

Supporting Documentation for InsulStar/ThermalStop/InsulBloc for ABAA Application

- i. Technical data sheet for the product. These are included in the binder.
- ii. Tested thickness for their material. Thicknesses are included in each of the test reports.
- iii. Manufacturer guide specification for the product. See NCFI ABAA Guide Specifications
- iv. Typical construction details which include the following as a minimum:
 - a. roof/wall
 - b. wall/foundation
 - c. window/wall
 - d. expansion joint,
 - e. change in plane,
 - f. Change in substrate,
 - g. Penetrations,
 - h. Inter-story connections and deflection joints, and
 - i. Substrate joints and defects.
- v. Installation instructions that include information on; See the supplied Technical Data Sheets and the NCFI ABAA Guide Specifications for all except the following:
 - a. Material compatibility listing: NCFI spray polyurethane foam is compatible with most construction materials. We are not aware of any common construction materials that will not work with SPF.
 - b. Chemical Resistance: we believe our spray polyurethane foams are resistant to most chemicals found on job sites.
- vi. A list of substrates that the material can be installed on and specifically list any material where the manufacturer does not recommend their material to be installed upon. NCFI spray polyurethane foam can be applied to all typical construction materials. Bare metal or metal with an oily finish such as galvalume, may need to be primed. A suitable primer for metal is Techno Adhesives 199.
- vii. Service temperature of installed produce is less than 180°F.
- viii. Marketing Material. None prepared for this product as an ABAA material. General information can be found on www.ncfi.com for our spray polyurethane foam products.
- ix. Declared VOC content in g/l and test method. According to an email from Laverne Dalgelish, VOC content for ABAA approval. Email is enclosed.
- x. MSDS – The MSDS for the finished foam product is enclosed.
- xi. Maximum allowed UV exposure. When installing NCFI spray polyurethane foam on the exterior of a building, the product has been exposed to UV light for 6 months without any harm to the product.
- xii. Test report for material tested in accordance with ASTM E-96 including method used. This test is enclosed.

NCFI SPRAY FOAM SYSTEM 11-015

DESCRIPTION:

NCFI 11-015 is a two component, one-to-one by volume, self-adhering, seamless, high insulating efficiency spray applied rigid polyurethane foam system. This NCFI system has been formulated with HFC-245fa as the blowing agent. NCFI 11-015 is suitable for use in the NCFI ThermalStop® and InsulBloc® insulation systems as well as other insulation applications. Complies with ASTM C1029.

DISTINGUISHING CHARACTERISTICS:

- High R-Value
- Zero ODP
- Class II Vapor Retarder - Semi-impermeable @2"
- High Yields
- High Closed Cell Content
- Air Barrier
- Good Dimensional Stability
- Meets ASTM E-84, FS ≤25, SD ≤450 at 4 inch Thickness
- FEMA Class 5 Flood Resistance
- Water Resistive Barrier

For proper use of this NCFI insulating material refer to the NCFI Application Information and any of the following codes or guides:

- International Building Code, (IBC), Chapter 26
- International Residential Code (IRC) Section R314 and R806
- API Fire Safety Guidelines for Use of Rigid Polyurethane and Polyisocyanurate Foam Insulation in Building Construction (AX230)

Installation Limitations

When covered with 1/2" gypsum board	Maximum Thickness in walls	Maximum Thickness in Ceilings
11-015	8"	12"

Limits based on NFPA 286

TYPICAL PHYSICAL PROPERTIES:

Core Density - ASTM 1622	2.0 pcf
Compressive Strength ASTM D 1621	27 psi
Moisture Vapor Transmission - ASTM E 96	1.3 perm-in
Closed Cell Content ASTM D6226	>90%
R value @ 1 inch ASTM C 518	6.8
Air Permeance - Infiltration ASTM E 283 Exfiltration	0.000 cfm/ft ² @ 1.57 psf 0.000 cfm/ft ² @ 1.57 psf
Bacterial & Fungal Growth ASTM G 21 & E 1428	Negligible
STC - ASTM E 90 OITC	31* 24*
Flammability ASTM E-84 @ 4 inches	Flame Spread ≤25 Smoke Dev ≤450
Max Service Temperature	180°F

Note: The above values are average values obtained from laboratory experiments and should serve only as guide lines. Free rise core density should not be confused with overall density. Overall densities are always higher than free rise core densities and take into account skin formation, thickness of application, environmental conditions, etc.

