



TECHNICAL MANUAL
for
HBS HEATLOK HFO and HBS
HEATLOK SOYA HFO
(Summer and Winter), for use as an
INSULATING THERMAL BARRIER

Version 3.1

ASCC Limited

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www.ascc.net.nz

Note: Always refer to this Technical Manual for correct supply and use of HUNTSMAN BUILDING SOLUTIONS HEATLOK HFO/HEATLOK SOYA HFO system for use as a thermal insulation barrier.

For any intended use outside of this Technical Manual specification, you must refer directly to the Supplier of the product 'HEATLOK HFO' and 'HEATLOK SOYA HFO' – ASCC Ltd, for advice and written approval for 'Specific Design' prior to specification or installation of HEATLOK HFO or HEATLOK SOYA HFO other than, as a thermal insulation barrier.

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Section A Introduction

1 COMPONENT LIST

Product	Description
HEATLOK HFO	Polyol and MDI

2 PRODUCT OPTION LIST

Product	Description
HEATLOK HFO	Summer
HEATLOK HFO	Winter
HEATLOK SOYA HFO	Summer
HEATLOK SOYA HFO	Winter

3 PRODUCT SCOPE OF USE

HBS HEATLOK HFO - insulating Thermal Barrier is applied to residential housing and light commercial buildings complying with NZS 3604 or NASH Standard Part 2:2019 Light Steel Framed Buildings. HEATLOK HFO (supplied in summer and winter versions) is applied to walls, underfloor and ceilings. If specifiers require additional details please contact ASCC Ltd for written approval.

4 PRODUCT DESCRIPTION

HBS HEATLOK HFO is a two-part Spray Polyurethane Foam (SPF), used to provide an insulating thermal barrier applied in-situ insulation product. When installed into either interior or exterior timber and steel framing, (Walls, Underfloor, and Ceiling), HEATLOK HFO significantly contributes to a building meeting the energy efficiency requirements set out in the New Zealand Building Code.

The cured product provides a light weight, moisture-resistant durable insulation thermal barrier solution suited to the needs of residential housing and commercial buildings.

This technical manual document outlines the technical specifications of the product, applicable New Zealand Building Code performance requirements and provides a description of the generic requirements of application of HBS HEATLOK HFO product.

Design and on-site installation procedures of HBS HEATLOK HFO shall be the responsibility of ASCC Ltd trained and approved applicators. Such approved applicators shall provide their own design, preparation and application document / manual which will describe the specific equipment and methodology of application developed by each applicator for each project. Every such document shall be reviewed and approved by ASCC Ltd before approval is given to the applicator.

5 PRODUCT FEATURES

HBS HEATLOK HFO is a two component, closed cell spray applied, rigid polyurethane foam system. Specific product features include:

- The product uses recycled plastic materials and rapidly renewable soy oils.
- The HFO blowing agent has zero ozone depleting potential.
- The HFO blowing agent has Global Warming Potential (GWP) = 1
- Commonly used as:
 - Thermal insulation
 - Air barrier
 - Vapour Retarder
 - Water resistive barrier
- Internal or protected external application, above and below grade.
- Fire Retardant to ASTM E84 'Class 1'

6 TECHNICAL DATA SHEET (TDS)

See Appendix 4 for the TDS for HBS HEATLOK HFO – Spray Polyurethane Foam Insulation*:

See Appendix 5 for the TDS for HBS HEATLOK SOYA HFO – Spray Polyurethane Foam Insulation*:

***Note:** the information is supplied by the manufacturer.

7 PRODUCT LIMITATIONS

HBS HEATLOK HFO is not intended to be exposed to the weather for prolonged periods and should be protected by cladding (or an approved coating system) within 6 months.

HBS HEATLOK HFO shall be installed only by trained and approved applicators.

