

SPECIFICATION – RIGID GRID ACCESS FLOORING

1.0 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1. Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Concrete sealer shall be compatible with pedestal adhesive, if used.
- B. Electrical contractor shall provide necessary material and labor to electrically connect the access floor to the building.
- C. Quantity Allowances: Provide the following as specified in Division 1, Section "Allowances":
 - 1. Floor panel sizes.
 - 2. Cut-outs in floor panels.

1.3 UNIT PRICES

- A. Unit Prices: The Contract Sum will be adjusted for changes in quantity from that indicated in allowances. For specified panel sizes and cutouts in floor panels based on amounts stipulated in the Form of Agreement and complying with Division 1, Section "Unit Prices." Changes to quantities and to the contract sum will be made by change order.

1.4 DEFINITION

- A. ESD: Electrostatic discharge. The transfer of electric charge between bodies at different potentials, from panel surface to raised floor substructure.

1.5 SYSTEM DESCRIPTION

- A. Raised Access Flooring System: Assemblies composed of modular and self-supporting floor sub-structure bolted together, having gravity placed floor panels on top of the substructure and not connected to the pedestal supports. Lateral strength of floor system shall be fully independent from floor panels being in place, or fully removed.

1.6 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide access flooring system capable of withstanding the following loads and stresses within limits and under conditions indicated, as determined by testing manufacturer's current standard test procedures:
 - 1. **Concentrated Loads:** Provide floor panels (24" x 24" or 600mm x 600mm), including those with cutouts, capable of withstanding a concentrated design load of 1100 lbf (5000 N), with a top-surface deflection under load and a permanent set not to exceed 0.15 and 0.008 inch (3.8 mm and 0.2 mm), respectively. If custom size floor panels are provided with a span of less than or equal to 800 mm (31.5"), they need to comply with the above deflection and permanent set values as well, except if located under installed equipment cabinets or racks.
 - 2. **Rolling Loads:** Panel supported on the Bergvik understructure system shall be able to withstand the following rolling loads at any location on the panel with the max. overall surface deflection of 0.040 inches when tested in accordance with CISC A/F, Section 3:
 - 1. 10,000 passes with a 6" dia. x 1-1/2" wide Alathane wheel cycling in a 36" path across the centerline of the middle panel with 600 lbs of load over the wheel.
 - 2. 10 passes with a 3" dia. x 1-13/16" wide Phenolic wheel cycling in a 36" path across the center line of the middle panel with 800 lbs of load over the wheel.
 - 3. **Uniform Distributed Loads:** Provide self-supporting floor sub-structure without panels in place, capable of withstanding a minimum 314 lbs/sf (15 kN/m²) uniform distributed load. For heavy equipment, which requires higher loading in accordance with the engineering drawing, the floor structure shall provide a uniform distributed load capable of supporting the equipment for each individual case to avoid using separate equipment stands under electrical cabinets, racks, CRAH's, PDU's, UPS's, etc.
 - 4. **Ultimate* Loads:** Provide access flooring sub-structure system capable of withstanding a minimum ultimate concentrated load of 1100 lbf (5000 N) and a minimum ultimate distributed load of 628 lbf/ft² (30 kN/m²) without failing. * = max deflection of L/300 of span between secondary beam sections.

