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Owens Corning® Enclosure Solutions FOAMULAR® NGX™ Extruded Polystyrene in Foundation Wall Applications Exterior Enclosure Specification

Owens Corning® Enclosure Solutions Below Grade Foundation Wall Systems with NGX™ Extruded Polystyrene Continuous Insulation (ci) Specification Guide

This specification guide presents in 3-part format all of the components of the Enclosure Solutions Below Grade Foundation Wall Systems with Extruded Polystyrene Assembly. The components are presented in two MasterFormat Divisions: **Division 07 Thermal and Moisture Protection**.

System performance requirements are presented in **Division 01 Exterior Enclosure Performance Requirements** where all components are specified as a single system.

The major section headings provided are outlined below. Sections that require editing by the specifier are marked in **[highlighted bold with brackets]**. Notes to the specifier are marked in **[PINK with brackets]**. Please note that edits to all Divisions are required to ensure complete performance of the system.

Division 01 General Requirements:

Divisions 07 provided in this document outline complete 3-part MasterFormat sections for all components of a below grade foundation wall with Extruded Polystyrene ci System.

Each of those sections cross reference back to the Division 01 Exterior Enclosure Performance Requirements to ensure that complete system performance requirements for building code compliance are concisely stated in the construction documents.

Include this section in your Project Manual to establish code compliance and complete system performance requirements.

SECTION 01 83 16 EXTERIOR ENCLOSURE PERFORMANCE REQUIREMENTS

Division 07 Insulation Components:

This section includes Owens Corning® (OC) FOAMULAR® NGX™ Extruded Polystyrene (XPS) continuous insulation. This section outlines those products where they are commonly placed in the thermal insulation MasterFormat section:

SECTION 07 21 13.13 FOAM BOARD INSULATION

Alternatively, the text for each product may be cut & pasted into their general MasterFormat Sections if desired:

SECTION 07 21 00 THERMAL INSULATION

PROJECT ARCHITECT RESPONSIBILITY: This is a general specification guide, intended to be used by experienced construction professionals, in conjunction with good construction practice and professional judgment. This guide is to aid in the creation of a complete foundation system specification that is to be fully reviewed and edited by the Architect of Record. Sections of this guide should be included, or edited, or omitted based on the requirements of a specific project. It is the responsibility of both the specifier and the purchaser to determine if a product or system is suitable for its intended use. Neither Owens Corning® nor any of their subsidiary or affiliated companies, assume any responsibility for the content of this specification guide relative to actual projects, and specifically disclaim any and all liability for any errors or omissions in design, detail, structural capability, attachment details, shop drawings or other construction related details, whether based upon the information provided by the aforementioned companies or otherwise.

SECTION 01 83 16 EXTERIOR ENCLOSURE PERFORMANCE REQUIREMENTS

PART 1 – GENERAL

1. SUMMARY

Tested Foundation Wall System Description: Furnish and install specified products that have been tested to meet specified performance requirements for thermal, air, water, and fire resistance.

A. SECTION INCLUDES:

1. The complete below grade foundation wall assembly shall include the following:
 - a. **[CMU, Concrete]** foundation wall by contractors.
 - b. Continuous **[waterproofing, dampproofing]** system applied to the exterior face of the foundation wall installed in a watertight and flexible manner, allowing for the relative movement of systems due to thermal and moisture variations and capable of withstanding moisture pressure without damage or displacement.
 - c. Extruded polystyrene continuous insulation preliminarily secured to wall with **[screws and air and water sealing washers, compatible adhesive]**.
 - d. **[Drainage composite]**. (Drainage composite intended to protect insulation and waterproofing and promote drainage and provide vapor diffusion and promote drainage away from foundation- alternatively, Owens Corning FOAMULAR® NGX™ INSUL-DRAIN® may be used. See FOAMULAR® NGX™ INSUL-DRAIN Data Sheet.)
2. All joints, penetrations, and gaps of the below grade foundation wall system shall be made water and air tight.

2. RELATED SECTIONS

Refer to the following Sections for additional requirements for each component in the assembly: **[Delete section from the list below that are not required by the project.]**

1. **Section 03 10 00 [Project Specific]**, Concrete Forming Accessories
2. **Section 03 30 00 [Project Specific]**, Cast-in-Place Concrete
3. **Section 03 40 00 [Project Specific]**, Precast Concrete
4. **Section 03 70 00 [Project Specific]**, Mass Concrete
5. **Section 04 20 00 [Project Specific]**, Unit Masonry
6. **Section 04 43 00 [Project Specific]**, Stone Masonry
7. **Section 07 10 00 [Project Specific]**, Dampproofing and Waterproofing
8. **Section 07 21 00 [Project Specific]**, Thermal Insulation
9. **Section 07 21 13 [Project Specific]**, Board Insulation
10. **Section 07 21 13.13 [Project Specific]**, Foam Board Insulation
11. **Section 07 27 00 [Project Specific]**, Air Barriers
12. **Section 07 62 00 [Project Specific]**, Sheet Metal Flashing and Trim
13. **Section 07 65 00 [Project Specific]**, Flexible Flashings
14. **Section 07 92 00 [Project Specific]**, Joint Sealants
15. **Section xx xx xx [Project Specific]**, LEED Requirements

3. ADMINISTRATIVE REQUIREMENTS

A. COORDINATION

Coordinate installation of below grade foundation wall, below grade **[waterproofing, dampproofing]** system, insulation, and accessories with air barrier membrane, and other moisture protection work.

