehicle-mounted work platforms. For these applications, the installer shall comply with OSHA Title 29 CFR 1910 Subpart F, Standard for Powered Platforms, Man-lifts, and Vehicle-Mounted Work Platforms.
 - 4. All relevant electrical field wiring to be performed by registered electricians experienced, trained and qualified to perform the work.
 - 5. Verify on-site measurements with installation conditions.
 - 6. Verify the quality of the mounting structure for its strength and suitability to perform as required. Visibly inspect for signs of damage, premature wear, abrasion, or other indications as to the conditions of materials.
 - 7. Select suitable fasteners.
 - 8. Unpack the door and inspect for damage. Report damage immediately. Verify receipt of delivery for all components before commencing installation.
 - 9. Dispose of packing materials in accordance with project protocols, and previous descriptions of the work included within this section.
 - 10. Install doors true, level, and plumb, without evident warping, twisting, bending, or excessive abrasion.
 - 11. Handle all materials with care. Should there be any damage to components during installation, do not attempt to rectify or otherwise reuse damaged parts without express approval from the manufacturer. Failure to do so may result in voiding of product warranties.
 - 12. Install doors and operating equipment complete with necessary hardware, jamb and head molding strips, anchors, inserts, spacers, leveling shims, hangers, and equipment supports according to the approved Shop Drawings, manufacturer's written instructions, and as specified in this project manual.
 - 13. Remove all protective film from Door Panels (Solid and Vision) prior to completing or immediately following installation. Failure to do so will void the product warranty.
- B. Exterior Mounted Hoods:
 - 1. Continue weather barrier system behind Hood. DO NOT expose sheathing, framing members, or building insulation behind Hood without weather barrier protection.
 - 2. Provide Flashing, counter-flash, at Hood perimeter. Integrate into building envelope system.
 - 3. Caulk and seal joints and seams of Hood enclosure panels and support brackets during field assembly.
- C. Tolerances:
 - 1. If necessary, the door may be installed in an opening that is slightly narrower or wider than the door's finished size. The tolerance shall be no more than 1-inch (26 mm).
 - 2. If the opening is 1-inch (26 mm) smaller, the guide tracks may be positioned ½" (12.7 mm) out from the jamb to compensate.
 - 3. Positioning the guide tracks back on the jamb at a distance greater than ½" (12.7 mm) may prevent safe operation of the door.
 - 4. DO NOT INSTALL the door if these conditions are exceeded.

3.05 SYSTEMS STARTUP

- A. Initial Operation:
 - 1. Before initial operation of the door and putting into service, check that it is in good working order and free of defects.
 - 2. Set the End-of-Travel positions as follows:
 - a. CLOSE End-of-Travel Position: The bottom profile makes full contact with the floor.
 - b. OPEN End-of-Travel Position: Clearance ~ ¾" (19 mm) to the lower edge of lintel seal profile at head of door opening.
 - 3. Mount any provided Warning Signs, one on each side of the wall on which the door is mounted.
- B. Test Run:
 - 1. After installing the door, test the functional safety according to the product report. Operate the door no fewer than 30 cycles during the testing phase. Verify proper working order of all safety components, including Emergency-Off button. Place on record in the inspection book, dated and signed, that a test run has been successfully completed.

3.06 ADJUSTING

- A. Starting and Adjusting:
1. Make necessary adjustments for safe, efficient operation of Overhead Rapid Coiling Doors.
 2. Adjustment work may only be carried out in the de-energized state. Use lockout-tagout procedures when not working inside the Control Panel.
 3. Adjustment work may require use of powered platforms, man-lifts, and vehicle-mounted work platforms. For these applications, the installer shall comply with OSHA Title 29 CFR 1910 Subpart F, Standard for Powered Platforms, Man-lifts, and Vehicle-Mounted Work Platforms.
 4. After successful completion of Test Run, examine counterbalance system components for wear. Check Springs, Belts and Straps for proper tension and readjust as required.
 5. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weather-tight for entire perimeter of opening.
 6. DO NOT carry out any structural alterations to the door without the manufacturer's written permission, as doing such may void warranties.
 7. Hand over operation of the door only after safe and proper functioning order has been verified, and final cleaning and removal of all protective films has been completed.

3.07 CLEANING

- A. Cleaning and Care:
1. Progress Cleaning: During construction operations Installer shall provide progress cleaning that minimizes accumulation of dirt, dust, ice, snow, standing water. Keep the installation area neat, minimize hazards for tripping and falls each day.
 2. Verify all protective films have been removed from the door panels prior to cleaning.
 3. Final Cleaning: At completion of Work, remove all remaining waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all exposed surfaces; leave area surrounding door (interior AND exterior) clean and ready for safe operation.
 - a. Provide final cleaning in accordance with ASTM E1971-05 and the approved IPM (Integrated Pest Management) plan.
 - b. Utilize non-toxic cleaning materials and methods.
 4. Cleaning and care should be performed on the door ONLY in the closed position, in the de-energized state. Use lockout-tagout procedures when working near hazardous energy sources.
 5. Use warm water together with a neutral, non-abrasive cleaning agent (household detergent, pH value 7, Isopropanol 99.9%).
 6. To clean the surface, use ONLY a soft cloth. Rinse off any dirt, dust, snow or ice particles with clean water. Never scrape ice, snow or foreign materials from the door.
 7. DO NOT rub over the panels when dry, otherwise risk of scratching the surface finish may occur.
- B. Waste Management:
1. Minimize waste, collect recyclable waste, and dispose of (or recycle) field-generated construction waste created during the demolition, construction, or final cleaning of the Overhead Rapid Coiling Door(s) and their accessory components.
 2. Maximize use of source reduction and recycling procedures.
 3. Divert a minimum 95 percent by weight of total product packaging solid waste from landfill.
 4. Clean materials that are contaminated prior to placing in collection containers in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling processes).