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5. **Pedestal Axial Load Test:** Provide sub-structure and pedestal assemblies without panels in place, capable of withstanding a 4900 lbf (20 200 N) axial load per pedestal.
6. **Seismic loads and performance:** Raised Access flooring shall withstand the effects of earthquake motions determined in accordance with **ASCE/SEI 7 and/or UFC3-310-04**. Seismic Design of floor system and components shall meet the requirements for "Special Access Floors". Special Access Floor Requirements include but are not limited to:
 - a. Connections transmitting seismic loads consisting of mechanical fasteners and anchors satisfying the requirements of ACI 318 appendix D including overstrength effects, welding, or bearing. Design load capacity shall comply with recognized design codes and/or certified test results.
 - b. Seismic Loads shall not be transmitted by friction, power actuated fasteners, or by frictions produced solely by the effects of gravity.
 - c. The design and analysis of the bracing system shall include provisions for the destabilizing effects of individual members buckling in compression.
 - d. Pedestals are of structural or mechanical shapes produced to ASTM or approved equivalent specifications that specify the minimum mechanical properties.
 - e. Primary and secondary layer floor beams shall be designed to carry axial and seismic loads and shall be mechanically fastened to the supporting seismically rated pedestals.
 - f. Floor beams shall primarily consist of shapes that are continuous over two (2) spans. In cases where more than one-third (1/3) of floor beams are not continuous, analysis shall be provided to demonstrate the floor framing ability to distribute seismic loads horizontally to the seismic pedestal locations.
 - g. Seismic overturning of equipment mounted to the floor shall be considered. Provisions shall be made to demonstrate a positively anchored load path from the equipment to the raised access floor structure. Slip-on heads shall not be used to resist seismic overturning.
 - h. For high seismic areas with heavy equipment loads (up to 6,000lbs / 2,700kgs), custom seismic bracing frames are designed to integrate with the Bergvik Iso Floor Seismic System to sustain peak lateral loads, achieving a static lateral load coefficient (fp) of 80% of the seismic mass while ensuring dynamic structural integrity and limiting amplification effects to 5% or less.
 - **Finished Floor Height (FFH) range:** 14" – 54" (400 - 1370mm)
 - **Finish:** Black E-coating as standard
 - **Material:** Structural steel
 - **Leveling capability:** +/- 1"
 - i. Recycled content: Sub-structure system and floor panel shall be required to have a minimum recycled content of 75%.

1.7 ESD-CONTROL PROPERTIES:

- A. Provide floor coverings with ESD-control properties indicated as determined by testing identical products per test method indicated by an independent testing and inspecting agency.
- B. Antistatic Floor Covering Properties:
 1. Electrical Resistance: Test per EN 14041, 2004.
 2. Test specimens and installed floor coverings: Greater than 50,000 ohms and an average value of less than 50.000 meg ohm when test specimens and installed floor coverings are tested surface to ground resistivity at a relative humidity of 50%.
 3. Static Generation: Max 2000 V when tested at 50 percent relative humidity with conductive footwear.

1.8 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include Auto-CAD layout or Revit model of access flooring system including measurements between all support members and indicated panel sizes in relationship to adjoining work based on field-verified dimensions.

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1. Details and sections with descriptive notes indicating materials, bolted floor sub-structure, finishes, fasteners, typical and special edge conditions, and accessories.
 2. For installed products indicated to comply with design loads, include structural data analysis report signed and sealed by a manufacturer or qualified professional engineer prior to starting installation.
- C. Samples for Initial Selection: For each type of flooring material and exposed finish indicated.
- D. Samples for Verification: For each type of flooring material and exposed finish indicated.
One complete full-size floor panel and floor sub-structure unit for each type of access flooring system required.
- E. Product Certificates: For each type of access flooring system, signed by product manufacturer.
- F. Qualification Data for Installer: Certified by manufacturer.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency or performed by access flooring manufacturer for each type of flooring material and exposed finish.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Lead Installer must be trained and certified by manufacturer for the warranty to be valid.
- B. Source Limitations: Obtain access flooring system through one source from a single manufacturer.
- C. Regulatory Requirements: Fabricate and install access flooring to comply with ASCE/SEI 7 requirements for raised flooring.
- D. Provide floor panels that are clearly and permanently marked on their underside with panel type, batch number/date, and flame spread rating.
- E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1, Section "Project Management and Coordination", including verification of room dimension(s) and floor height(s).
1. Review connection with mechanical and electrical systems. Floor substructure to be adapted to prevent clashes.
 2. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.

2.0 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install access floor at less than 40 degrees Fahrenheit or above 90 degrees Fahrenheit (4 and 32 deg C), and relative humidity above 70 percent.

2.1 COORDINATION

- A. Coordinate location of mechanical and electrical work in under floor cavity to prevent interference with access flooring pedestals and substructure.
- B. Mark pedestal locations on subfloor by use of a grid, to enable mechanical and electrical work to proceed without interfering with access flooring pedestals.
- C. Installation shall be performed in two (2) phases, with floor sub-structure only in Phase I, to enable mechanical and electrical work to be done without removing floor panels.
Once the mechanical and electrical work is completed under the raised floor, Phase II can commence with installation of the floor panels on top of the substructure. Proceed with installation only after completion of other construction within affected spaces receiving access flooring.

