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Specifications Guide – Section 23 86 16.19  
Insulation for Radiant-Heating Hydronic Piping

ISORAD V2 Board Insulation



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**Isolofoam Group Spec Note: This master specification is written to include SPEC NOTES noted as “Isolofoam Group Spec Note” in order to assist designers in their decision-making process. SPEC NOTES precede the text to which they apply. Although written by a professional specification writer, this section should serve as a guideline only and should be edited by a knowledgeable person to meet the requirements of each specific project.**

**Text indicated in bold and by square brackets is optional. Make appropriate decisions and delete the optional text as well as the brackets in the final copy of the specification. Delete or hide the SPEC NOTES in the final version of the document.**

This specification section is written to follow the recommendations of the Construction Specifications Institute/Construction Specifications Canada (CSI/CSC) such as MasterFormatTM, SectionFormatTM, and PageFormatTM. It is also written with metric and imperial units of measurement.

Values in this specification have been provided in metric units followed by imperial units in brackets. Where necessary, some of the values have been converted and rounded from imperial values.

**This Specification specifies thermal insulation board for hydronic heating systems and related accessories. It is based on ISORAD V2 by Isolofoam Group.**

Isolofoam Group manufactures and sells building insulation materials. Although the specification was written by a professional specification writer, Isolofoam Group does not practice architecture or engineering. Therefore, the design responsibility remains with the architect, engineer, or consultant. We trust the information provided within will be of some assistance. It is based upon data considered to be true and accurate and is offered solely for the user's consideration, examination and verification. Nothing contained herein is representative of a warranty or guarantee for which Isolofoam Group can be held legally responsible. Isolofoam Group does not assume any responsibility for any misinterpretation or assumptions the reader may formulate.

1. GENERAL
   1. SUMMARY
      1. Section Includes: Labour, materials, products, equipment and services to complete the insulation for radiant-heating hydronic piping specified herein. This includes, but is not limited to:
         1. Expanded polystyrene board insulation designed for piping installation of hydronic heating systems.
         2. Auxiliary materials and accessories required for a complete installation.
   2. RELATED REQUIREMENTS
      1. Related Requirements: Specifications throughout all Divisions of the Project shall be read as a whole, and may be directly applicable to this Section.
      2. Related requirements provided below are for convenience purposes only.

Isolofoam Group Spec Note: The following list of sections is provided as a sample only. Edit to meet the requirements of the project. Limit section listings to only those sections containing specific information that would directly affect the work of this section. Do not include Division 01 sections in this list.

* + - 1. Section **[03 30 00, Cast-in-place Concrete]**: for provision of cast-in-place concrete.
      2. Section **[06 16 23, Subfloor]**: for wood subfloors above grade.
      3. Section **[06 17 00,** **Shop-Fabricated Structural Wood]**: for structural elements for above grade floors.
      4. Section **[07 21 00, Thermal Insulation]**: for provision of other insulation materials.
      5. Section **[07 26 00, Vapour Retarders]**: for provision of materials acting as vapor retarder in the building envelope.
      6. Section **[07 27 00, Air Barriers]**:for provision of air barrier systems.
      7. Section **[23 83 16, Radiant-heating Hydronic Piping]**: for provision of radiant-heating hydronic piping.
  1. REFERENCE STANDARDS
     1. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
     2. All reference amendments adopted prior to the Bid Closing date of this Project shall be applicable to this Project.
     3. All materials, installation and workmanship shall comply with all applicable requirements and standards.
     4. ASTM International
        1. ASTM C203: Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation.
        2. ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
        3. ASTM D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
        4. ASTM D2842: Standard Test Method for Water Absorption of Rigid Cellular Plastics.
        5. ASTM E96/E96M: Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
     5. Canadian General Standards Board (CGSB)
        1. CGSB 71-GP-24M: Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation(Withdrawn Standard).
     6. CSA Group
        1. CSA B214: Installation Code for Hydronic Heating Systems.
     7. International Organization for Standardization
        1. ISO 14025: Environmental labels and declarations – Type III environmental declarations – Principles and procedures.
        2. ISO 9001:2015: Quality management systems – Requirements.
     8. Underwriters Laboratories of Canada
        1. CAN/ULC S102.2: Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.
        2. CAN/ULC-S701.1:2017: Standard for Thermal Insulation, Polystyrene Boards.
  2. ADMINISTRATIVE REQUIREMENTS
     1. Pre-installation Meeting: Schedule, and conduct pre-installation meeting at Project Site, in order to coordinate work of this Section, with work of related Subcontractors.
        1. Ensure attendance of Subcontractor performing work of this Section and representatives of manufacturers and fabricators involved in, or affected by, installation and coordination with other materials and installations that have preceded or will follow. Advise Consultant and Owner in advance of scheduled meeting dates.
        2. Agenda: As a minimum, include the following:
           1. Sequence of construction, coordination with substrate preparation, materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, protection of installed materials and details of construction.
           2. Review progress of other construction activities and preparations for the particular activity under consideration.
        3. Record significant discussions, agreements, and disagreements, including required corrective measures and actions.
        4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
     2. Sequencing:
        1. Sequence work to permit installation of materials in conjunction with related materials and envelope seals.
  3. ACTION AND INFORMATIONAL SUBMITTALS