B. PREINSTALLATION MEETINGS

Convene a meeting of involved sub-contractors a minimum of two weeks prior to commencing Work described in this Section.

1. Attendance is required by representatives of related trades including Owner's Representative, Contractor, Architect, Installer, Air Barrier Membrane System Manufacturer, Foundation Waterproofing Subcontractor, mechanical subcontractor, electrical contractor, and all subcontractors who have materials penetrating the foundation **[waterproofing, dampproofing]** system or finishes covering the membrane system. Manufacturer's Representative is available upon request with minimum two-week notice.

2. Contractor shall notify **[Architect, Engineer, Consultant]** at least 14 days prior to time for meeting.
 3. Contractor shall record minutes of meeting and distribute to attending parties.
 4. The agenda shall include at a minimum:
 - a. Materials proposed for use.
 - b. **[Verification of eligibility for any warranty].**
 - c. Sequence of construction.
 - d. Coordination with site and substrate preparation, condition, and pretreatment.
 - e. Compatibility of materials.
 - f. Air barrier requirements and installation.
 - g. Mechanical and electrical requirements and installation.
 - h. Minimum curing period.
 - i. Special details.
 - j. Mockups.
 - k. Waterproofing leakage and adhesion testing and inspection.
 - l. **[Waterproofing, Dampproofing]** protection and repair.
 - m. Work scheduling that covers air barrier coordination with installation of adjacent and covering materials.
4. SUBMITTALS
- Provide the following information in accordance with **Section 01 33 00 [Project Specific]** Submittal Procedures.
- A. PRODUCT DATA:
 1. Submit product data of each component in tested wall assembly as required in **[Sections 03 30 00 Cast-in-Place Concrete, 03 40 00 Precast Concrete, 04 20 00 Unit Masonry, 07 10 00 Dampproofing and Waterproofing, 07 21 00 Thermal Insulation, 07 27 00 Air Barriers]**. *[Insert all that apply from 1.2 RELATED SECTIONS.]*
 - B. SHOP DRAWINGS
 1. Submit shop drawings demonstrating tested wall assembly components as specified in **[Sections 03 30 00 Cast-in-Place Concrete, 03 40 00 Precast Concrete, 04 20 00 Unit Masonry, 07 10 00 Dampproofing and Waterproofing, 07 27 00 Air Barriers]**. *[Insert all that apply from 1.2 RELATED SECTIONS.]*
 - C. SAMPLES:

Submit product minimum **[three]** samples of each component of the tested below grade wall assembly system as required by this Section.
 - D. CERTIFICATES:

Submit documentation, signed by manufacturers, that products in tested below grade wall assembly meet Quality Assurance Requirements as required in this Section.
 - E. TEST AND EVALUATION REPORTS:

Submit manufacturer's verification, test reports, or third-party engineering analysis that the proposed materials assembled as a tested below grade wall system comply with the specified PERFORMANCE/ DESIGN CRITERIA of this Section.
 - F. MANUFACTURER'S INSTRUCTIONS

Provide installation instructions for all products in tested below grade wall assembly as required in this Section.
 - G. SUSTAINABLE DESIGN SUBMITTALS:

Provide documentation of required Quality Assurance Sustainability Standards Certifications for all products in tested below grade wall assembly as required in this Section.
 - H. SPECIAL PROCEDURE SUBMITTALS

[None.]
 - I. QUALIFICATION STATEMENTS

Provide documentation of required Quality Assurance Qualifications for Manufacturers and Installers for all products in tested wall assembly as required in this Section.

J. WARRANTY DOCUMENTATION

Submit sample warranties as required by this Section.

5. QUALITY ASSURANCE

A. QUALIFICATIONS

Manufacturers and Installers of specified products in the tested wall assembly shall meet Quality Assurance Qualifications requirements in **[Sections 03 30 00 Cast-in-Place Concrete, 03 40 00 Precast Concrete, 04 20 00 Unit Masonry, 07 10 00 Dampproofing and Waterproofing, 07 21 00 Thermal Insulation, 07 27 00 Air Barriers]**. **[Insert all that apply from 1.2 RELATED SECTIONS.]**

B. CERTIFICATIONS

1. Provide Manufacturer's written certification that tested wall assembly components are compatible **[and provided as a single-source from the manufacturer]**.
2. Provide Manufacturer's written certification that components are compatible with all adjacent materials that come into contact with the materials during construction and throughout the life of the building including insulation and attached membranes.
3. Provide Manufacturer's written certification that products are for the intended purpose as described in this Section.