* As measured in 2" x 4" studwall assembly

Polyurethane products manufactured or produced from this liquid system may present a serious fire hazard if improperly used or allowed to remain exposed or unprotected. The character and magnitude of any such hazard will depend on a broad range of factors, which are controlled and influenced by the manufacturing and production process, by the mode of application or installation and by the function and usage of the particular product. **Any flammability rating contained in this literature is not intended to reflect hazards presented by this or any other material under actual fire conditions.** These ratings are used solely to measure and describe the product's response to heat and flame under controlled laboratory conditions. Each person, firm or corporation engaged in the manufacture, production, application, installation or use of any polyurethane product should carefully determine whether there is a potential fire hazard associated with such product in a specific usage, and utilize all appropriate precautionary and safety measures.

NCFI 11-015 APPLICATION INFORMATION

EQUIPMENT AND COMPONENT RATIOS:

It is preferred that this system be processed with Graco Polyurethane Spray Equipment. NCFI 11-015R is connected to the resin pumps with NCFI 11-015A being connected to the isocyanate pumps. The proportioning pump ratio is 1 to 1. Graco preheater and hose temperature should be set at 130°F to give a good pattern. For high-pressure equipment, temperature settings may be slightly higher.

STORAGE AND USE OF CHEMICALS:

Keep temperature of chemicals above 70°F for several days before use. Cold chemicals can cause poor mixing, pump cavitations or other process problems due to higher viscosity at lower temperatures. Storage temperature should not exceed 90°F. Do not store in direct sunlight. Keep drums tightly closed when not in use and under dry air or nitrogen pressure of 2-3 psi after they have been opened. The shelf life of NCFI 11-015 is six months.

SAFE HANDLING OF LIQUID COMPONENTS:

Use caution in removing bungs from the container. Loosen the small bung first and let any built up gas escape before completely removing. **R component will froth at elevated temperatures.** Avoid prolonged breathing of vapors. In case of chemical contact with eyes, flush with water for at least 15 minutes and get medical attention. For further information refer to "MDI-Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal" publication AX-119 published by Alliance For The Polyurethanes Industry 1300 Wilson Blvd, Suite 800, Arlington, VA 22209.

APPLICATION GUIDELINES:

11-015 is suitable for application to most construction materials including wood, masonry, concrete, and metal. All surfaces to be sprayed should be clean, dry, and free of dew or frost. All metal to which foam is to be applied must be free of oil, grease, etc.

The maximum thickness of each layer or pass of foam should be 2" and allow 10 minutes between each pass for cooling. Multiple layers can be applied to reach the desired R value.

OPTIMUM ADHESION TEMPERATURE OF SURFACE TO BE SPRAYED:

On general work where the surface to be sprayed will remain at ambient temperature or cooler, the surface should be between 10°F and 120°F. In this range the warmer the surface the better the adhesion. NCFI has two grades of 11-015 foam for this application range, G-series for 50°F to 120°F and X-series for temperatures 10°F to 60°F. For best results, when surfaces to be sprayed are cooler than 60°F a flash coat should be applied with the second coat following as soon as the original coat is no longer tacky to the touch.

WEATHER PROTECTION OF FINISHED FOAM:

The finished surface of sprayed polyurethane foam should be protected from adverse effects of ultraviolet rays of direct sunlight, which can cause dusting and discoloration. Protective coatings designed for use with polyurethane foam are available.

VAPOR BARRIER PROTECTION ON COLD STORAGE APPLICATIONS:

When NCFI sprayed polyurethane foam insulates structures subject to continuous cold temperatures, such as coolers and freezers, a Class I moisture vapor retarder (0.1 perm or less) is normally required on the "warm" side of the foam insulation. Contact NCFI for specific recommendations.

CODE-COMPLIANT FIRE RESISTANCE:

Where foam is sprayed over large areas of building interiors, building codes require the installation of an approved thermal barrier between the foam plastic insulation and the occupied space. ½" gypsum board or other tested and approved material may be installed as a thermal barrier. Refer to specific building codes for details. Contact NCFI Polyurethanes for specific alternate approvals for 11-015.

The information on our data sheets is to assist customers in determining whether our products are suitable for their applications. The customers must satisfy themselves as to the suitability for specific cases. NCFI warrants only that the material shall meet its specifications; this warranty is in lieu of all other written or unwritten, expressed or implied warranties and NCFI expressly disclaims any warranty of merchantability, fitness for a particular purpose, or freedom from patent infringement. Accordingly, buyer assumes all risks whatsoever as to the use of the material. Buyer's exclusive remedy as to any breach of warranty, negligence or other claim shall be limited to the purchase price of the material. Failure to adhere strictly to any recommended procedures shall relieve NCFI of all liability with respect to the material or the use thereof.