Spray applied Polyurethane Foam should **not** be installed under the following conditions;

- When the substrate to be sprayed is wet, or covered with frost or ice, oil or grease, or dust or presents loose scales, or rust, signs of degradation, which may make it unsuitable for application and result in adhesion failure.
It should be noted that foam will adhere to dust, rust, scale, etc., and will prevent the foam from adhering to the substrate. This should not be considered an adhesion failure of the foam but rather a lack of proper preparation.
- Less than 38 mm thick, on the cold side of glass fibre batts, cellulose or other loose fill materials, due to the possibility of moisture development if the dew point resides in the material other than the SPF. (Cold climates only)
- Around recessed lighting fixtures, which require large free air space lest they overheat and turn into a fire hazard. This space varies for different fixtures, which is reported by the fitting

supplier. In-service SPF temp is **not to exceed 82°C**. Modern LED light fixtures create much less heat: consult manufacturers' instructions, or use a Light Barrier installed in accordance with AS/NZS 5110-A1

- d) Inside electrical outlets or electrical junction boxes.
- e) When filling confined cavities. A sprayed urethane system would cause excessive pressure and heat build-up.

(EXTREME CAUTION ALERT): Closed cell (32 – 36kg/m³) SPF is an exothermic reactive product. At no time should this material be sprayed in a confined cavity that will cause foam passes to be greater than the 100mm (4") per pass for Heatlok HFO High Lift.

NOTE: SPF is a combustible material, (grade dependent) requiring all safety practices to be followed both during the design and installation.

8 NZBC RELEVANT PERFORMANCE CLAUSES

HBS HEATLOK HFO Spray Polyurethane Foam (SPF) insulation product, when installed as per the requirements set out in this technical manual, complies with the following clauses of the New Zealand Building Code:

B1 – Structure (Compressive strength)

B2 – Durability (Thermal performance over time)

F2 - Hazardous Building Materials (non-hazardous when cured)

H1 – Energy efficiency (contribution to energy performance of a building when cured)

C3—Fire affecting areas beyond the fire source

B1.3.2 - STRUCTURE

HBS HEATLOK HFO spray foam applied insulation product when installed as per this manual is able to maintain its compressive strength over time.

B2.3.1 (a) - DURABILITY

HBS HEATLOK HFO spray foam applied insulation product when installed as per this manual is able to maintain its thermal performance over time.

F2 HAZARDOUS BUILDING MATERIALS

In reference to NZBC Clause F2.3.1 regarding Hazardous Building Materials, cured spray-applied HBS HEATLOK HFO - is non-hazardous, provided all application safety precautions adhered to as provided in this technical manual.

H1.3.1 – ENERGY EFFICIENCY

When HBS HEATLOK HFO - spray foam applied insulation product is installed as set out in this technical manual, the cured product significantly contributes to the energy performance of a building.

C3.1 - FIRE AFFECTING AREAS BEYOND THE SOURCE

When HBS HEATLOK HFO - spray foam applied insulation product is installed as set out in this technical manual, the cured product complies with the requirement that there is a low probability of injury or illness to persons not in close proximity to a fire source.

9 ENGINEER, DESIGNER AND SPECIFICATION CONSIDERATIONS

Designers are responsible for the framing design, and building contractors are responsible for the quality of construction of the framing.

HBS HEATLOK HFO is for use on new and existing timber and steel framing to provide a wind and moisture resistant thermal barrier for all climate and wind zones.

Specification

It is advised that the Architect/Designer or Specifier denote on the building/design plans for the purpose of identifying product use as follows;

Example:

← **HBS HEATLOK HFO System**
CodeMark Certificate of Conformity No: CM70099

A note should also be included directing all parties to where information can be obtained:

For a copy of this Technical Manual, TDS and SDS for HBS HEATLOK HFO

email: customerservice@ascc.net.nz or Ph. 09 966 2447

Technical Information is also available from: www.huntsmanbuildingsolutions.com

10 TECHNICAL PHOTO GALLERY



Figure 1: HEATLOK HFO applied to wall and ceiling



Figure 2: HEATLOK HFO applied to a roof/ceiling prior to roofing



Figure 3: HEATLOK HFO applied to under floor sub wall



Figure 4: HEATLOK HFO applied to external facing wall with a Rigid Air Barrier installed.