C. SUSTAINABILITY STANDARDS CERTIFICATIONS

Provide documentation that specified products of the tested assembly meet Product Design/ Performance Criteria and Product Materials requirements of this Section and Quality Assurance Sustainability Standards Certifications in **[Sections 03 30 00 Cast-in-Place Concrete, 03 40 00 Precast Concrete, 04 20 00 Unit Masonry, 07 10 00 Dampproofing and Waterproofing, 07 21 00 Thermal Insulation, 07 27 00 Air Barriers]**. **[Insert all that apply from 1.2 RELATED SECTIONS.]**

D. MOCK-UPS

Construct a below grade wall system sample panel minimum 8 feet long x depth of actual foundation that includes structural foundation wall, **[drainage composite]**, **[waterproofing, dampproofing]**, air and water barrier transition, extruded polystyrene (XPS) continuous insulation, insulation attachment methods, through-wall flashing, weeps/ venting, termination bars, drip edges, and sealants. The mock-up shall also include a sill transition assembly detailed and sill flashings, to demonstrate surface preparation, crack and joint treatment, application of **[waterproofing, dampproofing]**, and sealing of gaps, terminations, and penetrations of **[waterproofing, dampproofing]** assembly.

1. Coordinate construction of mockups to permit inspection by Owner's testing agency of **[waterproofing, dampproofing]** before external insulation and backfill are installed.
2. Include transitions to air barrier membrane and building corner condition.
3. **[Architect, Engineer, Consultant]** approval of mockup is required. If it is determined that mockup does not comply with requirements, affected details must be reconstructed until mockups are approved.
4. Locate as directed and remove upon review and approval.
5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless **[Architect, Engineer, Consultant]** specifically approves such deviations in writing. **[Indicate portion of wall represented by mockup on Drawings or draw mockup as separate element.]**
6. **[Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.]**
7. **[Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on field mockups.]**

E. DELIVERY, STORAGE, AND HANDLING

For specified products in the tested below grade foundation wall assembly, follow Delivery, Storage, and Handling requirements per **[Sections 07 10 00 Dampproofing and Waterproofing, 07 21 00 Thermal Insulation, 07 27 00 Air Barriers]**. **[Insert all that apply from 1.2 RELATED SECTIONS.]**

F. FIELD CONDITIONS

For specified products in the tested below grade foundation wall assembly, follow Field Conditions requirements per **[Sections 07 10 00 Dampproofing and Waterproofing, 07 21 00 Thermal Insulation, 07 27 00 Air Barriers]**. **[Insert all that apply from 1.2 RELATED SECTIONS.]**

G. WARRANTY

1. PRODUCT WARRANTY

Provide product warranties as required by **[Sections 07 10 00 Dampproofing and Waterproofing, 07 21 00 Thermal Insulation, 07 27 00 Air Barriers]**. *[Insert all that apply from 1.2 RELATED SECTIONS.]*

2. SYSTEM WARRANTY

Provide system warranty as required by **[Sections 07 10 00 Dampproofing and Waterproofing, 07 21 00 Thermal Insulation, 07 27 00 Air Barriers]**. *[Insert all that apply from 1.2 RELATED SECTIONS.]*

3. INSTALLATION WARRANTY

Provide installation warranty as required by **[Sections 07 10 00 Dampproofing and Waterproofing, 07 21 00 Thermal Insulation, 07 27 00 Air Barriers]**. *[Insert all that apply from 1.2 RELATED SECTIONS.]*

PART 2 – PRODUCTS

1. TESTED BELOW GRADE FOUNDATION WALL ASSEMBLY

A. MANUFACTURERS

BASIS-OF-DESIGN: Below Grade Foundation Wall System.

1. Substitution Limitations

The "Basis of Design" tested wall assembly listed in this Section is tested as a system. The Contractor shall provide the products of the named manufacturers without substitution, unless a written request for an "or equal complete system substitution" has been approved in writing by the **[Architect, Engineer, Consultant]**. Substitution requests must be accompanied by the following to be considered:

- Verification that proposed products meet published product performance criteria.
- Verification from proposed manufacturers that the proposed substitution is tested with the other assembly components to meet Division 01, EXTERIOR ENCLOSURE PERFORMANCE REQUIREMENTS, **Section 01 83 16 [Project Specific]**.

B. DESCRIPTION

Provide and install **[CMU, concrete]** below grade foundation wall assembly, with continuous **[waterproofing, dampproofing]** system over the exterior structure and continuous extruded polystyrene (xps) insulation that effectively controls thermal, air, and water performance and provides continuous insulation and continuity of the building envelope.