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NCFI SPRAY FOAM SYSTEM 11-016

DESCRIPTION:

NCFI 11-016 is a two component, one-to-one by volume, self-adhering, seamless, high insulating efficiency spray applied rigid polyurethane foam system. This NCFI system has been formulated with HFC-245fa as the blowing agent and contains an anti-microbial ingredient to inhibit growth of molds that may affect this product. NCFI 11-016 is suitable for use in the NCFI InsulStar® and InsulBloc® insulation systems as well as other insulation applications. Complies with ASTM C1029.

DISTINGUISHING CHARACTERISTICS:

- High R-Value
- Zero ODP
- Class II Vapor Retarder - Semi-impermeable @2"
- High Yields
- High Closed Cell Content
- Air Barrier
- Good Dimensional Stability
- Meets ASTM E-84, FS ≤25, SD ≤450 at 4 inch Thickness
- FEMA Class 5 Flood Resistance
- Water Resistive Barrier

For proper use of this NCFI insulating material refer to the NCFI Application Information and any of the following codes or guides:

- International Building Code, (IBC), Chapter 26
- International Residential Code (IRC) Section R314 and R806
- API Fire Safety Guidelines for Use of Rigid Polyurethane and Polyisocyanurate Foam Insulation in Building Construction (AX230)

Installation Limitations

When covered with 1/2" gypsum board	Maximum Thickness in walls	Maximum Thickness in Ceilings
11-016	8"	12"

Limits based on NFPA 286

TYPICAL PHYSICAL PROPERTIES:

Core Density - ASTM 1622	2.0 pcf
Compressive Strength ASTM D 1621	27 psi
Moisture Vapor Transmission - ASTM E 96	1.3 perm-in
Closed Cell Content ASTM D 6226	>90%
R value @ 1 inch ASTM C 518	6.8
Air Permeance - Infiltration ASTM E 283 Exfiltration	0.000 cfm/ft ² @ 1.57 psf 0.000 cfm/ft ² @ 1.57 psf
Bacterial & Fungal Growth ASTM G 21 & E 1428	Negligible*
STC - ASTM E 90 OITC	31** 24**
Flammability ASTM E-84 @ 4 inches	Flame Spread ≤25 Smoke Dev ≤450
Max Service Temperature	180°F

Note: The above values are average values obtained from laboratory experiments and should serve only as guide lines. Free rise core density should not be confused with overall density. Overall densities are always higher than free rise core densities and take into account skin formation, thickness of application, environmental conditions, etc.

*NCFI 11-016 is formulated with an anti-microbial. See back of this page for details.

** As measured in 2" x 4" studwall assembly

Polyurethane products manufactured or produced from this liquid system may present a serious fire hazard if improperly used or allowed to remain exposed or unprotected. The character and magnitude of any such hazard will depend on a broad range of factors, which are controlled and influenced by the manufacturing and production process, by the mode of application or installation and by the function and usage of the particular product. **Any flammability rating contained in this literature is not intended to reflect hazards presented by this or any other material under actual fire conditions.** These ratings are used solely to measure and describe the product's response to heat and flame under controlled laboratory conditions. Each person, firm or corporation engaged in the manufacture, production, application, installation or use of any polyurethane product should carefully determine whether there is a potential fire hazard associated with such product in a specific usage, and utilize all appropriate precautionary and safety measures.

NCFI 11-016 APPLICATION INFORMATION

EQUIPMENT AND COMPONENT RATIOS:

It is preferred that this system be processed with Graco Polyurethane Spray Equipment. NCFI 11-016R is connected to the resin pumps with NCFI 11-016A being connected to the isocyanate pumps. The proportioning pump ratio is 1 to 1. Graco preheater and hose temperature should be set at 130°F to give a good pattern. For high-pressure equipment, temperature settings may be slightly higher.

STORAGE AND USE OF CHEMICALS:

Keep temperature of chemicals above 70°F for several days before use. Cold chemicals can cause poor mixing, pump cavitations or other process problems due to higher viscosity at lower temperatures. Storage temperature should not exceed 90°F. Do not store in direct sunlight. Keep drums tightly closed when not in use and under dry air or nitrogen pressure of 2-3 psi after they have been opened. The shelf life of NCFI 11-016 is six months.

