SECTION  – board insulation

This section has been edited to include Gensler's Product Sustainability Standards ("GPS Standards") criteria, providing language for only the "Gensler Standard" tier of performance - the required minimum level of performance for sustainable attributes of the product. To include "Market Differentiator" level of performance or for any other questions, please contact your regional specification leader, Tim Taylor, or Kaley Blackstock.

1. GENERAL
   1. summary
      1. Section includes requirements for supply and installation of the following:
         1. Foundation and Underslab Insulation Board.
         2. Concrete Faced Perimeter Insulation Board.
         3. Mineral Wool Cavity Wall Insulation Board.
         4. Plastic Cavity Wall Insulation Board.
         5. High Density Underslab Insulation Board.
         6. Parking Garage Ceiling Insulation Board.
      2. Related Requirements:
         1. Section 04 20 00 – Masonry.
         2. Section 07 14 16 – Cold Fluid Applied Waterproofing Membrane.
         3. Section 07 21 16 – Blanket Insulation and Vapour Barriers.
         4. Section 07 27 26 – Air Barrier Membrane.
         5. Section 07 42 26 – Preformed Aluminum Panels and Soffit.
         6. Section 31 26 00 – Excavating and Backfill.
         7. Section 33 46 19 – Underslab Drainage Systems."
   2. REFERENCE STANDARDS
      1. Underwriters Laboratories of Canada (ULC):
         1. CAN/ULC S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
      2. American Society for Testing and Materials (ASTM):
         1. ASTM D 1621-10, Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
         2. ASTM D 2842-06, Standard Test Method for Water Absorption of Rigid Cellular Plastics.
      3. Canadian General Standards Board (CGSB):
         1. CGSB 71 GP 24M, Adhesive, Flexible for Bonding Cellular Polystyrene Insulation.
         2. CAN/CGSB-37.5, Cutback Asphalt Plastic Cement.
      4. Canadian Standards Association (CSA):
         1. CSA A123.3-05 (R2010), Asphalt Saturated Organic Roofing Felt.
   3. submittals
      1. Sustainable Design Submittals: Refer to Division 01 Section 01 81 33 – Sustainable Design Requirements – Embodied Carbon.
      2. Provide submittals in accordance with the General Conditions and Section 01 33 00 – Submittal Procedures.
      3. Affidavits:
         1. In lieu of samples and inspection procedures when required by CGSB and CAN/ULC Standards, submit affidavits, if requested, that materials supplied under these requirements meet CGSB and CAN/ULC Standards.
      4. Safety Data Sheets:
         1. Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on site for reference by workers.
   4. INFORMATIONAL SUBMITTALS

The following submittal is a part of the GPS Standards and is required for all projects, relating to the Global Warming Potential (embodied carbon) limits established for select products. Contractors must submit a Type III EPD to verify that the product does not exceed the embodied carbon limits listed in Part II.

* + 1. Embodied Carbon Reporting: Type III Environmental Product Declarations, per ISO 14025 disclosing the Global Warming Potential of the product from Stages A1 through A3 in accordance with Section 01 81 33 – Sustainable Design Requirements - Embodied Carbon for products listed under "Embodied Carbon Reporting" in Article "Quality Assurance."

The paragraph below aligns with edits made in January of 2023 to Gensler's master specifications for our GC3 initiative. This requires that contractors complete an EPD Reporting Form, referenced in 018133 "Sustainable Design Requirements - Embodied Carbon" disclosing (checking a box) if an EPD exists for the product, and to provide the EPD.

* + 1. Environmental Product Declaration (EPD) Disclosure Submittals: Completed Environmental Product Declaration Reporting Form in accordance with Section 01 81 33 – Sustainable Design Requirements - Embodied Carbon, for the following product types in this Section:
       1. Insulation board, each type.

The following submittal is a part of the GPS Standards and is required for all projects. This relates to VOC content limit requirements listed in Part II.

* + 1. VOC Content: Product data or laboratory reports showing compliance with VOC content limits.

The following submittal is a part of the GPS standards and is required for all projects. This relates to TVOC emissions testing reports or certificates listed under 'Quality Assurance' for select product types.