Isolofoam Group Spec Note: Edit text in square brackets to reflect the specifics of the project.

* + 1. Make Submittals in accordance with provisions indicated in **[Section 01 33 00, Submittal Procedures.]**
    2. Product Data: Submit product literature and data sheets for board insulation indicating product features, performance criteria, physical dimensions, finishes and limitations.
       1. Submit WHMIS Safety Data Sheets (SDS) in accordance with requirements of **[Section 01 33 00, Submittal Procedures.]**
    3. Sustainable Design Submittals:
       1. Building Product Disclosure and Optimization: To promote the use of environmentally and health-conscious construction materials, manufacturer must provide publicly available information as follows:

Isolofoam Group Spec Note: Retain text in square brackets below if the project is pursuing LEED V4 credits related to building product disclosure and optimization.

* + - * 1. Environmental Product Declarations (EPD): Submit industry-wide (generic) EPD conforming to ISO 14025 **[or other approved environmental product declaration framework recognized by CaGBC]**.
        2. General Emissions Evaluation Documentation: Submit valid “GREENGUARD Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings” certificate issued by UL Solutions certifying that the specified rigid insulation meets the low emission requirements for volatile organic compounds (VOCs). Website: https://spot.ul.com/.
    1. Shop Drawings: Show the following:
       1. Locations and extent of insulation boards and details of typical conditions.
       2. Piping diagrams.
       3. Details of interfaces with other materials that form part of building envelope assemblies.
    2. Quality Assurance Submittals: Submit following in accordance with Section **[01 45 00, Quality Control]**.
       1. Certificates: Submit proof of manufacturer's ISO 9001 registration and compliance.
       2. Manufacturer's Instructions: Submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

Isolofoam Group Spec Note: Edit text below to reflect the applicable building code to the jurisdiction of the project.

* + 1. Evaluation Reports: Submit evaluation reports from CCMC or similar third-party reports published by evaluation bodies recognized by authorities having jurisdiction demonstrating compliance with requirements of the **[National Building Code of Canada].**
  1. QUALITY ASSURANCE
     1. Sample Warranties: Submit sample warranties for extended warranties indicated in this Section for Consultant's review.
     2. Manufacturer Qualifications:
        1. Provide Products from a manufacturer with minimum 10 years of experience and capable of providing board insulation that meets or exceeds performance requirements indicated in this Section.
        2. Manufacturer must be an ISO 9001 registered company.
     3. Applicator Qualifications:
        1. Company specializing in performing work of this Section with minimum **[5]** years documented experience with installation of building envelope products specified herein.

Isolofoam Group Spec Note: Edit text in square brackets to reflect the specifics of the project.