SAFE HANDLING OF LIQUID COMPONENTS:

Use caution in removing bungs from the container. Loosen the small bung first and let any built up gas escape before completely removing. **R component will froth at elevated temperatures.** Avoid prolonged breathing of vapors. In case of chemical contact with eyes, flush with water for at least 15 minutes and get medical attention. For further information refer to "MDI-Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal" publication AX-119 published by Alliance For The Polyurethanes Industry 1300 Wilson Blvd, Suite 800, Arlington, VA 22209.

APPLICATION GUIDELINES:

11-016 is suitable for application to most construction materials including wood, masonry, concrete, and metal. All surfaces to be sprayed should be clean, dry, and free of dew or frost. All metal to which foam is to be applied must be free of oil, grease, etc.

The maximum thickness of each layer or pass of foam should be 2" and allow 10 minutes between each pass for cooling. Multiple layers can be applied to reach the desired R value.

OPTIMUM ADHESION TEMPERATURE OF SURFACE TO BE SPRAYED:

On general work where the surface to be sprayed will remain at ambient temperature or cooler, the surface should be between 10°F and 120°F. In this range the warmer the surface the better the adhesion. NCFI has two grades of 11-016 foam for this application range, G-series for 50°F to 120°F and X-series for temperatures 10°F to 60°F. For best results, when surfaces to be sprayed are cooler than 60°F a flash coat should be applied with the second coat following as soon as the original coat is no longer tacky to the touch.

WEATHER PROTECTION OF FINISHED FOAM:

The finished surface of sprayed polyurethane foam should be protected from adverse effects of ultraviolet rays of direct sunlight, which can cause dusting and discoloration. Protective coatings designed for use with polyurethane foam are available.

VAPOR BARRIER PROTECTION ON COLD STORAGE APPLICATIONS:

When NCFI sprayed polyurethane foam insulates structures subject to continuous cold temperatures, such as coolers and freezers, a Class I moisture vapor barrier (0.1 perm or less) is normally required on the "warm" side of the foam insulation. Contact NCFI for specific recommendations.

CODE-COMPLIANT FIRE RESISTANCE:

Where foam is sprayed over large areas of building interiors, building codes require the installation of an approved thermal barrier between the foam plastic insulation and the occupied space. ½" gypsum board or other tested and approved material may be installed as a thermal barrier. Refer to specific building codes for details. Contact NCFI Polyurethanes for specific alternate approvals for 11-016.

*NCFI 11-016 is formulated with an anti-microbial ingredient to inhibit the growth of molds that may affect this product. The anti-microbial properties do not protect occupants of spaces insulated with 11-016 from potential deleterious effects of molds, mold spores, or disease organisms that may be present in the environment.

The information on our data sheets is to assist customers in determining whether our products are suitable for their applications. The customers must satisfy themselves as to the suitability for specific cases. NCFI warrants only that the material shall meet its specifications; this warranty is in lieu of all other written or unwritten, expressed or implied warranties and NCFI expressly disclaims any warranty of merchantability, fitness for a particular purpose, or freedom from patent infringement. Accordingly, buyer assumes all risks whatsoever as to the use of the material. Buyer's exclusive remedy as to any breach of warranty, negligence or other claim shall be limited to the purchase price of the material. Failure to adhere strictly to any recommended procedures shall relieve NCFI of all liability with respect to the material or the use thereof.

NCFI INSULBLOC SPRAY FOAM SYSTEM (11-017)

DESCRIPTION:

NCFI InsulBloc 11-017 is a two component, one-to-one by volume, self-adhering, seamless, high insulating efficiency spray applied rigid polyurethane foam system. This NCFI system has been formulated with HFC-245fa as the blowing agent and contains an anti-microbial ingredient to inhibit growth of molds that may affect this product. The InsulBloc® insulation system is suitable for application on the exterior or interior side of buildings as well as other insulation applications. Complies with ASTM C1029.

DISTINGUISHING CHARACTERISTICS:

- High R-Value
- Zero ODP
- Class II Vapor Retarder - Semi-impermeable @2"
- High Yields
- High Closed Cell Content
- Air Barrier
- Good Dimensional Stability
- Meets ASTM E-84, FS ≤ 25 , SD ≤ 450 at 4 inch Thickness
- FEMA Class 5 Flood Resistance
- Water Resistive Barrier

For proper use of this NCFI insulating material refer to the NCFI Application Information and any of the following codes or guides:

- International Building Code, (IBC), Chapter 26
- International Residential Code (IRC) Section R314 and R806
- API Fire Safety Guidelines for Use of Rigid Polyurethane and Polyisocyanurate Foam Insulation in Building Construction (AX230)