C. PERFORMANCE/ DESIGN CRITERIA

1. THERMAL RESISTANCE

Provide a tested or modeled wall system that meets or exceeds code required R-value for below grade foundation wall assemblies in the jurisdiction of the project. Submit manufacturer product data sheets and test reports prepared by a qualified testing agency to verify properties for insulation including R-value and other physical properties. *(Refer to Technical Bulletin ES-F-CO-01 for IBC Prescriptive Requirements for Below Grade Foundation Wall Construction).*

2. INDOOR AIR QUALITY

- Provide **[extruded polystyrene (XPS), fiberglass]** insulation products that are formaldehyde free.

3. RECYCLED CONTENT

Provide insulation products **[extruded polystyrene, fiberglass, and/or mineral wool]** whose recycled content is verified via third party certification.

4. THIRD PARTY LISTING, CERTIFICATION, AND ENGINEERING JUDGEMENTS

Provide independent third-party verification listings or engineering judgements for the primary code requirements of **[NFPA 285 (fire propagation)]**, **[ASTM E119 (fire resistance)]**, **[ASTM E2357 (air leakage)]**, and **[ASTM E331 (water penetration)]** requirements.

D. MATERIALS

- [CMU, Concrete]** foundation wall by contractors.
- Continuous **[waterproofing, dampproofing]** system applied to the exterior face of the foundation wall installed in a watertight and flexible manner, allowing for the relative movement of systems due to thermal and moisture variations and capable of withstanding moisture pressure without damage or displacement.

3. Extruded polystyrene continuous insulation preliminarily secured to wall with **[screws and air and water sealing washers, adhesive]**.
4. **[Drainage composite]**. (Drainage composite intended to protect insulation and waterproofing and promote drainage and provide vapor diffusion and promote drainage away from foundation- alternatively, Owens Corning FOAMULAR® NGX™ INSUL-DRAIN® may be used. See FOAMULAR® NGX™ INSUL-DRAIN Data Sheet.)
5. All joints, penetrations, and gaps of the below grade foundation wall system shall be made water and air tight.

PART 3 – EXECUTION- NOT USED

END OF SECTION 01 83 16

SECTION 07 21 13.13 FOAM BOARD INSULATION

PART 1 – GENERAL

1. SUMMARY

See Division 01, EXTERIOR ENCLOSURE PERFORMANCE REQUIREMENTS, Section 01 83 16. All proposed product substitutions must comply to be considered.

A. SECTION INCLUDES

Provide and install **[CMU, concrete]** below grade foundation wall assembly, with continuous **[waterproofing, dampproofing]** system over the exterior structure and continuous extruded polystyrene (xps) insulation that effectively controls thermal, air, and water performance and provides continuous insulation and continuity of the building envelope.

1. Provide labor, materials, tools and equipment necessary to complete the Work of this Section including, but not limited to, the following:
 - a. Extruded Polystyrene continuous insulation for below grade foundation wall application.
 - b. Fasteners and Hardware or other method as recommended by continuous insulation manufacturer.
2. The complete wall system shall include the following:
 - a. **[CMU, Concrete]** foundation wall by contractors.
 - b. Continuous **[waterproofing, dampproofing]** system applied to the exterior face of the foundation wall installed in a watertight and flexible manner, allowing for the relative movement of systems due to thermal and moisture variations and capable of withstanding moisture pressure without damage or displacement.
 - c. Extruded polystyrene continuous insulation preliminarily secured to wall with **[screws and air and water sealing washers, compatible adhesive]**.
 - d. **[Drainage composite]**. (Drainage composite intended to protect insulation and waterproofing and promote drainage and provide vapor diffusion and promote drainage away from foundation- alternatively, Owens Corning FOAMULAR® NGX™ INSUL-DRAIN® may be used. See FOAMULAR® NGX™ INSUL-DRAIN Data Sheet.)
3. All joints, penetrations, and gaps of the below grade foundation wall system shall be made water and air tight.

B. RELATED SECTIONS

The items listed are not included in this Section, but are specified in the Section listed: **[Delete section from the list below that are not required by the project.]**

1. **Section 03 10 00 [Project Specific]**, Concrete Forming Accessories
2. **Section 03 30 00 [Project Specific]**, Cast-in-Place Concrete
3. **Section 03 40 00 [Project Specific]**, Precast Concrete
4. **Section 03 70 00 [Project Specific]**, Mass Concrete
5. **Section 04 20 00 [Project Specific]**, Unit Masonry
6. **Section 04 43 00 [Project Specific]**, Stone Masonry
7. **Section 07 10 00 [Project Specific]**, Dampproofing and Waterproofing
8. **Section 07 21 00 [Project Specific]**, Thermal Insulation
9. **Section 07 21 13 [Project Specific]**, Board Insulation
10. **Section 07 21 13.13 [Project Specific]**, Foam Board Insulation
11. **Section 07 27 00 [Project Specific]**, Air Barriers
12. **Section 07 62 00 [Project Specific]**, Sheet Metal Flashing and Trim
13. **Section 07 65 00 [Project Specific]**, Flexible Flashings
14. **Section 07 92 00 [Project Specific]**, Joint Sealants
15. **Section xx xx xx [Project Specific]**, LEED Requirements