* + 1. TVOC Emissions: Laboratory test reports or third-party certificates showing compliance with the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers" version 1.2-2017 for products listed under "TVOC Emissions" in Article "Quality Assurance."

The following submittal is a part of the GPS Standards and is required for all projects. This relates to material ingredient disclosure reports listed under 'Quality Assurance' for select product types.

* + 1. Material Ingredient Disclosure: Submit one of the following reports for products listed under "Embodied Carbon Reporting" in Article "Quality Assurance."
       1. Health Product Declaration.
       2. UL Product Lens.
       3. Living Building Challenge Declare Label or Living Product Challenge Label.
       4. EPEA Material Health Statement.
       5. Cradle-to-Cradle v4 Material Health Certificate or multi-attribute certificate.

The following submittal is a part of the GPS Standards and is required for all projects.

* + 1. Sustainability Reporting: Provide the following for insulation products.
       1. Recycled content, including Pre-consumer and post-consumer percentages.
       2. Biobased content.
       3. Manufacturing location.
  1. QUALITY ASSURANCE

Retain requirements below for LEED/WELL projects. Gensler's GPS requirements for CDPH testing (which is verified by a GreenGuard Gold Certification) is only required for unfaced mineral wool batt insulation at this time but will be required by Gensler's GPS standards for all board and batt products starting June of 2024.

* + 1. Low-Emitting Materials: For all thermal and acoustical applications of unfaced mineral wool batt insulation products, provide materials complying with the testing and products requirements of UL Environmental Validation and UL GreenGuard Gold certification.

The following requirement is a part of the GPS Standards and is required for all projects. This corresponds to the GPS Standards requiring that select products have EPDs. This document corresponds with an informational submittal required in this section. Edit list of product types below to align with the project. Note that starting in June of 2024, only product-specific EPDs will be permitted for products listed below (industry-wide EPDs will no longer be accepted).

* + 1. Embodied Carbon Reporting: Obtain the following products with the type of publicly available, third-party verified Type III Environmental Product Declaration (EPDs) listed below in accordance with Section 01 81 33 – Sustainable Design Requirements - Embodied Carbon.
       1. Extruded polystyrene foam-plastic board: Industry-wide or product-specific Type III EPD.
       2. Mineral-wool board: Industry-wide or product-specific Type III EPD.

The following requirement is a part of the GPS Standards and is required for all projects. This corresponds to the GPS Standards requiring that select products have testing reports or certificates for the California Department of Public Health (CDPH) Standard Method v1.2-2017 emissions testing ("TVOC emissions"). This document corresponds with an informational submittal required in this section.

* + 1. TVOC Emissions: Obtain the following products with publicly available reports or certificates verifying compliance with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers" version 1.2-2017, following the private office scenario:
       1. Adhesive.

The following requirement is a part of the GPS Standards and is required for all projects. This document corresponds with an informational submittal required in this section.

* + 1. Material Ingredient Disclosure: Obtain the following products with publicly available reports disclosing material ingredients to residuals no greater than 1000ppm:
       1. Extruded polystyrene foam-plastic board.
       2. Concrete Faced Perimeter Insulation Board.
       3. Plastic Cavity Wall Insulation Board.
       4. High Density Underslab Insulation Board.
       5. Mineral Wool Cavity Wall Insulation Board.
       6. Parking Garage Ceiling Insulation Board.
  1. DELIVERY, STORAGE AND HANDLING
     1. Store insulation materials in dry areas, protected from wetting, sunlight, and traffic. Store insulation board flat on a flat surface, and to prevent edge damage and placing of materials on top of stored boards.
     2. Ensure that insulation board and adhesives are stored at a minimum temperature of 4 deg C for twelve (12) hours before installation, and that freezable adhesives are stored only at temperatures above 0 deg C at all times.