Installation Limitations

When covered with 1/2" gypsum board	Maximum Thickness in walls	Maximum Thickness in Ceilings
11-017	8"	12"

Limits based on NFPA 286

TYPICAL PHYSICAL PROPERTIES:

Core Density - ASTM 1622	2.0 pcf
Compressive Strength ASTM D 1621	27 psi
Moisture Vapor Transmission - ASTM E 96	1.3 perm-in
Closed Cell Content ASTM D 6226	>90%
R value @ 1 inch ASTM C 518	6.8
Air Permeance - Infiltration ASTM E 283 Exfiltration	0.000 cfm/ft ² @ 1.57 psf 0.000 cfm/ft ² @ 1.57 psf
Bacterial & Fungal Growth ASTM G 21 & E 1428	Negligible*
STC - ASTM E 90 OITC	31** 24**
Flammability ASTM E-84 @ 4 inches	Flame Spread ≤ 25 Smoke Dev ≤ 450
Max Service Temperature	180°F

Note: The above values are average values obtained from laboratory experiments and should serve only as guide lines. Free rise core density should not be confused with overall density. Overall densities are always higher than free rise core densities and take into account skin formation, thickness of application, environmental conditions, etc.

*NCFI 11-017 is formulated with an anti-microbial. See back of this page for details.

** As measured in 2" x 4" studwall assembly

Polyurethane products manufactured or produced from this liquid system may present a serious fire hazard if improperly used or allowed to remain exposed or unprotected. The character and magnitude of any such hazard will depend on a broad range of factors, which are controlled and influenced by the manufacturing and production process, by the mode of application or installation and by the function and usage of the particular product. **Any flammability rating contained in this literature is not intended to reflect hazards presented by this or any other material under actual fire conditions. These ratings are used solely to measure and describe the product's response to heat and flame under controlled laboratory conditions.** Each person, firm or corporation engaged in the manufacture, production, application, installation or use of any polyurethane product should carefully determine whether there is a potential fire hazard associated with such product in a specific usage, and utilize all appropriate precautionary and safety measures.

NCFI InsulBloc APPLICATION INFORMATION

EQUIPMENT AND COMPONENT RATIOS:

It is preferred that this system be processed with Graco Polyurethane Spray Equipment. NCFI 11-017R is connected to the resin pumps with NCFI 11-017A being connected to the isocyanate pumps. The proportioning pump ratio is 1 to 1. Graco preheater and hose temperature should be set at 130°F to give a good pattern. For high-pressure equipment, temperature settings may be slightly higher.

STORAGE AND USE OF CHEMICALS:

Keep temperature of chemicals above 70°F for several days before use. Cold chemicals can cause poor mixing, pump cavitations or other process problems due to higher viscosity at lower temperatures. Storage temperature should not exceed 90°F. Do not store in direct sunlight. Keep drums tightly closed when not in use and under dry air or nitrogen pressure of 2-3 psi after they have been opened. The shelf life of NCFI 11-017 is six months.

SAFE HANDLING OF LIQUID COMPONENTS:

Use caution in removing bungs from the container. Loosen the small bung first and let any built up gas escape before completely removing. **R component will froth at elevated temperatures.** Avoid prolonged breathing of vapors. In case of chemical contact with eyes, flush with water for at least 15 minutes and get medical attention. For further information refer to "MDI-Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal" publication AX-119 published by Alliance For The Polyurethanes Industry 1300 Wilson Blvd, Suite 800, Arlington, VA 22209.

APPLICATION GUIDELINES:

InsulBloc is suitable for application to most construction materials including wood, masonry, concrete, and metal. Application can be to the exterior or interior side of wall surfaces. All surfaces to be sprayed should be clean, dry, and free of dew or frost. All metal to which foam is to be applied must be free of oil, grease, etc.

The maximum thickness of each layer or pass of foam should be 2" and allow 10 minutes between each pass for cooling. Multiple layers can be applied to reach the desired R value.

OPTIMUM ADHESION TEMPERATURE OF SURFACE TO BE SPRAYED:

On general work where the surface to be sprayed will remain at ambient temperature or cooler, the surface should be between 20°F and 120°F. In this range the warmer the surface the better the adhesion. NCFI has two grades of InsulBloc foam for this application range, G-series for 50°F to 120°F and X-series for temperatures 20°F to 60°F. For best results, when surfaces to be sprayed are cooler than 60°F a flash coat should be applied with the second coat following as soon as the original coat is no longer tacky to the touch.