2. REFERENCES

A. REFERENCE STANDARDS

Materials shall meet the property requirements of one or more of the following specifications as applicable to the specific product or end use. **[Delete references from the list below that are not required by the text of the edited Section.]**

1. American Society for Testing of Materials (ASTM)
 - a. ASTM A272: Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.
 - b. ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of Heat Flow Meter Apparatus.
 - c. ASTM C578: Standard Specification for Rigid Cellular Polystyrene Thermal Insulation.
 - d. ASTM D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
 - e. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
 - f. ASTM E96: Standard Test Methods for Water Vapor Transmission of Materials.
3. ADMINISTRATIVE REQUIREMENTS
 - A. COORDINATION

Coordinate installation of below grade foundation wall, below grade **[waterproofing, dampproofing]** system, insulation, and accessories with air barrier membrane, and other moisture protection work.
 - B. PREINSTALLATION MEETINGS

Convene a meeting of involved sub-contractors a minimum of two weeks prior to commencing Work described in this Section.

 1. Attendance is required by representatives of related trades including Owner's Representative, Contractor, Architect, Installer, Air Barrier Membrane System Manufacturer, Foundation Waterproofing Subcontractor, mechanical subcontractor, electrical contractor, and all subcontractors who have materials penetrating the foundation **[waterproofing, dampproofing]** system or finishes covering the membrane system. Manufacturer's Representative is available upon request with minimum two-week notice.
 2. Contractor shall notify **[Architect, Engineer, Consultant]** at least 14 days prior to time for meeting.
 3. Contractor shall record minutes of meeting and distribute to attending parties.
 4. The agenda shall include at a minimum:
 - a. Materials proposed for use.
 - b. **[Verification of eligibility for any warranty].**
 - c. Sequence of construction.
 - d. Coordination with site and substrate preparation, condition, and pretreatment.
 - e. Compatibility of materials.
 - f. Air barrier requirements and installation.
 - g. Mechanical and electrical requirements and installation.
 - h. Minimum curing period.
 - i. Special details.
 - j. Mockups.
 - k. Waterproofing leakage and adhesion testing and inspection.
 - l. **[Waterproofing, Dampproofing]** protection and repair.
 - m. Work scheduling that covers air barrier coordination with installation of adjacent and covering materials.
4. SUBMITTALS

Provide the following information in accordance with **Section 01 33 00 [Project Specific]** Submittal Procedures.

 - A. PRODUCT DATA: Manufacturers' data on each type of product furnished including:
 1. Preparation instructions and recommendations.
 2. Technical data and tested physical and performance properties of products.
 3. Storage, handling requirements, and recommendations.
 - B. SHOP DRAWINGS (project-specific to foundation wall and above grade wall)
 1. Show locations and extent of below grade foundation wall and any footings. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, flashing transition assemblies, and tie-ins with adjoining construction.
 2. Include details of interfaces with other materials that form part of building enclosure.
 - C. SAMPLES: Submit product minimum **[three]** samples of the following:
 1. Extruded Polystyrene Insulation minimum **[three inches by three inches].**
 2. Any fasteners, hardware, and adhesives recommended by manufacturer.
 - D. CERTIFICATES:

Submit documentation signed by Manufacturer that products meet Quality Assurance Certification requirements of this Section.

E. TEST AND EVALUATION REPORTS:

1. Engineering analysis: provide third party evaluation report from insulation manufacturer for that specified insulation meets compressive strength and moisture resistance requirements described in Part 2 of this Section.

F. MANUFACTURER'S INSTRUCTIONS

Provide Manufacturer's installation instructions for each product specified in this Section. (See Owens Corning Foamular® NGX™ Installation Instructions for Below Grade Walls & Foundations.)

G. SUSTAINABLE DESIGN SUBMITTALS

Submit material health and recycled content of each product specified as required in Quality Assurance Sustainability Standards Certification of this Section.

[LEED: Provide product prerequisite and/or credit summaries for each product specified as applicable including recycled content and Health Product Transparency information.]

H. SPECIAL PROCEDURE SUBMITTALS

[None.]

I. QUALIFICATION STATEMENTS

Provide documentation of required Quality Assurance Qualifications for Manufacturers and Installers for all products in wall assembly as required in this Section.

K. WARRANTY DOCUMENTATION

Submit sample warranties as required by this Section.

5. QUALITY ASSURANCE

A. QUALIFICATIONS

1. MANUFACTURERS

Insulation systems shall be manufactured and marketed by a firm with a minimum of **[20]** years' experience in the production and sales of insulation materials. Obtain continuous insulation material through one source from a single manufacturer. Manufacturers proposed for use, but not named in these specifications shall submit evidence of ability to meet all requirements specified and include a list of projects of similar design and complexity completed within the past **[five]** years.