3.08 CLOSEOUT ACTIVITIES

- A. Demonstration:
1. It shall be the responsibility of the Installer (Door Dealership) to demonstrate safe operating procedure of the Overhead Rapid Coiling Door to the Owner's appointed staff or representative.
 2. Schedule demonstration with personnel with at least 3 days' advance notice.
 3. Demonstrate safe and proper operation of the door, including safety features and manufacturer's recommended protocols.
 4. Sign-off must be obtained from the Owner's staff or representative by the Installer noting the date and awareness of safe and recommended operating procedures for the Overhead Rapid Coiling Door.
- B. Training:
1. Start-up Services: Engage a factory-authorized service representative to perform start-up services and to train and educate facilities maintenance personnel for ongoing management and maintenance of the door as specified below:
 - a. Test and adjust controls and safeties. Replace any damaged and malfunctioning controls and equipment observed.
 - b. Train designated personnel on procedures and schedules related to start-up and shutdown, troubleshooting, servicing, preventative maintenance, and procedures for testing and resetting release devices.
 - 1) Employees servicing or maintaining machines or equipment with Overhead Rapid Coiling Doors may be exposed to serious physical harm or death if hazardous energy is not properly controlled. Train personnel to be compliant with the OSHA Title 29 CFR 1910.147, Standard for the Control of Hazardous Energy (Lockout/Tagout).
 - 2) Employees servicing or maintaining machines or equipment with Overhead Rapid Coiling Doors may be required to use powered platforms, man-lifts, and vehicle-mounted work platforms. Risk of physical harm or death from falling can occur if

safe operating procedures are not followed. For these applications, personnel shall comply with OSHA Title 29 CFR 1910 Subpart F, Standard for Powered Platforms, Man-lifts, and Vehicle-Mounted Work Platforms.

- c. Review data in the maintenance manuals. Refer to related sections regarding project closeout, and operation and maintenance manuals.
2. Schedule training with personnel with at least 7 days' advance notice.
3. Sign-off must be obtained from the Owner's staff or representative by the Installer noting the date and awareness of safe and recommended operating procedures for the Overhead Rapid Coiling Door.

3.09 PROTECTION

- A. Protecting Installed Construction:
 1. Overhead Rapid Coiling Doors not yet in use may be vulnerable to impact damage and abrasions. Protect completed work of Overhead Rapid Coiling Doors from accidental and incidental damage after installation, and prior to acceptance by the Owner. Doors not in use should be set out with safety cones, caution tape and signage noting the door as not operational.
 2. Use lockout-tagout procedures for control of hazardous energy sources while the door is not operational.
 3. Protect completed work of Overhead Rapid Coiling Doors from other adjacent work in progress. Aggressive media, wind, and heat may damage the door. Protect the door from aggressive media:
 - a. Saltpeter from stone or concrete.
 - b. Cement.
 - c. Plaster.
 - d. Acids.
 - e. Alkali.
 - f. Road Salt.
 - g. SFRM – Sprayed Fire-Resistive Materials.
 - h. Spray Foam Insulating Materials.
 - i. Aggressive Paints, Sealants and other Coatings.
 - j. DO NOT open or close the door if weather conditions are windy.
 - k. Avoid temperatures greater than 122°F (50°C) near the door.

3.10 MAINTENANCE

- A. General:
 1. Overhead Rapid Coiling Doors require low maintenance. All bearings, including gearing, shall be designed maintenance-free for normal operating conditions and shall be greased for the working life.
- B. Unmaintained Doors:
 1. There is a danger of injury and damage if Overhead Rapid Coiling Doors are not regularly maintained. This may also void product warranties.
 2. Inspect and maintain the door regularly as described in the manufacturer's written operations manual, or entrust this work to the manufacturer's service department.
 3. Maintenance work on the door may only be carried out in the de-energized state. Use Lockout and tagging procedures at the Control Panel before undertaking any work. It may also be required to disconnect the system from the main electrical supply at the disconnect device, and ensure that it cannot be inadvertently turned on during service to the Control Panel.
 4. In general, malfunctions and troubleshooting should be entrusted to a qualified installer.
 - a. Inspection and Maintenance of Overhead Rapid Coiling Doors should only be carried out by those qualified to do so, with suitable training, knowledge, and practical experience which allows for proper inspections and maintenance correctly and safely.
- C. Maintenance Intervals:
 1. Testing and maintenance of Overhead Rapid Coiling Doors must be carried out once per year, and as far apart as possible at the same intervals.
 2. Depending on the door size and total number of cycles per year:
 3. If a total of 50,000 cycles per year is exceeded, service all functional elements every six months:
 - a. Electric operator including gearbox safety device and brake.
 - b. All fastener and screw connections.
 - c. Travel limit cut-off.
 - d. Light curtains.
 - e. Control system / impulse generator.
 - f. If the door curtain is extremely dirty, cleaning is recommended using a proprietary cleaning agent.

[PROJECT NO.]

[DATE]

[PROJECT NAME]

[PROJECT LOCATION]

3.11 ATTACHMENTS

A. Included:

1. Product Data (Cut) Sheets, for reference to product selections.

a. Hörmann, *Product Data Sheet, Speed-Guardian™ Complete View 5000 CV 42* (version 1.0).

END OF SECTION 08 33 23.13