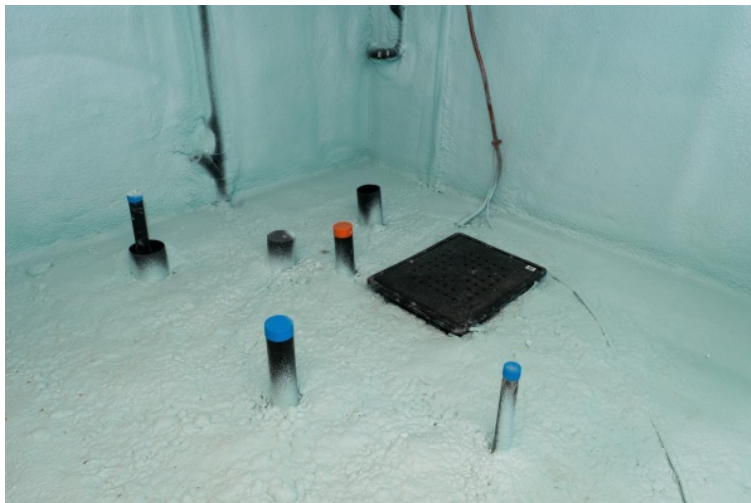


Figure 5: HEATLOK HFO example of application around penetrations in a basement



Figure 6: HEATLOK HFO applied between wall studs.



Figure 7: HEATLOK HFO applied to underside of cathedral roof/ceiling or deck system

Section B Product Application Requirements

1 INSTALLATION PROCEDURES

Pre-Installation

Installation of HBS HEATLOK HFO must be completed by ASCC Ltd Approved and trained installers who have experience in the installation of HBS HEATLOK two part spray foams.

It is the responsibility of the HBS HEATLOK HFO installer to inspect their work place prior to beginning the installation of HBS HEATLOK HFO to ensure the installed work will meet the owner / contractors requirements.

Special Note: Notify owner / general contractor of any concerns prior to the start of HBS HEATLOK HFO installation.

The moisture content of any timber framing must be no higher than 19% EMC (Equilibrated Moisture Content).

Install HBS HEATLOK HFO to steel or timber framing members as agreed by ASCC Ltd as set out in the Product Scope of Use and Limitations.

Every applicator will provide to ASCC Ltd a copy of their own Building Product Quality Plan (**BPQP**).

Such document / manual shall contain appropriate information covering the following –

- a) Name and contact details of the applicator
- b) Title of the document (Must include "BPQP")
- c) Version number and date of the document e.g. Ver. 1.02 Jan 2017
- d) Index of contents
- e) Introduction covering the purpose of the document
- f) Indicate the requirement that the document meets the requirements set out in this HBS HEATLOK HFO technical manual
- g) Describe all relevant safety requirements and procedures including the names of persons or title of persons responsible for ensuring their compliance
- h) Describe all equipment necessary for the proper installation of the product
- i) Describe all relevant safety, maintenance and use of the equipment procedures
- j) Describe all relevant site pre-installation checks and relevant documentation
- k) Describe all relevant design procedures and relevant documentation
- l) Describe all relevant onsite test and verification of application procedures, together with relevant records of these results.

2 SUBSTRATES

SPF can be applied to a wide range of substrate materials. The key consideration is that adequate adhesion between the substrate and the SPF be achieved by proper surface preparation prior to the application of the SPF. All substrates need to be clean, dry and free of grease, oil, water, ice, sawdust, etc. Surfaces should be physically tested that the surface area is sound and solid to support HEATLOK HFO foam once applied.

If there is any doubt about the suitability of a substrate for application of SPF, consult ASCC Ltd for advice, prior to application of SPF.

2.1 Galvanised Steel & Roll Formed Steel:

Over time delamination may happen from galvanised steel. To ensure full and secure adhesion one must properly prepare the surface then treat it with a primer or binder. Newly galvanised steel should be washed with a solvent, then with water, before priming. Weathered galvanised steel may not need the first washing step with solvent, and may only require a wash with water prior to priming. When spraying steel buildings it is a good idea to first use a glue binder before installing SPF. Many engineered buildings will have oil covered steel from the manufacturing of the metal. These oils challenge the proper adhesion of SPF. In some installations there will be sufficient mechanical interlocking with the light gauge steel framing, that a perfect chemical bond to the framing member is not required (provided there is good adhesion to a rigid backing substrate).