2. INSTALLERS

The installation work of this section shall be performed by one entity, an experienced contractor that employs installers and supervisors who are trained and authorized by manufacturer, with a minimum **[two]** years' record of successful installations on projects of similar scope.

B. CERTIFICATIONS

1. Provide Manufacturer's written certification that foundation **[waterproofing,dampproofing]** components are compatible.
2. Provide Manufacturer's written certification that assembly components are compatible with all adjacent materials that come into contact during construction and throughout the life of the building.
3. Provide Manufacturer's written certification that products are for the intended purpose as described in this Section.

C. SUSTAINABILITY STANDARDS CERTIFICATIONS

1. **[GREENGUARD Indoor Air Quality Certified by independent third-party testing (XPS Insulation.)]**
2. Minimum recycled content Certified by independent third-party testing.
3. Environmental Product Declaration validated by Underwriters Laboratories.

D. MOCK-UPS

Construct a below grade wall system sample panel minimum 8 feet long x depth of actual foundation that includes structural foundation wall, **[drainage composite]**, **[waterproofing,dampproofing]**, air and water barrier transition, extruded polystyrene (XPS) continuous insulation, insulation attachment methods, through-wall flashing, weeps/ venting, termination bars, drip edges, and sealants. The mock-up shall also

include a sill transition assembly detailed and sill flashings, to demonstrate surface preparation, crack and joint treatment, application of **[waterproofing,dampproofing]**, and sealing of gaps, terminations, and penetrations of **[waterproofing,dampproofing]** assembly.

1. Coordinate construction of mockups to permit inspection by Owner's testing agency of **[waterproofing,dampproofing]** before external insulation and backfill are installed.
 2. Include transitions to air barrier membrane and building corner condition.
 3. **[Architect, Engineer, Consultant]** approval of mockup is required. If it is determined that mockup does not comply with requirements, affected details must be reconstructed until mockups are approved.
 4. Locate as directed and remove upon review and approval.
 5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless **[Architect, Engineer, Consultant]** specifically approves such deviations in writing. **[Indicate portion of wall represented by mockup on Drawings or draw mockup as separate element.]**
 6. **[Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.]**
 7. **[Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on field mockups.]**
6. DELIVERY, STORAGE, AND HANDLING
- A. Deliver and store products in Manufacturer's unopened packaging until ready for installation.
 - B. Store and protect products in accordance with manufacturer's instructions. Store in a dry area and protect from water, direct sunlight, flame, and ignition sources.
 - C. Remove and replace materials that are damaged.
 - D. In the event the extruded polystyrene insulation board becomes wet, wipe dry prior to installation.
7. FIELD CONDITIONS
- A. AMBIENT CONDITIONS
 1. Apply products within the range of ambient and substrate temperatures recommended by manufacturer.
 2. Protect substrates from environmental conditions that affect insulation performance.
8. WARRANTY
- A. MANUFACTURER WARRANTY
 1. Product Warranty
Provide Manufacturer's standard limited warranty against manufacturing defects.
 2. Provide Manufacturer's Lifetime Limited Warranty for ASTM C578 performance properties including retaining 90% thermal performance for the life of the product. (See [Owens Corning® FOAMULAR® Sample Warranty.](#))

PART 2 – PRODUCTS

1. EXTRUDED POLYSTYRENE INSULATION

A. MANUFACTURERS

BASIS-OF-DESIGN: Owens Corning® (www.owenscorning.com/insulation/commercial) FOAMULAR® NGX™ **[250, INSUL-DRAIN®]** XPS or equal product from one of the following:

1. **[Insert acceptable alternate supplier.]**
2. **[Insert acceptable alternate supplier.]**
3. Substitution Limitations

The "Basis of Design" products listed in this Section are tested and warranted as a system. The Contractor shall provide the products of the named manufacturers without substitution, unless a written request for an "or equal complete system substitution" has been approved in writing by the **[Architect, Engineer, Consultant]**. Substitution requests must be accompanied by the following to be considered for substitution:

- a. Verification that proposed products meet published product performance criteria.
- b. Verification from proposed manufacturers that the proposed substitution is tested with the other assembly components to meet Division 01, EXTERIOR ENCLOSURE PERFORMANCE REQUIREMENTS, **Section 01 83 16 [Project Specific]**.

B. DESCRIPTION

Provide continuous extruded polystyrene insulation, unfaced. Each insulation board must be labeled with manufacturer's name, product brand name, ASTM material specification reference, and identification of the third-party inspection agency used for building code qualification.