* + 1. Mock-up:
       1. Construct mock-up in accordance with Section **[01 45 00, Quality Control]** representative of typical primary board insulation assemblies including substrate and typical penetrations.
       2. Mock-up must be a minimum 2.5 m long by 2.5 m wide (8 ft long by 8 ft wide) and include materials and accessories identical to those that will be used in floor assembly.
       3. Locate mock-up where directed by Consultant.
       4. Allow **[24]** hours for inspection of mock-up by Consultant before proceeding with remainder of work of this Section.
       5. Purpose of mock-up: To establish benchmark for the work of this Section.

Isolofoam Group Spec Note: Edit paragraph below to establish whether mock-ups must be demolished at the end of the Project, or if they can be incorporated into the final building.

* + - 1. Mock-up at time of Substantial Performance of the work: **[Demolish and remove.]** **[May be incorporated in the completed work if intact and undamaged.]**
    1. Source Limitations: Obtain primary boards specified in this Section from a single manufacturer. Obtain secondary materials such as adhesives, tapes and sealants from sources compatible with primary board insulation.
  1. DELIVERY, STORAGE AND HANDLING
     1. Deliver, store and handle materials in accordance with Section **[01 61 00, Product Requirements]** and in accordance with manufacturer's written instructions.
     2. Protect boards from physical damage and from deterioration due to moisture, UV, heat, soiling, and other sources that may cause deleterious effects.
     3. Do not expose to sunlight except as necessary for installation and concealment.
     4. Protect against ignition at all times.
     5. Promptly complete installation and concealment of boards in each area of construction. Pour concrete slab or screed over boards as soon as practical after installation of boards. If boards will be left exposed for any period of time, install protective covering to prevent damage due to construction activities or environmental degradation.
  2. FIELD CONDITIONS
     1. Weather Conditions: Begin installation only when current and anticipated weather conditions allow for proper assembly of boards in accordance with manufacturers' written instructions and warranty requirements.

1. PRODUCTS
   1. MANUFACTURERS
      1. Materials specified in this Section are based on products by Isolofoam Group; 1338, boulevard Vachon Nord, Sainte-Marie (QC) G6E 1N4 CANADA; T.: 418-387-3641; 1-800-463-8886; F.: 1-877-463-8886; Website: [isolofoam.com](isolofoam.com/en/) as listed in this Specification.

Isolofoam Group Spec Note: Retain one of the two options below to either permit or preclude other manufacturers from bidding on the work of this Section.

* + 1. **[Substitution Limitations: No further substitutions are acceptable.]**

**OR**

* + 1. **[Substitution Limitations: Conforming to requirements of Section 01 25 00, Substitution Procedures and as follows:** 
       1. **Consultant will consider requests for substitution if received [10] days before Bid Closing Deadline. Requests received after that time will be rejected. Consultant will consider requests for substitution when following conditions are satisfied:** 
          1. **Requests for substitution include a list of at least five similar projects of equivalent size where products have been installed for a minimum of five years.**
          2. **Requested substitution does not require extensive revisions to the Contract Documents.**
          3. **Requested substitution is consistent with the Contract Documents and will produce indicated results.**
          4. **Requested substitution will not adversely affect construction schedule.**
          5. **Requested substitution provides specified warranty.]**
  1. DESIGN AND PERFORMANCE REQUIREMENTS
     1. Provide insulation based on thicknesses indicated on Drawings to provide the minimum thermal resistances necessary to prevent moisture condensation and to maintain comfortable conditions for building occupants.
     2. Insulation boards provided under this Section must conform to CAN/ULC-S701.1 and other requirements specified in this Section.
     3. Insulation boards provided under this Section must conform to CSA B214 and other requirements specified in this Section.
     4. Insulation boards used for the work of this Section must not contain blowing agents to contribute to thermal resistance. Otherwise, the long-term thermal resistance (LTTR) value specified in CAN/ULC-S701.1 must be used for design and compliance purposes.
     5. Above grade floors must be able to support load from concrete overlay necessary for the installation of the hydronic heating system.
  2. EXPANDED POLYSTYRENE INSULATION FOR SLAB-ON-GRADE HYDRONIC HEATING SYSTEMS (110 kPa / 16 psi)

Isolofoam Group Spec Note:  
The text below specifies Isolofoam Group’s ISORAD V2 160 R10 and ISORAD V2 160 R15 products (110 kPa / 16 psi).