WEATHER PROTECTION OF FINISHED FOAM ON EXTERIOR APPLICATIONS:

The finished surface of sprayed polyurethane foam should be protected from adverse effects of ultraviolet rays of direct sunlight, which can cause dusting and discoloration. Protective coatings designed for use with polyurethane foam are available. On exterior applications where a masonry veneer or mechanically attached covering is to be installed, the InsulBloc foam surface may be exposed to UV light up to 6 months.

VAPOR BARRIER PROTECTION ON COLD STORAGE APPLICATIONS:

When NCFI sprayed polyurethane foam insulates structures subject to continuous cold temperatures, such as coolers and freezers, a Class I moisture vapor barrier (0.1 perm or less) is normally required on the "warm" side of the foam insulation. Contact NCFI for specific recommendations.

CODE-COMPLIANT FIRE RESISTANCE:

Where foam is sprayed over large areas of building interiors, building codes require the installation of an approved thermal barrier between the foam plastic insulation and the occupied space. ½" gypsum board or other tested and approved material may be installed as a thermal barrier. Refer to specific building codes for details. Contact NCFI Polyurethanes for specific alternate approvals for InsulBloc.

*InsulBloc is formulated with an anti-microbial ingredient to inhibit the growth of molds that may affect this product. The anti-microbial properties do not protect occupants of spaces insulated with InsulBloc from potential deleterious effects of molds, mold spores, or disease organisms that may be present in the environment.

The information on our data sheets is to assist customers in determining whether our products are suitable for their applications. The customers must satisfy themselves as to the suitability for specific cases. NCFI warrants only that the material shall meet its specifications; this warranty is in lieu of all other written or unwritten, expressed or implied warranties and NCFI expressly disclaims any warranty of merchantability, fitness for a particular purpose, or freedom from patent infringement. Accordingly, buyer assumes all risks whatsoever as to the use of the material. Buyer's exclusive remedy as to any breach of warranty, negligence or other claim shall be limited to the purchase price of the material. Failure to adhere strictly to any recommended procedures shall relieve NCFI of all liability with respect to the material or the use thereof.

NCFI ABAA Guide Specifications

PART 1—GENERAL

1.01 RELATED DOCUMENTS

- A. The Drawings and provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.

1.02 SUMMARY

- A. Provide labor, materials, and equipment necessary to spray-apply polyurethane foam (SPF) insulation, air seal and water repellent treatment for *[chose one of the three following and delete the rest: cavity wall CMU OR exterior stud wall brick cavity OR stud wall assembly]* throughout the Project.

1.03 SUBMITTALS

- A. Submit manufacturer's technical product data of material intended for use, including specifications, installation instructions, material safety data sheets, and general recommendations.
- B. Submit an installer's certification or recommendation letter from the spray polyurethane foam material manufacturer.

1.04 PROJECT CONDITIONS

- A. Substrate: Proceed with spray polyurethane foam application only after substrate construction, penetration work, and related welding and other hot work has been completed. For CMU applications, verify that mortar has cured sufficiently and masonry substrate is dry by checking surface for moisture with Moisture Detection Paper (MDP) strips.
- B. Weather Limitations: Do not install spray polyurethane foam during precipitation or when precipitation is imminent. Do not install when the ambient humidity exceeds the manufacturer's limits. On general work where the surface to be sprayed will remain at ambient temperature or cooler, the surface should be between 10°F and 120°F. In this range the warmer the surface the better the adhesion. NCFI has two grades of foam for this application range, G-series for 50°F to 120°F and X series for temperatures 10°F to 60°F. For best results, when surfaces to be sprayed are cooler than 60°F a flash coat should be applied with the second coat following as soon as the original coat is no longer tacky to the touch.

1.05 QUALITY ASSURANCE

- A. Installer shall be a firm which has had at least 3 years of successful experience in application of spray polyurethane foam. Installer must be an NCFI GoldStarSM certified insulation contractor or have SPF manufacturer's certification for the application.

- B. Installer will provide equipment to spray-apply polyurethane foam including, but not limited to, high pressure plural component proportioning pump, heated hoses of suitable length, spray gun, drum pumps or other material feeding system, and other ancillary equipment necessary for the Project.
- C. Test application: Prior to start of work, installer will spray-apply an area of approximately 100 square feet at the specified thickness as directed by Architect for the purpose of demonstrating visual and physical effects. Proceed with work only after Architect's acceptance of test application.