C. PERFORMANCE/ DESIGN CRITERIA

1. Type IV per ASTM C578 certified by independent third-party testing agency. (Square edged product also available in VI, VII, and V. See [Owens Corning ASTM C578 Types & Properties Technical Bulletin](#) for more information.)
2. Compressive Strength: 25 psi, minimum per ASTM D1621. (Square edged product also available in 40, 60, and 100 psi. Contact Owens Corning for more information.)
3. Thermal Resistance (180 day real-time aging as mandated by ASTM C578, measured per ASTM C518 at mean temperature of 75F): R-5.0 per inch of thickness, with 90% lifetime limited warranty on thermal resistance.
4. Water Absorption (ASTM C272): Maximum 0.30 percent by volume.
5. Surface Burning Characteristics (ASTM E84): Flame spread less than 25; smoke developed less than 450, certified by independent third-party testing agency.

D. MATERIALS

1. Compliance certified by independent third party such as GREENGUARD Indoor Air Quality Certified® and/or GREENGUARD GoldSM.
2. Contains no HCFCs or HFC 134a blowing agents.
3. Zero ozone depleting blowing agent that has warming potential (100 years) of less than 80. (See Owens Corning FOAMULAR® NGX™ Technical Bulletin).
4. Recycled Content: Minimum 20%, certified by independent third party such as SCS Global Services.
5. Provide [3/4", 1", 1-1/2", 2", 2-1/2", 3", 4" (FOAMULAR 250)], [1", 1-1/2", 2-1/4" (INSUL-DRAIN)] thick; 48"x96"; tongue & groove. (FOAMULAR® 250 XPS also available in Square Edge and Shiplap.)
6. [Top-edged horizontal drainage channels with filtration fabric facer.] (FOAMULAR® INSUL-DRAIN® only)

2. ADHESIVE FOR EXTRUDED POLYSTYRENE INSULATION

A. MANUFACTURERS

1. [Insert acceptable alternate supplier.]
2. [Insert acceptable alternate supplier.]
3. Substitution Limitations

The Contractor shall provide the products of the named manufacturers without substitution, unless a written request for an "or equal complete system substitution" has been approved in writing by the [Architect, Engineer, Consultant]. Substitution requests must be accompanied by the following to be considered for substitution:

- a. Verification that proposed products meet published product performance criteria.
- b. Verification from proposed manufacturers that the proposed substitution is tested with the other assembly components to meet Division 01, EXTERIOR ENCLOSURE PERFORMANCE REQUIREMENTS, Section 01 83 16 [Project Specific].

B. DESCRIPTION

Compatible, non-solvent based adhesive for use with extruded polystyrene insulation. Provide adhesive recommended by the manufacturer for securing extruded polystyrene (XPS) continuous insulation to CMU or concrete wall and/or [waterproofing, dampproofing]. (Waterproofing or Dampproofing manufacturer may allow membrane to be used as adhesive- verify with manufacturer.)

C. PERFORMANCE/ DESIGN CRITERIA

1. Non-solvent based.
2. Low VOC.
3. Compatible with [waterproofing,dampproofing] barrier and extruded polystyrene.

D. MATERIALS

1. [Two-Part Adhesive], [Single-Component Foamed Adhesive], [Aerosol Spray Adhesive] [Single-Component Tube Applied].

3. FASTENERS FOR EXTRUDED POLYSTYRENE INSULATION

A. MANUFACTURERS

1. [Insert acceptable alternate supplier.]
2. [Insert acceptable alternate supplier.]
3. Substitution Limitations

- The Contractor shall provide the products of the named manufacturers without substitution, unless a written request for an "or equal complete system substitution" has been approved in writing by the **[Architect, Engineer, Consultant]**. Substitution requests must be accompanied by the following to be considered for substitution:
- a. Verification that proposed products meet published product performance criteria.
 - b. Verification from proposed manufacturers that the proposed substitution is tested with the other assembly components to meet Division 01, EXTERIOR ENCLOSURE PERFORMANCE REQUIREMENTS, **Section 01 83 16 [Project Specific]**.
- B. DESCRIPTION
Solid plastic fastener with attached air and water sealing washer: Provide fastener recommended by their manufacturer for securing extruded polystyrene (XPS) continuous insulation to CMU or Concrete foundation wall. Fastener length and size based on CMU or concrete thickness and fastener manufacturer recommendation.
- C. PERFORMANCE/ DESIGN CRITERIA
1. Permanently attaches insulation with flush finish.
- D. MATERIALS
1. Minimum 2-inch diameter air and water sealing washers: seal tested for water and air.