* + 1. Rigid expanded polystyrene insulation panel (EPS): complying to CAN/ULC-S701.1 (Type 2), with a multidirectional tube retaining system, clipping system ensuring continuity of insulation made up of secured panels and of minimum physical characteristics specified below:
       1. Acceptable Products: **“ISORAD V2 160 R10”** or **“ISORAD V2 160 R15”** by Isolofoam Group.
       2. Thermal Resistance per 25 mm (1 in.): Not less than RSI 0.71 m2•°C/W (R4.05 ft2•h•°F/Btu) when tested in accordance with ASTM C518.
       3. Compressive Strength: Not less than 110 kPa (16 psi) when tested in accordance with ASTM D1621.
       4. Flexural Strength: Not less than 240 kPa (35 psi) when tested in accordance with ASTM C203.
       5. Water Absorption: Not more than 1.5 percent (%) when tested in accordance with ASTM D2842.
       6. Water Vapour Permeance: Not more than 200 ng/Pa•s•m2 (3.5 perms) when tested in accordance with ASTM E96/E96M.
       7. Flame Spread Rating (FSR) of 240 or less when tested in accordance with CAN/ULC-S102.2.
       8. Total VOC Emissions: Not more than 0.22 mg/m3 when tested in accordance with CDPH Standard Method v1.2, as required for Greenguard Gold certified products.
       9. Edges: Manufacturer’s custom **“ISOCLICK ALIGN”** 4-sided edge-clipping system, ensuring continuity of insulation, panels are locked together, and alignment of hydronic pipe insertion system is ensured.
       10. Tube size: 13 mm (1/2 inch) and 16 mm (5/8 inch) diameter tube.
       11. Panel Size: **[1220 mm x 1220 mm (4 ft x 4 ft)]**.

Isolofoam Group Spec Note: Edit the text below to reflect the size and thickness of boards required for the project based on the project’s criteria.

* + - 1. Thickness: **[64 mm (2-1/2 inches); overall 89 mm (3-1/2 inches)]** **[95 mm (3-3/4 inches); overall 121 mm (4-3/4 inches)]**.
  1. EXPANDED POLYSTYRENE INSULATION FOR SLAB-ON-GRADE HYDRONIC HEATING SYSTEMS (173 kPa / 25 psi)

Isolofoam Group Spec Note:  
The text below specifies Isolofoam Group’s ISORAD V2 250 R10 and ISORAD V2 250 R15 products (173 kPa / 25 psi).

* + 1. Rigid expanded polystyrene insulation panel (EPS): complying to CAN/ULC-S701.1 (Type 3), with a multidirectional tube retaining system, clipping system ensuring continuity of insulation made up of secured panels and of minimum physical characteristics specified below:
       1. Acceptable Products: **“ISORAD V2 250 R10”** or **“ISORAD V2 250 R15”** by Isolofoam Group.
       2. Thermal Resistance per 25 mm (1 in.): Not less than RSI 0.74 m2•°C/W (R4.2 ft2•h•°F/Btu) when tested in accordance with ASTM C518.
       3. Compressive Strength: Not less than 173 kPa (25 psi) when tested in accordance with ASTM D1621.
       4. Flexural Strength: Not less than 345 kPa (50 psi) when tested in accordance with ASTM C203.
       5. Water Absorption: Not more than 1.5 percent (%) when tested in accordance with ASTM D2842.
       6. Water Vapour Permeance: Not more than 130 ng/Pa•s•m2 (2.3 perms) when tested in accordance with ASTM E96/E96M.
       7. Flame Spread Rating (FSR) of 240 or less when tested in accordance with CAN/ULC-S102.2.
       8. Total VOC Emissions: Not more than 0.22 mg/m3 when tested in accordance with CDPH Standard Method v1.2, as required for Greenguard Gold certified products.
       9. Edges: Manufacturer’s custom **“ISOCLICK ALIGN”** 4-sided edge-clipping system, ensuring continuity of insulation, panels are locked together, and alignment of hydronic pipe insertion system is ensured.
       10. Tube size: 13 mm (1/2 inch) and 16 mm (5/8 inch) diameter tube.
       11. Panel size: 1220 mm x 1220 mm (4 ft x 4 ft).