2.2 EXTRA MATERIAL

- A. Furnish extra material described in subparagraphs below that match the products installed. The material shall be packaged with protective coverings for storage and identified with labels describing contents.
1. Flooring Panels: Five (5) of each manufactured size (if applicable).
 2. Pedestals, including head bracket: Five (5) of each height (if applicable).

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3. 80x40mm Tube Steel Sections, Length=6096 mm (240 inches) long: Five (5) each (if applicable)
4. Stepless cable ladder holder brackets of each width (if applicable).

2.3 MANUFACTURER

- A. Basis-of-Design Product: Subject to compliance with requirements, provide a Dynamic Raised Access Floor System or equal by the following:

Bergvik Southern Africa
Unit 6, Capital Hill 65
Cnr. K101 & Le Roux Ave
Midrand 1685, Johannesburg
Phone: +27 11 312 7901
Email: info@bergvik.com

- B. The Consultant will review the request and, at his/her sole discretion, accept or reject said request. If the request for approval is accepted, the Consultant will issue an Addendum listing the alternate material or product as an "approved equal", not less than five (5) days prior to the date set for closing of tenders.

2.4 PRODUCTS

- A. Floor Panels and Substructure, General

1. Product: "Iso Floor" – a fully modular, self-supporting bolted steel substructure featuring a gravity-placed laminated wood-core panel system with a metal underside. Floor panels shall not be connected to the pedestal supports, ensuring that the system's rigid lateral strength remains independent from all floor panels being in place or fully removed. If indicated on the engineering drawings, only the self-supporting substructure (or pedestals only if specified) shall be installed during Phase I to accommodate all underfloor installations prior to the Phase II installation of floor panels.
2. Floor Panels, General: Provide modular panels complying with the following requirements that one person, using a portable lifting device, can interchange with other field panels without disturbing adjacent panels or understructure:
3. Nominal Panel Size: 600mmx600mm or 24inx24in. Custom size panels to be specified based on engineering drawing.
4. Fabrication Tolerances: Fabricate panels to the following tolerances with square ness tolerances expressed as the difference between diagonal measurements from corner to corner.
5. Size and squareness: +/- 0.2 mm (0.008 inches) of required size, with a squareness tolerance of +/- 0.38 mm (0.015 inches), unless tolerances are otherwise indicated for a specific panel type.
6. Flatness: +/- 0.50 mm (0.020 inches), measured on a diagonal on top of panel.
7. Thickness tolerance: +/- 0.1 mm (0.004 inches).

- B. Floor Panels and Substructure, Specific Products

1. **Wood-Core Panels with metal backside:** Fabricate from 38 mm (1.5 inches) thick, V313 moist resistant and E1 type particle board core, made with <10 ppm urea formaldehyde. Laminate bottom aluminum face sheet with a direct laminate process using heat and pressure, providing a flame-spread index of 25 or less per ASTM E84 or NFPA 266.

Provide tapered core edges including direct laminated surface finish of M335 Granite décor. All panel edges should be enclosed with a 0.6 mm (0.02-inches) glued perimeter ABS edge trim.

Edge trim shall be applied so it fully covers the tapered panel edges, including surface finish.

Provide "open bottom access" under electrical equipment for easier cabling intake, using a 40mm square (1.57 inch) steel tube under all sides of the electrical equipment if shown on engineering drawings.

Provide custom panel sizes if shown on engineering drawings to ensure all panels in service aisles or cooling aisles are always fully removable.

2. **Bergvik Air Flow Panels:** The Bergvik Iso Floor Raised Floor steel airflow panel features a standard 24" x 24" size with a deep-profile design, engineered to support loads up to 2,000 lbs in accordance with ASCE/SEI 7, with a maximum deflection of 0.08" (L/300). The total open airflow area is 69% with directed air supply towards the Server Rack front. Panel comes without damper as a standard to maximize airflow efficiency.