PART 2-PRODUCTS

2.01 MATERIALS

- A. Spray polyurethane foam shall be InsulBloc[®], InsulStar[®], or ThermalStop[®] manufactured by NCFI Polyurethanes, Mount Airy, NC. Spray polyurethane foam shall have the following physical properties:

Property	Test Method	Requirement	Result	Units
Air Permeance	ASTM E 2178	≤ 0.02	Pass	L/s-m ²
Flame Spread	ASTM E 84	≤ 75	Pass	N/A
Water Vapor Transmission	ASTM E 96	Declare thickness where material meets 1 perm	33.5	mm
Thermal Transmission	ASTM C 518	Report	1.2	m ² -°C/W
Compressive Strength	ASTM D 1621	≥ 104	Pass	kPa
Density	ASTM D 1622	≥ 24	Pass	kg/m ³
Tensile Strength	ASTM D 1623	≥ 138	Pass	kPa
Closed Cell Content	ASTM D-2856	≥ 90		%
Dimensional Stability Aged 28 days	ASTM D 2126	≥ -4 @ -20°C ≤ 8 @ 80°C ≤ 15 @ 70°C, 97 ± 3% RH	Pass	%
Water Absorption	ASTM D 2842	≤ 4	Pass	%
Pull Adhesion	ASTM D 4541	≥ 110	Pass	kPa
Crack Bridging	ASTM C 1305	Pass at -26°C	Pass	N/A

- B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. Requests for Architect's approval and complete technical data for evaluation must be received at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

2.02 MISCELLANEOUS MATERIALS

- A. Foam Repair Kit: Closed-cell foam sealants such as Handi-Foam two part kits from Fomo Products and Touch 'n Seal 2 component systems from Convenience Products, or other equivalent kits.
- B. Seam Tape: Butyl Seam Tape by NCFI Polyurethanes.
- C. Moisture Detection Paper (MDP) Strips: MDP Strips manufactured by NCFI Polyurethanes, Mount Airy, NC.

PART 3-EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive insulation of substances which would interfere with the adhesion of the spray polyurethane foam. Remove loose dirt, sawdust, and debris by blowing with compressed air.
- B. Cover gaps greater than 2 inches with seam tape or gypsum backer board, then spray foam over the opening.
- C. Mask adjacent materials as needed to prevent overspray or apply releasing agent prior to foam application to block adhesion (thru wall flashing).
- D. Test substrate with Moisture Detection Paper (MDP) strips to affirm that the substrate is dry.

3.02 APPLICATION

- A. Apply spray polyurethane foam directly to the substrate in accordance to the manufacturer's installation instructions. All surfaces to be sprayed with foam must be free of all forms of moisture and ice. Apply foam to a uniform monolithic density without voids.
- B. Do not apply spray polyurethane foam during inclement weather or when ambient temperature and humidity are outside the ranges prescribed by the manufacturer.
- C. Apply the spray polyurethane foam to an average thickness of _____ inches with a minimum thickness of _____ inches. Apply the full thickness in any given area the same day.

Note to Specifier: Base average thickness on the R-value requirements (1" ≈ R-6.5). Specify minimum thickness as average thickness less 1/4 inch per inch of average thickness as in table below.

Table 1: Typical R-Values at Specified Thicknesses

R-Value of Insulation	Average Thickness (inches)	Minimum Thickness (inches)
6.8	1	3/4
9.6	1 1/2	1 1/4
13	2	1 1/2
16	2 1/2	2

- D. Shield the spray polyurethane foam from interior exposure with an approved thermal barrier.
- E. Remove overspray from adjacent surfaces.
- F. When installed on the outside of exterior sheathing or CMU and the foam is applied at a thickness in excess of the specified depth and does not interfere with the installation of the brick and does not block the drainage plane, it can be left in place. If these conditions are not met, the foam should be trimmed or sanded back to a depth that alleviates these problems. Planing the foam can be done with a hand saw to trim off slices when the thickness excess is the result of bulges or lumps. If large areas need to be planed, a circular sander or wire wheel grinder may be used. Removing the foam surface skin layer does not diminish the air blockage, dampproofing ability or R value per inch of the foam membrane. Once the foam layer is planed down to a satisfactory depth, no additional treatment is required before the brick veneer is installed. In some cases, such as small areas around penetrations, it may be easier to completely scrape the foam off of the block surface and re-spray the foam. Patching the foam in this manner is acceptable.