Isolofoam Group Spec Note: Edit the text below to reflect the size and thickness of boards required for the project based on the project’s criteria.

* + - 1. Thickness: **[64 mm (2-1/2 inches); overall 89 mm (3-1/2 inches)]** **[95 mm (3-3/4 inches); overall 121 mm (4-3/4 inches)]**.
  1. EXPANDED POLYSTYRENE INSULATION FOR SLAB-ON-GRADE HYDRONIC HEATING SYSTEMS (210 kPa / 30 psi)

Isolofoam Group Spec Note:   
The text below specifies Isolofoam Group’s ISORAD V2 300 R10 and ISORAD V2 300 R15 products (210 kPa / 30 psi).

* + 1. Rigid expanded polystyrene insulation panel (EPS): complying to CAN/ULC-S701.1 (Type 3), with a multidirectional tube retaining system, clipping system ensuring continuity of insulation made up of secured panels and of minimum physical characteristics specified below:
       1. Acceptable Products: **“ISORAD V2 300 R10”** or **“ISORAD V2 300 R15”** by Isolofoam Group.
       2. Thermal Resistance per 25 mm (1 in.): Not less than RSI 0.75 m2•°C/W (R4.25 ft2•h•°F/Btu) when tested in accordance with ASTM C518.
       3. Compressive Strength: Not less than 210 kPa (30 psi) when tested in accordance with ASTM D1621.
       4. Flexural Strength: Not less than 345 kPa (50 psi) when tested in accordance with ASTM C203.
       5. Water Absorption: Not more than 1.5 percent (%) when tested in accordance with ASTM D2842.
       6. Water Vapour Permeance: Not more than 130 ng/Pa•s•m2 (2.3 perms) when tested in accordance with ASTM E96/E96M.
       7. Flame Spread Rating (FSR) of 240 or less when tested in accordance with CAN/ULC-S102.2.
       8. Total VOC Emissions: Not more than 0.22 mg/m3 when tested in accordance with CDPH Standard Method v1.2, as required for Greenguard Gold certified products.
       9. Edges: Manufacturer’s custom **“ISOCLICK ALIGN”** 4-sided edge-clipping system, ensuring continuity of insulation, panels are locked together, and alignment of hydronic pipe insertion system is ensured.
       10. Tube size: 13 mm (1/2 inch) and 16 mm (5/8 inch) diameter tube.
       11. Panel size: 1220 mm x 1220 mm (4 ft x 4 ft).

Isolofoam Group Spec Note: Edit the text below to reflect the size and thickness of boards required for the project based on the project’s criteria.

* + - 1. Thickness: **[64 mm (2-1/2 inches); overall 89 mm (3-1/2 inches)] [95 mm (3-3/4 inches); overall 121 mm (4-3/4 inches)]**.
  1. EXPANDED POLYSTYRENE INSULATION FOR UPPER STOREY OR EXISTING SLAB HYDRONIC HEATING SYSTEMS (210 kPa / 30 psi)

Isolofoam Group Spec Note:   
The text below specifies Isolofoam Group’s ISORAD V2 300 R3 and ISORAD V2 300 R5 products   
(210 kPa / 30 psi).