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- a. At 69%, Panel without damper: 2000 cfm at 0.1-inch of H₂O (static pressure). This is calculated data.
 - 3. **Floor understructure:** Assembly shall consist of 80x40mm (3 1/4-inch x 1.57-inch) primary and secondary layer tube steel beam sections bolted together, 90 degrees perpendicular to each other with 80/40 mounting brackets and self-tapping screws. Tube steel sections shall provide a yield and a tensile strength to meet the maximum allowed temporary deflection of L/300 of span. A distributed and concentrated static load calculation report shall be furnished. Provide "open bottom access" under the electrical equipment racks using a 40 mm (1.57-inch square) steel tube under all sides of the equipment if shown on engineering drawings.
 - 4. **Standard Pedestals:** Pedestal Assembly shall consist of a base plate, an 80x40mm (3 1/4-inch x 1.57-inch) tube column and head cap, which also includes pedestal head bracket with provisions for height adjustment. All components are made of steel.
 - a. Base: Rectangular base with not less than 75 cm² (11.6 inches) of bearing area.
 - b. Column: Of height required to bring finished floor to elevations indicated, (205 mm / less than 8 inches), pressed securely into base plate and head cap.
 - c. Vibration-proof leveling mechanism required for making and holding fine adjustments in height over a range of not less than 25mm (+/- 1 inch). This mechanism shall lock at a selected height, therefore requiring deliberate action to change height setting, preventing vibratory displacement.
 - d. Head Bracket: Inserted to the top of the pedestal to support and level the primary beam.
 - e. Rust / corrosion of metal components: All parts of the Access Floor sub-structure, including pedestal components, shall have a finish to ensure that no zinc particles will erode into the atmosphere.
 - 5. **Seismic Pedestals:** Pedestal Assembly shall consist of a welded foot plate design, a 2.5" square tube column and head plates bolted to tube to include a pedestal foot plate with provision for +/- 1" height adjustment. All components are made from high grade steel.
 - a. Foot plate: Rectangular base with not less than xx cm² (xxx inches) of bearing area.
 - b. Column: Of height required to bring finished floor to elevations indicated, (205 mm / less than 8 inches), bolted securely to foot plate and head plates.
 - c. Vibration-proof leveling mechanism required for making and holding fine adjustments in height over a range of not less than +/- 1 inch (25mm). This mechanism shall lock at a selected height, therefore requiring deliberate action to change height setting, preventing vibratory displacement.
 - d. Head plates: Affixed at top on both sides of the seismic pedestal to support the primary beam.
 - e. Rust / corrosion of metal components: All parts of the Access Floor sub-structure, including pedestal components, shall have a finish to ensure that no zinc particles will erode into the atmosphere.
- C. Floor Panel Coverings**
- 1. General: Provide factory-applied direct laminate by raised access flooring manufacturer to top surface of floor panels.
 - 2. Standard Direct Laminate:
 - a. Manufactured from phenolic and melamine resin impregnated papers, using a separate, high-wear type melamine glass overlay.
 - 1) Wear resistant to >6000 cycles according to EN 438-2:6 1991.
 - 3. Fabricate to cover each panel face prior to applying edge trim.
 - 4. Colors and Decors: M335 Granite Gray // H818 Alder // A0040 Oak as shown on engineering drawings.
- D. Basis-of-Design Product:** Subject to compliance with requirements, provide the product, or a comparable product by one of the following:
- 1. Surfactor

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2.5 ACCESSORIES

- A. Pedestal Mounting Clamps: Used for cable ladders and easy to install, mounting clamps are customized for Iso Floor and Iso Floor Seismic pedestals with minimum floor height of 16". Suited for most common brackets in the marketplace and can attach to other equipment such as "Starline track busway power distribution" rails.
- B. Cutouts: Provide cutouts in floor panels for cable grommets and service outlets. Provide reinforcement or additional support, if needed, to make custom size panels or cutouts to comply with standard performance requirements.
 - 1. Number, Size, Shape, and Location: Allow for cutouts as shown on engineering drawings.
 - 2. Fit cutouts with manufacturer's standard grommets in sizes indicated or, if size of cutouts exceeds maximum grommet size available, trim edge of cutouts with manufacturer's standard plastic molding or edge trim. Furnish removable covers for grommets if specified.
- C. Ramps: Manufacturer's standard ramp construction of width and slope indicated, but not steeper than 1:12, with non-slip floor covering to match the floor panel finish and construction requirements as of the access flooring, or as indicated on the engineering drawings.
- D. Railings: Standard extruded-aluminum railings, type SUPERIOR ALUMINUM at ramps and open-sided perimeter of access flooring where indicated. Include handrail, intermediate rails, posts, brackets, end caps, wall returns, wall and floor flanges, plates, and anchorages where required, or as indicated on the engineering drawings.
- E. Panel Lifting Device: Manufacturer's standard portable lifting device of double type required for specified panels. Provide one lifting device or a number as otherwise specified.
- F. Perimeter Support: Where indicated, provide manufacturer's standard method for supporting panel edges and forming transition between access flooring and adjoining floor coverings. Perimeter support covering shall match floor panel finish(es), or as indicated on the engineering drawings.