3.03 REPAIR TECHNIQUES

- A. Where damage occurs which violates the spray foam's air seal and moisture seal, repair as needed using the specified spray polyurethane material or the specified foam repair kit material.
- B. If electrical or plumbing penetrations are cut that violate the air, thermal, or moisture seal after the foam application, utilize filler foam to patch and recreate the seamless foam membrane.
- C. Repair larger damaged areas with an additional application of the spray foam.

Material Safety Data Sheet



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Dalton, GA

Hickory, NC

Mount Airy, NC

Salt Lake City, UT

PRODUCT IDENTIFICATION

Trade Name: All Grades NCFI Spray Foams
Chemical Name: Polyurethane Foam
Synonyms: Urethane Foam

Chemical Family: Urethane Polymer
Formula: N/A
Date Prepared: 11/17/09

INGREDIENTS- HAZARD CLASSIFICATION

Name:	%	TLV/PEL
None.		

PHYSICAL DATA

Boiling Point (°F): N/A

Solubility in Water: Insoluble

Appearance and Odor: Fine-celled foam, normally tan but can be any color, possible amine odor if freshly cut, hardness varies with density.

Specific Gravity: 0.007 - 0.32

% Volatile by Volume: 0

FIRE AND EXPLOSION HAZARD DATA

Flash Point (test method): Not applicable. The ignition temperature of rigid polyurethane foam is in the range of 700 - 800°F. The temperature must exceed 300°F for a period of time before the occurrence of degradation, which may lead eventually to self-ignition. At this temperature most solid combustible material will exhibit signs of charring, one of the first steps in ignition.

Extinguishing Media: Water, dry chemicals, CO₂. Use water for larger fires.

Special Fire Fighting Procedures: A self-contained breathing apparatus should be worn to protect against toxic and irritating vapors.

Unusual Fire and Explosion Hazards: When foam burns it produces a large volume of dense smoke that presents a major hazard in that it can cause panic and disorientation and inhibit ability to escape.

REACTIVITY DATA

Stability: Stable

Polymerization: Will not occur

Incompatibility: None.

Hazardous Decomposition Products: When burned; CO, CO₂, NO_x, aliphatic fragments, traces of HCN, benzene, toluene; possibly HF, HCl, HBr, oxides of phosphorus.

Conditions to Avoid: N/A

Conditions to Avoid: N/A

HEALTH HAZARD DATA

Permissible Exposure Limit: Not Applicable

Effects of Overexposure: Not Applicable

First Aid Procedures: Not Applicable

SPECIAL PROTECTION INFORMATION

Respiratory Protection: Use dust mask when fabrication dust is in the air.

Ventilation: Not Applicable.

Eye Protection: Goggles when foam dust is in the air.

Gloves: Not Applicable

Other: Not Applicable

SPILL OR LEAK PROCEDURES

Not Applicable

SPECIAL PRECAUTIONS

Where any foam is sprayed in building interiors its exposed surface should be protected from fire hazard by 1/2" Portland cement plaster or 1/2" gypsum board or equivalent. For the prediction of fire hazard in construction, refer to API "Fire Safety Guidelines for Use of Rigid Polyurethane and Polyisocyanurate Foam Insulation in Building Construction" (AX-106). For proper use refer to any of the following codes:

International Building Code, (IBS Chapter 26)
International Residential Code (IRC, section R316, R806)
International Energy Conservation Code (IECC, Section 402)
Southern Standard Building Code, Section 2603
BOCA Basic Building Code, Section 2603
ICBO Uniform Building Code, Section 2602

Rigid foam dust from fabricating operations is an irritant and is flammable. Dust should be collected at the point of generation and stray dust should be regularly swept up.

Large amounts of rigid polyurethane foam assembled in one place, such as for processing into finished products or in storage, present a potential fire hazard. Once ignited, these foams may spread flame rapidly and produce intense heat, dense smoke and toxic gases. Raw foam and fabricated items should be stored indoors, away from fabricating operations, and be protected by automatic sprinklers. Access aisles should be maintained between foam piles.

Ignition sources such as smoking materials, naked lights, open flames and exposed heating elements should be kept away from storage and fabricating areas. Scrap foam should not be permitted to accumulate but should be disposed of promptly.

In case of fire, drench the burning foam with water from a fire hose with a spray nozzle.

Fire fighters should use self-contained breathing apparatus.

General fire safety recommendations such as management interest, personnel training, construction, location, alarms, identification of fire causes, house-keeping, smoke-venting, floor drainage, etc., that apply to storage of other combustible materials also apply to the storage of rigid polyurethane foam.