* + 1. Rigid expanded polystyrene insulation panel (EPS): complying to CAN/ULC-S701.1 (Type 3), with a multidirectional tube retaining system, interlocking system ensuring continuity of insulation made up of secured panels and of minimum physical characteristics specified below:
       1. Acceptable Products: **“ISORAD V2 300 R3”** or **“ISORAD V2 300 R5”** by Isolofoam Group.
       2. Thermal Resistance per 25 mm (1 in.): Not less than RSI 0.75 m2•°C/W (R4.25 ft2•h•°F/Btu) when tested in accordance with ASTM C518.
       3. Compressive Strength: Not less than 210 kPa (30 psi) when tested in accordance with ASTM D1621.
       4. Flexural Strength: Not less than 345 kPa (50 psi) when tested in accordance with ASTM C203.
       5. Water Absorption: Not more than 1.5 percent (%) when tested in accordance with ASTM D2842.
       6. Water Vapour Permeance: Not more than 130 ng/Pa•s•m2 (2.3 perms) when tested in accordance with ASTM E96/E96M.
       7. Flame Spread Rating (FSR) of 240 or less when tested in accordance with CAN/ULC-S102.2.
       8. Total VOC Emissions: Not more than 0.22 mg/m3 when tested in accordance with CDPH Standard Method v1.2, as required for Greenguard Gold certified products.
       9. Edges: Manufacturer’s custom 4-sided edge-interlocking system, ensuring continuity of insulation, panels are locked together, and alignment of hydronic pipe insertion system is ensured.
       10. Tube size: 13 mm (1/2 inch) and 16 mm (5/8 inch) diameter tube.
       11. Panel size: 1220 mm x 1220 mm (4 ft x 4 ft).

Isolofoam Group Spec Note: Edit the text below to reflect the size and thickness of boards required for the project based on the project’s criteria.

* + - 1. Thickness: **[13 mm (1/2 inch); overall 1-1/2 inches (38 mm)]** **[25 mm (1 inch); overall 51 mm (2 inches)]**.
  1. ACCESSORIES
     1. Provide board insulation accessories that are compatible with board insulation materials to produce a complete assembly.
     2. Adhesive: to CGSB 71-GP-24M, low VOC, as recommended by the adhesive manufacturer for use with polystyrene insulation. Ensure adhesive is compatible with insulation and is capable of securely adhering insulation to substrates without negatively affecting insulation or substrates.
     3. PEX piping staples for polystyrene panels: PEX piping staples sized for specified pipe diameter and designed to fasten to polystyrene panels such as **[Uponor Blue Foam Staples]**.
     4. PEX piping clips: PEX piping clips sized for specified pipe diameter for fastening of pipe to subfloor.

1. EXECUTION
   1. MANUFACTURER'S INSTRUCTIONS
      1. Compliance: Comply with manufacturer's latest written installation publications, including product technical bulletins, handling, storage and installation instructions, and datasheets.
   2. INSPECTION
      1. Verify that surfaces and conditions are ready to fulfill work of this section.
      2. Confirm that adhesives are compatible with board insulation products.
      3. Confirm that vapour retarder (if shown on Drawings or specified) is in place and properly installed.
      4. Report unsatisfactory or non-conforming conditions to Consultant in writing.
      5. Do not start work until deficiencies have been corrected.
      6. Beginning of work implies acceptance of conditions.
   3. INSTALLATION
      1. Comply with requirements of CSA B214 unless indicated otherwise.
      2. Install boards and accessory materials according to manufacturer's written instructions and to provide insulating continuity throughout the building envelope. Select sizes to fit applications from manufacturer's standard thicknesses, widths, and lengths.
      3. Install boards that are undamaged, dry, clean, free of ice and snow, and have not been exposed to any deleterious substances.
      4. Install boards with moulded tube retaining system facing up. Provide protective covering to prevent physical damage until concrete slab or screed is poured. Protect from exposure to ultraviolet (UV) radiation from the sun when panels will be exposed for an extended period.
      5. Install piping in accordance with manufacturer's installation instructions, as specified in Section **[23 83 16, Radiant-heating Hydronic Piping]** and in accordance with pattern shown on Drawings.
      6. Where pipes change direction, ensure pipes are firmly held in place by pressing them down between moulded retainers. Use **[staples for PEX piping for fastening to polystyrene insulation]** **[clips for PEX piping for fastening to subfloors]** in areas where pipes require additional restraint.
      7. Once installed, panels must remain clipped together for remainder of construction period and until pouring of concrete slab or screed.
      8. Remove debris from top of insulation panels before covering them with concrete or other materials. Pour concrete in locations shown on Drawings and as indicated in Section **[03 30 00, Cast-in-place concrete]**.
   4. INSTALLATION – INSULATION FOR SLAB-ON-GRADE HYDRONIC HEATING SYSTEMS