2.2 Bare Steel (Pre-Primed):

Polyurethane foam can usually be sprayed directly on pre-primed bare steel after the standard removal of any loose scale, rust or oils. It is important, however, when insulating tanks, that the steel be sand blasted and primed. It is recommended that the SPF manufacturers' specification on the application of polyurethane foam on storage tanks be followed fully.

2.3 Copper, Gypsum Board, and Fibre Cement Board:

Such surfaces require no special treatments other than ensuring they are clean, sound and dry.

2.4 Aluminium

Aluminium should be cleaned with a solvent, (never with a caustic solution). **Aluminium must always be primed prior to the application of polyurethane foam** to prevent corrosion of the aluminium by acids forming at the interface of the SPF and the aluminium.

2.5 Wood:

The maximum moisture content for wood to be sprayed with SPF is 19%. Special care should be taken with laminates, such as plywood, due to their potential for higher moisture content and the presence of matter from surface treatments, which may adversely affect the adhesion of the SPF to this substrate. Test with Wood-Moisture meter, do not guess!

2.6 Concrete:

Potential high moisture content in concrete makes this material one of the most challenging materials to spray on. It is suggested that the **maximum moisture content for concrete to be sprayed with SPF is 10%.** A hygrometer will check the moisture content.

If there is excessive salt precipitation on the concrete (efflorescence), the best way to clean the concrete is by using muriatic acid. This liquid will have a double action as it will remove the salt residue and will also help seal the surface, thus preventing further efflorescence. One can sand blast or wire brush the surface, then seal it prior to spraying it with foam.

2.7 Building Wrap:

Consider the following when applying polyurethane foam directly to a flexible building wrap, i.e. in a Skillion Roof design, or onto walls from the inside of the building.

Heatlok HFO may be applied directly to any type of purpose made bituminous or synthetic building wrap, including foil backed (but excluding polyethylene sheet which is not a suitable substrate as there is no adhesion to LDPE).

The best procedure for spraying onto building wrap is:

1. Check building wrap is not loose or floppy, and is well attached to the studs, and not sagging between purlins. (Note: for purlin spacing >900 mm wire mesh is recommended to help support the weight of the foam)
2. Spray a "flash-coat" of Heatlok HFO over the building wrap and contacting the timber or metal framing and allow to set firm. This will take 5-10 minutes depending on the ambient conditions. This process will tension the building wrap and give it some rigidity.
Note: The flash-coat is not part of the insulation (R value) calculation and may be ignored.
3. Spray the first pass of Heatlok HFO onto the flash-coated building wrap. Do not exceed 25-30 mm with this pass. This will render the building wrap/foam composite rigid and able to take the balance of the foam with no distortion.
4. Spray the second pass of Heatlok HFO to desired thickness to achieve the required R value (or up to a maximum 100mm per pass).

This procedure will prevent the building wrap blowing outwards and compromising the required cavity to the cladding (cavity batten system).

Skillion roofs are less of a problem as the corrugated iron provides good support for the building wrap and maintains proper ventilation between the building wrap and the flutes of the iron. (Note: a suitably ventilated ridge cap is required).