PART 3 – EXECUTION

1. EXAMINATION
 - A. Verify that below grade wall, footing, structural components, and **[waterproofing, dampproofing]** have been installed per requirements of the Project.
 - B. Verify adjacent materials are dry and ready to receive insulation.
 - C. Do not begin installation until substrates have been properly prepared. If substrate preparation is the responsibility of another installer, notify owner's agent and **[Architect, Engineer, Consultant]** of unsatisfactory preparation in writing before proceeding. Do not proceed with work until unsatisfactory conditions have been corrected.
 - D. Installation of products specified in this Section constitutes acceptance of existing conditions and assumption of responsibility for satisfactory performance.
2. PREPARATION
 - A. Clean surfaces thoroughly prior to installation.
 - B. Prepare surfaces using methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
3. INSTALLATION
 - A. EXTRUDED POLYSTYRENE CONTINUOUS INSULATION
 1. Verify manufacturer recommended cure time for **[waterproofing, dampproofing]** system before installing continuous insulation board.
 2. Install extruded polystyrene (XPS) insulation boards over the CMU or concrete wall and **[waterproofing, dampproofing]** layer in accordance with manufacturers' written recommendations.
 3. Install XPS insulation with long edges horizontal in maximum sizes to minimize joints.
 4. Align horizontal rows and stagger vertical joints.
 5. Insulation board edges shall be butted together tightly and fit around openings and penetrations. Install square edges to fit square and tight.
 6. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation.
[Owens Corning® does not require a particular method of securing FOAMULAR® NGX™ Insulation, nor does Owens Corning® require joint sealing unless the XPS is to create an air & water barrier- refer to Owens Corning FOAMULAR® Air & Water Barrier System Guide Specification.]
 7. Apply single layer of insulation boards to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.
 8. Fasten XPS insulation to exterior face of CMU or concrete wall using **[mechanical fasteners and/or compatible adhesive]** per manufacturer's written instructions. *[Choose a, b, or combination]*
 - a. Compatible Adhesive
 1. Apply compatible adhesive to substrate & **[waterproofing, dampproofing]**, per adhesive manufacturer, **[waterproofing, dampproofing]** manufacturer, and insulation manufacturer recommendations.
 2. **[Place pads of construction adhesive spaced approximately 24 inches (610 mm) o.c. along the edges of the inside face of the insulation board, or as recommended by the**

- adhesive manufacturer.], [Apply adhesive to entire surface with a serrated trowel or spray equipment complying with the adhesive manufacturer's written instructions.] (Select either spot adhesion or fully adhered.)**
3. Install XPS insulation in adhesive prior to adhesive curing per adhesive manufacturer's instructions.
 4. Hold insulation securely in place until adhesion is satisfactory.
 5. Application rate and spacing shall be evenly distributed and minimum necessary per jobsite conditions as required by Insulation & Adhesive Manufacturers to hold the continuous insulation in place until cladding attachment system can be installed to permanently secure the insulation board in accordance with cladding attachment requirements.
 - b. Plastic Fastener with Air & Water Sealing Washer
 1. Install through XPS insulation into CMU or concrete substrate below by pre-drilling with drill bit sized per fastener manufacturer recommendations using a standard drill with a variable clutch adjustment.
 2. Do not attach with impact driver.
 3. Pretreat fastener and penetration with compatible waterproofing sealant recommended by waterproofing manufacturer.
 4. Drive fasteners into pre-drilled hole so the washer is tight and flush with insulation surface but do not countersink.
 5. Fastener spacing shall be evenly distributed and the minimum necessary per job site conditions as required by Insulation & Fastener Manufacturers to hold the continuous insulation in place until backfill can be installed to permanently secure the insulation board.
 9. **[Fastening requirements may be revised per job site conditions if insulation board is being installed at the same time as the waterproofing or dampproofing system that will serve to secure insulation board to the substrate. Contractor must receive written confirmation from the [Architect, Engineer, Consultant] before altering fastener requirements.]**
 10. **[Install drainage composite to prevent damage and moisture accumulation and to allow vapor diffusion.] (For flat surfaced FOAMULAR® products.)**
 11. Install backfill carefully to avoid damage as soon as possible, best within 60 days.
4. REPAIR
- A. FILL ERRANT PUNCTURES, PENETRATIONS, AND HOLES
1. If fasteners are removed leaving penetration into the **[waterproofing, dampproofing]** system beneath, the affected area must be detailed with sealant see **[Section 07 10 00 Dampproofing and Waterproofing]**. **[Note: Fill of errant punctures, penetrations, and holes may be included in two separate specification sections and therefore the responsibility of two separate trades. Identify the responsible trade according to project specific requirements.]**
 2. Completely fill the hole with sealant. Fill the hole in the continuous insulation board to full depth making sealant contact with the **[waterproofing,dampproofing]** membrane below the insulation and fully flush with the outer face of the insulation.
5. CLEANING
- A. Prior to project closeout, remove all related rubbish, excess material, tools, and equipment from the site. Dispose of waste material in a manner approved by applicable jurisdictions.
6. PROTECTION
- A. Protect insulation from damage due to weather and physical abuse until protected by permanent construction.
 - B. If black tape or coatings are installed over the XPS insulation board, cover the black surfaces as soon as possible to avoid damage due to potential solar heat build-up on the black surface.
 - C. Do not permit extruded polystyrene insulation board to come in contact with surfaces or temperatures in excess of 165°F.
 - D. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION 07 21 13.13

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