1. products
   1. manufacturers
      1. Basis-of-Design Products: Products named in this Section were used as the Basis-of-Design for the Project; additional manufacturers offering similar products may be incorporated into the Work of this Section provided they meet the performance requirements established by the named products and provided they submit requests for substitution five (5) days in advance of Bid Closing.
      2. Acceptable Manufacturers: Subject to compliance with requirements specified in this Section, manufacturers offering products that may be incorporated into the Work include the following:
         1. Dow Canada.
         2. Owens-Corning Canada.
         3. Rockwool Inc.
         4. T. Clear Corp.
   2. MATERIALS
      1. Embodied Carbon: Maximum Global Warming Potential for Production Stages A1 through A3 as defined in Section 01 81 33 – Sustainable Design Requirements - Embodied Carbon for the following products:

Below complies with the current GPS standards for extruded polystyrene foam plastic boards.

* + - 1. Extruded Polystyrene Foam-Plastic Board: 41 kg of CO2eq per m2.

Below complies with the current GPS standards for low density mineral wool boards. Currently there is no GPS limit for mineral boards exceeding 4.3 pcf.

* + - 1. Light Low Density (Boards having a Nominal Density Up to 4.3 PCF) Mineral Wool Boards: 3.3 kg of CO2eq per m2.
    1. Foundation and Underslab Insulation Board:
       1. Closed-cell, cellular, foamed, smooth skin, extruded expanded polystyrene, having 30 psi compressive strength, thicknesses as indicated on drawings and specified herein, conforming to CAN/ULC S701, Type IV.
       2. Basis of Design Materials:
          1. Styrofoam SM by Dow Chemical Canada Inc.
          2. Celfort 300 by Owens-Corning Canada Inc.
       3. Provide underslab insulation board with shiplapped edges.
    2. Concrete Faced Perimeter Insulation Board:
       1. Construction:
          1. Perimeter Foundation Insulation: Extruded polystyrene board to ASTM C 578 (CAN/ULC-S701) Type IV, rigid, closed cell, with integral high-density skin, complete with integral 8 mm (5/16") thick latex-modified concrete facing.
          2. Board Size: 610 mm x 1220 mm x 59 mm (24" x 48" x 2-5/16").
          3. Edges: Tongue and groove sides, square edge ends.
          4. Thermal Resistance (ASTM C 518): Long term aged R-value of 5/1" (0.03 sm K/W / 1mm).
          5. Foam Compressive Strength: ASTM D 1621, minimum: 35 psi (240 kPa).
          6. Compressive Strength Total: ASTM D 1621, minimum 40 psi (275.6 kPa).
          7. Water Absorption (ASTM D 2842): < 0.1 (0.7% by volume maximum).
       2. Water Vapor Permeance (ASTM E 96): 0.8 (50 ng/Pas m).
       3. Basis of Design Material: WallGUARD Concrete Faced Insulated Perimeter Wall Panels by T. Clear Corp.
    3. Mineral Wool Cavity Wall Insulation Board:
       1. Fibrous mineral wool insulation, unfaced, in accordance with CAN/ULC S702, Type 1, thermal resistance not less than RSI 0.76/25 mm; rated non combustible in accordance with CAN/ULC S114 and having a flame spread rating of 5 or less in accordance with CAN/ULC S102; density 72 kg/m3; square edges, board size 406 mm x 1220 mm x thickness indicated on the Drawings:
          1. Density: To ASTM C 303:

Outer layer: 100 kg/m3

Inner layer: 60 kg/m3

* + - * 1. Water vapour permeance: 1555 ng/Pa.s.m2.
        2. Moisture absorption: 1% maximum to ASTM C 1104/C 1104M.
        3. Fungi resistance: Zero mould growth to ASTM C 1338.
        4. Basis of Design Material: CavityRock by Rockwool Inc.
    1. Plastic Cavity Wall Insulation Board:
       1. Polystyrene, extruded type, in accordance with CAN/ULC S701, Type 3, thermal resistance not less than RSI 0.87/1"; square edges, board size 16" x 8' x thickness required to achieve insulation value indicated on Drawings; minimum compressive strength 170 kPa at 10% deformation in accordance with ASTM D 1621-10, water absorption (% by volume) maximum 0.7% in conformation with ASTM D 2842-06:
       2. Basis of Design Materials:
          1. Dow Styrofoam CavityMate.
          2. Owens-Corning Foamular CW25.
    2. High Density Underslab Insulation Board:
       1. Closed-cell, cellular, foamed, smooth skin, extruded expanded polystyrene, having [40][60][100] psi compressive strength, thicknesses as indicated on drawings and specified herein, conforming to CAN/ULC S701, Type IV.
       2. Basis of Design Materials:
          1. Styrofoam [HI-40] [HI-60] [HI-100] by Dow Chemical Canada Inc.
          2. Foamular [400][600] [1000] by Owens-Corning Canada Inc.
       3. Provide high density underslab insulation board with shiplapped edges.
    3. Parking Garage Ceiling Insulation Board:
       1. Faced, non-combustible, rigid, mineral wool fire rated insulation board to ASTM C 612, Type IVB.
       2. Non-combustibility: To CAN/ULC S114.
       3. Compressive resistance:
          1. At 10%: 16.9 kPa to ASTM C 165.
          2. At 25%: 28.1 kPa to ASTM C 165.
       4. Size: 610 mm x 1219mm.
       5. Thickness: 50mm, unless otherwise indicated on the Drawings.
       6. Facer: Aluminum foil with fiberglass (RFF) reinforcement to ASTM.
       7. Basis of Design Material: ROCKBOARD 60 with RFF Facer by Rockwool Inc.
  1. ACCESSORIES
     1. Insulation Fasteners:
        1. Mechanical Fasteners: High quality, impact resistant plastic fastener system specifically designed for installation of board insulation materials; 38 mm (1-1/2") diameter, shaft length to suit insulation thickness and hot dipped galvanized fastener to suit substrate.
        2. Insulation Clips: Impale type, perforated 50 mm x 50 mm (2" x 2") cold rolled carbon steel 1 mm (1/32") core metal thickness, adhesive back; 1.6 mm (1/16") diameter annealed steel wire spindle, length to suit insulation, 25 mm (1") diameter self locking washers.
        3. Perimeter Insulation Fasteners: Concrete faced insulation manufacturer's standard concealed fasteners with groove mounting plate and fastening spline.
     2. Adhesive:
        1. Trowelable Polystyrene Insulation Adhesive: Trowel consistency, synthetic rubber-based insulation adhesive compatible with polystyrene insulation in accordance with CGSB 71 GP 24M; suitable for application to temperature of -10 deg C or lower, as approved by insulation board supplier.
     3. Felt Slip Sheet: No. 15 asphalt saturated, organic, unperforated felt conforming to CSA A123.3-05 (R2010).
     4. Slip Sheet Mastic: Cut back asphalt plastic cement conforming to CAN/CGSB-37.5.
     5. Protection Board: Pre moulded, semi rigid asphalt/fibre composition board, minimum 6mm (1/4") thick, formed under heat and pressure as recommended by board insulation manufacturer for below grade installations.