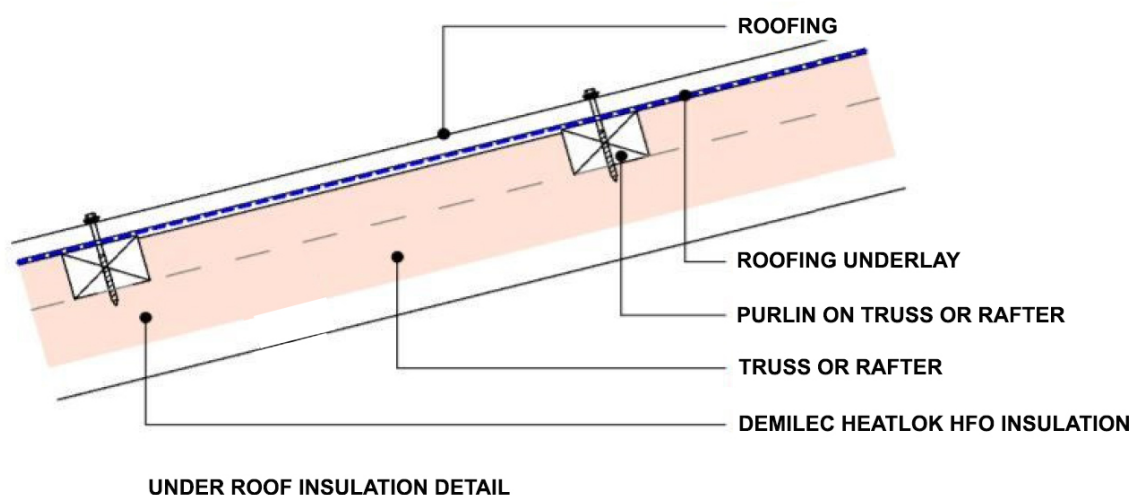


Figure 8: Recommended under roof insulation detail for corrugated iron without a cavity gap

2.8 Composite Floor Decks:

Application of Heatlok HFO directly to the underside of ComFlor® composite floor deck systems (and other similar systems) provides a combined insulation and moisture retarder, eliminating the possibility of condensation forming on the underside of the steel formwork. (Refer Section 2.1 regarding proper preparation of Galvanised Steel substrates)

2.9 Plastic Plumbing and Cabling:

Heatlok HFO may be applied directly onto plastic plumbing (PE, PEX, ABS, PVC and polyurethane) and plastic sheathed wiring (TPS, XLPE and data cables). See Appendix 1 and Appendix 2.

Note the following precautions:

1. **Always** apply a light coating of foam onto all plastic pipes and cables, to thickness of 20-25mm, and allow to cool for 15 minutes before any further foam is applied. This will insulate the pipes/cables from the heat generated from subsequent layers of spray foam as it exotherms.
2. When power cables are to be insulated/encapsulated (or installed in conduit), it is important to note the derating table provided by the cable manufacturer. (In some cases a larger cable may need to be utilised depending on the intended load.)

3 SPECIAL CARE FOR APPLICATION

3.1 Downlight Barrier

All lighting that breach the ceiling lining like downlights must have a luminaire barrier installed in accordance with AS/NZS 5110-A1

3.2 Moisture/Humidity

Care should be taken whenever the relative humidity rises above 90%. High relative humidity can negatively affect the performance of the SPF such as adhesion and can also result in a high water-vapour or moisture content in the SPF and therefore a lower thermal performance R-value.

Additionally it can potentially result in **OFF-RATIO foam** due to some of the isocyanate component reacting with atmospheric moisture, thus changing the Polyol : MDI ratio of the finished SPF.

3.3 Thickness of Passes:

Passes should be no less than 12.5 mm. This is due to the possibility of low exotherm resulting in reversion of the foam creating a thin layer of improperly reacted foam, which adversely affects the adhesion of the whole polyurethane to the substrate. To avoid excessive exothermic reaction passes should be no more than 100 mm depending on the recommendation of the specific systems manufacturer. Not following the standard guidelines from the manufacturer and supplier will VOID any warranty.

4 STORAGE

The chemical drums should be stored and maintained between 10°C and 29°C before processing at the job site. If the drums are bulged due to excessive heat, do not open the drum. Cool the drum for 24 to 48 hours to allow the reacted blowing agent to return to a liquid state.

All product should be stored on pallets off the floor and kept free of dampness until required. Refer to ASCC Ltd for additional recommendations.

5 WORKPLACE HEALTH AND SAFETY

Materials shall be delivered in manufacturer's original containers clearly labelled with manufacturer's name, product identification, safety information, net weight of contents and expiration date.

Material shall be stored in a safe manner and where the temperatures are in the limits specified by the material manufacturer.

Empty containers shall be removed from site on a daily basis **where practicable**.

Store and dispose of any solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

All products must be stored inside, in a well-ventilated area, up off concrete floors, kept dry, out of direct sunlight and away from freezing conditions. The SPF products, **properly stored** in the original unopened containers, have a shelf life of 12 months from date of manufacture.

6 APPLICATOR SAFETY REQUIREMENTS

6.1 Safety Data Sheets (SDS)

The HSNO compliant SDS for Heatlok HFO and its components is available from ASCC Ltd. Phone **09 966 2447** or email customerservice@ascc.co.nz to get the latest version.