3.0 EXECUTION

A. Examination

- 1. Examine substrates, with Installer and manufacturer's representative present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- 2. Verify that substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, foreign deposits, and debris. Verify that concrete slab sub floor has been sealed.
- 3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

- 1. Lay out floor panel installation to keep the number of cut panels at floor perimeter to a minimum. Avoid using panels cut to less than 8 inches
- 2. 200mm). If shown on the engineering drawing, provide larger size panels for cut-in to avoid perimeter panels that are less than 8 inches (200 mm).
- 3. Complete any necessary sub floor preparation and vacuum clean subfloor to remove construction debris before beginning installation.

C. Installation

PHASE I

- 1. Install access flooring system and accessories under supervision of access flooring manufacturer's authorized and certified representative to produce a rigid, firm installation that complies with performance requirements and is free of instability, rocking, rattles, and squeaks.
 - a. Install primary beam sections supported by and mounted to pedestal assemblies so that no interference with feeder cables to and from equipment racks or cabinets occurs.

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- b. Set pedestals with nail plugs as recommended by access flooring manufacturer to provide secure and full bearing of pedestal base on sub floor. Gluing of pedestals is not recommended.
- c. Level sub-structure pedestals supporting primary beam sections to permit panels to be level and to proper height as set out in engineering drawings. Secure the leveling by tightening the locking nuts on all pedestals.
- d. Install secondary beam sections supported by the primary beam sections, using 80/40 mounting brackets and self-tapping screws, so that they line up center to center with all panels in accordance with the manufacturers floor layout drawings. Before installation of phase II starts, perform cable management, electrical and HVAC installations under the floor substructure to prevent floor panels to be removed and reinstalled by other subcontractors. By following this procedure, project schedule can be shortened and damage of floor panels can be avoided.

D. Installation

PHASE II

1. Install floor panels securely in place, properly seated with panel edges flush. Do not force panels into place. Verify if custom size panels are to be located in rows where equipment racks or cabinets of different depths are to be installed, to allow for service aisle panels to be fully removable.
2. Scribe perimeter panels to provide a close fit with adjoining construction using foam tape between perimeter panel and wall, with no voids greater than 6 mm (1/4 inch) where panels abut vertical surfaces.
3. Cut and trim access flooring and perform other dirt-or-debris-producing activities at a remote location, or as required to prevent contamination of subfloor under access flooring already installed.
4. Ground flooring system as recommended by manufacturer and as needed to comply with performance requirements for electrical resistance of floor system and coverings.
5. Clean dust, dirt, and construction debris caused by floor installation, and vacuum sub floor area, as installation of floor panels proceeds.
6. Install access flooring without change in elevation between adjacent panels and within the following tolerances:
 - a. Plus or minus 1.5 mm (1/16 inch) in any 3 meter (10-foot) distance.
 - b. Plus or minus 3 mm (1/8 inch) from a level plane over entire flooring area.

3.1 POST INSTALLATION - ADJUSTING, CLEANING, AND PROTECTING

- A. Prohibit traffic on access flooring structure unless floor panels have been installed, or floor structure is covered by secure means to prevent accidents.
- B. After completing installation, vacuum clean access flooring and cover with continuous sheets of reinforced paper or plastic if required. Maintain protective covering until time of substantial completion.
- C. Replace access floor panels that are stained, scratched, or otherwise damaged or that do not comply with specified requirements.
- D. After completed installation, inspect completed raised access floor installation together with customer using manufacturers standard "completed inspection form" and sign off for approval. Provide one copy to the customer and return one copy to manufacturer as a proof of completion and acceptance.
- E. After receipt of "completed inspection form", manufacturer shall provide customer with a detailed warranty document dated and signed by authorized officer of the manufacturer.

- END OF SECTION -