Isolofoam Group Spec Note: Retain text below when measures to control air infiltration or soil gas infiltration are required.

* + 1. **[Install soil gas barrier membrane and overlap membrane joints at least 300 mm (12 inches).**
    2. **Seal the gas barrier membrane with compatible products (e.g., elastomeric sealant, tape, self-adhesive membrane or sealing foam) at junctions, penetrations and perimeter of other spaces.]**
    3. Place boards on even surface of uniformly compacted fill.
    4. Clip insulation system together at interlocking edges to ensure alignment of pipe retainers and continuity of thermal insulation.
    5. Cover entire surface with insulation panels.
  1. INSTALLATION – INSULATION FOR UPPER STOREY HYDRONIC HEATING SYSTEMS
     1. Remove all construction debris from the subfloor.
     2. Block openings in the floor, for stairwells, for ventilation or any other penetrations to prevent concrete from entering these.

Isolofoam Group Spec Note: Retain one of the two options below.

* + 1. **[Installation with membrane covering entire floor surface:**
       1. **Install a polyethylene membrane over the entire floor surface and extending at least 150 mm (6 in) up the face of walls and the perimeter of blocked openings.**
       2. **Seal membrane to prevent concrete from flowing into wall cavities and openings.**
       3. **Install boards on subfloor.**
       4. **Clip insulation boards at interlocking edges to ensure continuity of thermal insulation and alignment of hydronic pipe insertion system and to retain boards in place together until and during pouring of concrete slab.**
       5. **Where board edges cannot be clipped (e.g., along perimeter of walls and other openings), fasten boards to subfloor using nails with retaining washers spaced not more than 460 mm (18 in).]**

**OR**

* + 1. **[Installation with membrane along perimeter of walls and openings:**
       1. **Install a polyethylene membrane not less than 460 mm (18 in) wide along perimeter of walls and floor openings and extend membrane at least 150 mm (6 in) up face of walls and edge of blocked openings.**
       2. **Seal membrane to prevent concrete from flowing into wall cavities and openings.**
       3. **Install boards on subfloor.**
       4. **Clip insulation boards at interlocking edges to ensure continuity of thermal insulation and alignment of hydronic pipe insertion system and to retain boards in place together until and during pouring of concrete slab.**
       5. **Where board edges cannot be clipped (e.g., along perimeter of walls and other openings), fasten boards to subfloor using adhesive compatible with polystyrene insulation. Apply a continuous bead of adhesive and press firmly on boards to ensure proper adhesion.]**
    2. Cover entire surface with insulation panels.
  1. CLEANING
     1. Proceed in accordance with Section **[01 74 00, Cleaning]**.
     2. On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
  2. PROTECTION OF WORK
     1. Protect finished work in accordance with Section **[01 61 00, Product Requirements]**.
     2. Protect boards against damage caused by ultraviolet (UV) radiation, adverse weather exposures, physical abuse, and other harmful conditions. Ensure boards are protected from UV radiation when panels will be exposed for an extended period.
     3. Traffic protection after installation: When concrete or screed placement does not occur immediately after installation of insulation boards, protect insulation boards from subsequent construction activities with rigid protective plywood covering to prevent damage to installation.

**END OF SECTION**