It is mandatory to keep a copy of the SDS in the job site or in the spray rig, at all times during application and transport of SPF.

6.2 Certified Handler (Approved Handler)

Certified Handler Certificate: A Certified Handler Certificate (previously called Approved Handler Certificate) is required in New Zealand for all contractors handling MDI. It is recommended that at least one team member also hold a current First Aid Certificate.

6.3 Inhalation:

Breathing vapours or mists of isocyanates must be strictly controlled at all times. **Persons affected by inhalation of isocyanates should immediately seek medical attention.**

6.4 Skin Contact:

Persons who have significant skin contact with isocyanates should wash with soap and water. The affected areas must subsequently be washed with alcohol.

Persons who have skin contact with the resin component should thoroughly wash the affected area with soap and water.

6.5 Eye Contact (Eye Wash Stations)

For eye contact with either resin or isocyanate, the **eye(s) should be flushed immediately and continuously for at least 20 minutes with clean water. In practice an eyewash station needs a minimum 20L capacity.**

6.6 Personal Protection

Ensure you have adequate supplies of PPE!

Personal Protective Equipment (PPE) supplies should include:

- Gloves
- Coveralls
- Face masks
- Filter cartridges

6.6.1 Face Masks:

Applicators can choose a mask to suit their situation. We recommend a full face air fed mask, however there are many other varieties available that will work, including Cartridge masks fitted with the appropriate filter (for VOC).

For “Compressor supplied Air” an Activated Carbon filter setup must be installed to remove oil mist and carbon monoxide produced by the compressor, also the air inlet to the compressor must be >6 meters away from any engine exhaust so as to intake fresh air.

Low pressure air supply pumps are also available that do not require an activated carbon filtration, **however fresh air for the intake is even more important.**

Refer Appendix 3: A Guide to Respirators – Extract

Bottled air is also an option, however may not be commercially viable on many jobs.

7 MAINTENANCE

Once HBS HEATLOK HFO has been installed as per this technical manual and as required by the NZBC, no further maintenance is required.

8 QUALITY MANAGEMENT SYSTEM

ASCC Ltd follows a Quality System as set out in the ASCC Ltd Building Product Quality Plan (BPQP).

Refer to: ASCC Ltd BPQP Heatlok Systems (check latest version)

9 INDEX OF TERMS AND WORDING

NZS: New Zealand Standard

SPF: Spray Polyurethane Foam

TDS: Technical Data Sheet

SDS: Safety Data Sheet - (previously known as MSDS)

BPQP: Building Product Quality Plan

10 WARRANTY



LIMITED LIFETIME WARRANTY

Demilec (Manufacturer) warrants Heatlok® HFO High Lift (Product) when installed by certified contractors using factory trained applicators and applied in accordance to the product specification, will perform as stated in the Product Technical Data Sheet. This warranty is in effect throughout the life of the building provided the original purchaser registers with the Warranty Department of the Manufacturer within thirty days of occupancy. Manufacturer's sole responsibility under this Limited Lifetime Warranty shall be to repair or replace any defective Product at the cost of the material only. Manufacturer shall not be responsible for labor cost or any other costs whatsoever related to, or in connection with, the removal or installation of either the original or replacement product.

Manufacturer shall not be held liable under this Warranty for defects or failure caused by improper installation of Product (not in strict adherence with the Manufacturer's written instructions) or damage due to fire, storms, floods, acts of God, abuse, neglect, or defects, failure or damage caused by materials adjacent to the Product, or damage caused by alteration after completion of the installation of the Product. Statements made by contractors and installers about the performance qualities of the Product or contained in advertising literature do not constitute an expressed warranty.

This Limited Lifetime Warranty gives the building owner specific legal rights, and the building owner may also have other rights, which can vary from state to state. Building owners making claims under this Limited Lifetime Warranty must notify Demilec in writing of the defect promptly following its discovery and must submit with this notice proof of the date of purchase, contractor who applied the Product and the date, location and description of the circumstances under which the defect occurred or was first noticed. Notice shall be given in writing to the address below.