1. execution
   1. examination
      1. Before commencing work, ensure that all surfaces to which perimeter insulation board is applied are clean, reasonably smooth with no abrupt changes in plane, free of grease, and with protruding fins of mortar or concrete removed, and that the surfaces are otherwise acceptable for insulation application as specified.
   2. preparation
      1. Clean substrates of substances harmful to insulations; remove projections that interfere with insulation attachment.
      2. Proceed with installation only after unsatisfactory conditions have been corrected.
   3. installation
      1. Install insulation and accessories in accordance with manufacturer's written instructions applicable to products and application indicated and as follows:
         1. Use insulation that is undamaged, dry, and unsoiled.
         2. Maintain continuous thermal insulation, vapour barrier and air tightness for building spaces and elements, and as follows:
            1. Saw cut and trim insulation neatly to fit spaces, fill voids with foamed in place insulation compatible with installed insulation.
            2. Butt edges and ends tight.
            3. Fit insulation tight against mechanical, electrical, and other items protruding through the plane of insulation.
            4. Use insulation free of broken or chipped edges.
            5. Apply single layer of insulation to produce thickness indicated unless multiple layers are otherwise specifically shown or required to make up total thickness.
            6. Fit insulation firmly against substrate using mechanical fasteners spaced in accordance with manufacturers recommended spacing and pattern; in addition, adhere insulation to uneven substrate surfaces and provide additional fasteners to eliminate air spaces between insulation and substrate.
            7. Mechanically fasten insulation boards 50 mm (2") in from edges at 305 mm (12") centers.
      2. Leave insulation joints unbonded over line of expansion and control joints; bond a continuous 150 mm (6") wide strip of primary vapour membrane over expansion and control joints using compatible adhesive.
      3. Protect insulation from damage until it is covered; replace any broken, sunburned, crushed, or dented insulation immediately prior to covering; coordinate with back filling operations.
      4. Board Insulation: Install board insulation to vertical surfaces with adhesive applied in accordance with manufacturer's written instructions, and as follows:
         1. Exterior Application: Extend boards as indicated on Drawings to top of footing, installed on exterior face of perimeter foundation wall.
         2. Apply adhesive to the substrate by the "dab" method not less than (3/8" x 3/4") size at 150 mm (6") centers; bed the insulation in the adhesive before the adhesive loses its tack or skins over.
         3. Protect below grade insulation on vertical surfaces from damage during backfilling by applying protection board; set in adhesive according to insulation manufacturer's written instructions.
         4. Secure insulation mechanically and cover insulation with parging and metal lath as specified in Section 04 20 00 – Unit Masonry, where insulation extends above grade, and concrete faced insulation is not supplied.
      5. Concrete Faced Insulation:
         1. Layout concrete-faced insulation boards to maximize board sizes. Do not use boards less than 152 mm (6") wide.
         2. Install concrete faced insulation board system in orientation as indicated or to maximize full sheets. Complete with fastening clips and cap flashing in accordance with manufacturer's installation guidelines.
      6. Foundation and Under Slab Insulation: Extend boards **[a minimum of 1220 mm (4') in from perimeter foundation wall] [as indicated on Drawings]**, and as follows:
         1. Lay boards on level compacted fill.
         2. Insulate structural slabs at entrances with insulation placed horizontally underneath the concrete and insulate surrounding slabs on grade in the same way for a distance of 1220 mm (4') in every direction from the perimeter of the structural slab; omit perimeter insulation on adjacent foundations for the width of the structural slab.
      7. Load Bearing Insulation: Install in accordance with manufacturer's written instructions, and as follows:
         1. Load Bearing Insulation: Install board insulation horizontally on level compacted fill **[and within driveway ramps] [to locations indicated on Drawings]**.
      8. Cavity Wall Insulation: Fit courses of insulation between wall ties and other confining obstructions in cavity; butt edges tightly in vertical and horizontal directions and as follows:
         1. Install cavity insulation with a tight fit to substrate materials, provide adhesive and additional fasteners where uneven substrates cause air spaces behind insulation; apply adhesive to substrate in a continuous film not less than 3 mm (1/8") thick when wet and bed the insulation into adhesive before adhesive loses its tack or skins-over.
         2. Apply insulation fasteners using a minimum of six (6) fasteners in two rows located near the centre of the board along the narrow dimension and near the third points along the long dimension; secure boards with two clips at the centre where both dimensions are less than 610 mm (24").
         3. Coordinate application of cavity wall insulation with installation of masonry ties and anchors specified in Section 04 20 00 – Unit Masonry.
         4. Apply sheet membrane vapour retarder behind Z bars prior to installation of insulation between Z bars supporting preformed metal cladding.
         5. Install insulation clips to walls before sheet membrane air barriers are applied.
      9. Parking Garage Insulation: Install in accordance with manufacturer's written instructions, and as follows:
         1. Fit insulation closely around electrical boxes, pipes, ducts, frames, and other objects in or passing through insulation.
         2. Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of vents.
         3. Install insulation board using all-purpose construction adhesive and mechanical fasteners, in accordance with insulation manufacturer's written recommendations.
         4. Seal joints with acoustical joint sealant in accordance with Section 07 92 00 – Joint Sealants.
   4. protection
      1. Protect installed board insulation from damage due to harmful weather exposures, physical abuse, and other causes.
      2. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

end of section