THIS WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, WHETHER AT LAW OR IN EQUITY, OR WHETHER ARISING OR EXISTING UNDER STATUTE. MANUFACTURER DISCLAIMS ALL OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. UNDER NO CIRCUMSTANCES WILL MANUFACTURER FOR SPECIAL, INCIDENTAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES, ARISING FROM OR IN CONNECTION WITH THE PRODUCT OR ITS USE. MANUFACTURER SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING FROM BREACH OF THE EXPRESS WARRANTY OR FOR THE COST OF REMOVING, INSTALLING, OR REINSTATING ANY REPAIR OR REPLACEMENT.

Warranty and Claims Department
Demilec
3315 E. Division Street
Arlington, TX 76011
Phone: 817-640-4900
Fax: 817-633-2000
Email: Info@Demilec.com
Website: www.Demilec.com

3315 E. Division Street, Arlington, TX 76011
Phone (817) 640-4900, Fax (817) 633-2000
Info@Demilec.com, www.Demilec.com

Heatlok HFO High Lift Limited Lifetime Warranty
Last Revision 9-19-19
Page 1 of 1

Section C Onsite Requirements

1 INSTALLER / APPLICATOR (APPROVED TRAINING AND REGISTER)

Each ASCC Ltd Approved Applicator shall be responsible for the on- site application of HBS HEATLOK HFO as it applies to their work and shall be responsible for having periodic reviews of their documentation and diary notes that are related to HBS HEATLOK HFO application. In addition each Approved Applicator will complete a full daily report for each installation carried out. Checklists on site for each job will include the following information:

- Address of the site to be sprayed
- Name and address of the customer
- Name of operator
- Type of application (Ceiling/Walls/Underfloor), and the substrate sprayed onto
- Temperature of substrate
- Weather conditions including relative humidity and ambient temperature during installation. (record periodically in changeable conditions)
- Names of Polyol and MDI used, including batch numbers and comments on temperature of drums (as stored prior to the job)
- Type of machine, gun and mixing chamber used
- Temperature and dynamic pressure settings used during spraying
- A photograph of the installed foam per job per day.
- a record of the final volume used and confirmation that a sample has been taken.

The checklist in Section C-2 below can be used for this purpose:

At the completion of every job or workday, the Approved Applicator must send an electronic record of work completed to ASCC Limited.

The information to be included with this record is:

- a. **Mandatory:** Completed job sheet/On-Site Checklist. This may be a scanned image or a photograph, however all fields must be legible.
- b. **Optional:** Photographs for every job, clearly depicting the work and taken:
 - i. At the start of the workday/before any work undertaken
 - ii. At the end of the workday OR at the end of the job.

Job records, including photographs can be emailed to ASCC Limited using the following email address: checklist@ascc.net.nz

The email subject line should include the applicator company name and a job reference (e.g. job number or address). Photo attachments should be no greater than 2MB each.

2 CHECKLIST – PRE AND POST INSTALLATION, AND FINAL

				Job number:					
				Date:					
				Supervisor:					
				Applicator:					
ON SITE CHECKLIST FOR DEMILEC/HBS APPROVED APPLICATORS _{v2.6}				Assistant:					
Building consent #:									
Owner/Applicant:									
Architect/Designer/Engineer:									
Site address:									
Weather conditions:						Relative Humidity (RH): ____ %			
Substrate:		Wood ☐		Steel ☐		Concrete ☐		Other: _____	
Prep work complete:		☐ Comment: _____				Pre-Application Photo: ☐			
Air Temperature: Limit(s): _____		Start temperature						Finish temperature	
Substrate Moisture (%): Limit(s): _____		Start moisture						N/A	
Substrate Temperature (°C): Limit(s): _____		Start temperature						Finish temperature	
Rise time: Spec: _____		Start rise time						Finish rise time	
Pump pressure (psi)	MDI:		Polyol:		Mixing Chamber:				
Temperature (°C)	MDI:		Polyol:		Hose:				
Spray pattern OK?	Time: _____ Yes ☐ No: _____		Time: _____ Yes ☐ No: _____		Time: _____ Yes ☐ No: _____		Time: _____ Yes ☐ No: _____		
Spray sample collected, bagged and labelled for density testing:				☐					
	Unit Size	Batch Number(s)		Qty. Brought to Site		Quantity Returned		Quantity Used	
MDI Product name:									
Polyol Product name:									
Total Volume sprayed (m ³):	Weight of MDI Used (kg):	Weight of Polyol Used (kg):		Total Weight of System Used (kg):		Post-Application Inspection: ☐			
						Photo: ☐			
						Post- 24 hours Inspection: ☐			
						Photo: ☐			
Comments:									
Signed:					Signed:				
(Applicator)					(Supervisor)				

Section D Appendices

1 APPENDIX 1: COMPATIBILITY OF HEATLOK HFO FOAM WITH PLASTIC AND METAL PLUMBING



Boisbriand, February 15, 2021

**Subject: Compatibility and applications of Spray Polyurethane Foam System
HEATLOK HFO on ABS, PVC, CPVC, PEX**

Spray Polyurethane Foam (SPF) is one of the best choices of insulation materials for every type of construction, given the fact that products act as a high quality insulation and a good air-barrier in a single application. The products have good adhesion and good compatibility with products used in construction. Any types of SPF close and open cells could be sprayed on ABS, PVC, PEX, Stainless Steel or metal pipes without damaging the pipe, there is no chemical reaction or heat damage, but the good practice recommendations are:

1. Running pipe in exterior walls or inside the insulation is not the best plumbing design energy-wise. Try to run a minimum quantity of pipes inside the insulation in the exterior envelope system.
2. If possible, do not encapsulate the entire pipe in the foam. Just put SPF between the pipe and the exterior climate conditions.
3. All connectors or fittings should keep flexibility for temperature dilation. Good practice is to tape or put a piece of aluminum foil or polyethylene around: valves, connectors, sprinkler head, etc.
4. Piping system should be installed in conformity to code construction and self-support. ABS raiser and main line need structural support and flexible unions.
5. CPVC piping should be depressurized during the application of SPF.
6. Installation of SPF shall be in accordance with all manufacturer instructions for the maximum thickness per pass and the cooling time period between pass.

Two-pound close cell HEATLOK products have been applied since 1970 in North America. The application on pipes is a common application and is not a problem in our industry. Had there been a problem, it would have been known.

For any further information, please do not hesitate to contact us.

François Lalande

François Lalande, Tech. Arch.
Director, Commercial Development

Encl. SPFA TT-14 & SPFA TT-16

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TechTip I4 – SPF CPVC Piping

As a result of two separate and extensive studies, the proper application of sprayed polyurethane foam, both open and closed cell, is not an issue from either a chemical compatibility or exposure to exothermic heat during or after the foaming process.

In 2009, SPFA systems house members, and Lubrizol (a leading supplier to CPVC resins) conducted a joint study that conclusively shows that sprayed polyurethane foam does not have a chemical compatibility issue and does not cause environmental stress cracking (ESC). This SPFA study included high-pressure, two-component open- and closed-cell SPF, as well as low-pressure, two-component closed-cell formulations using a wide range of halogenated flame retardants, which had been identified as a potential source of ESC. It should be noted CPVC pipes can be damaged from mechanical stress and the foam applicator should take all necessary steps to prevent any movement or stress to the pipe itself while working in proximity to pipes.

A separate study by an SPFA-member systems house and Lubrizol concluded that both closed-cell and open-cell SPF may be applied to CPVC piping without damage caused by the SPF's exotherm (heat of reaction). Open- and closed-cell spray foams were applied to over 50 different pipe samples of Blazemaster® sprinkler pipes ranging from ¾" to 1½" diameter and Flow Guard Gold® plumbing pipes from ½" to 1" diameter (both manufactured by Lubrizol). Pipes were tested:

- Water-filled and dry (empty);
- At internal pipe pressures in excess of typically seen in the field;
- Using SPF thicknesses above recommended application rates.

The study concluded that SPF may be applied to any CPVC pipe size, both standard plumbing and sprinkler types.

When applying SPF to CPVC piping, SPFA recommends the following precautions:

- CPVC piping should be depressurized during SPF application
- Closed-cell SPF should be applied using the manufacturer's recommended maximum pass thickness and minimum time between passes.
- Open-cell SPF should be applied using the manufacturer's recommended maximum pass thickness.
- When applying SPF around sprinkler heads, the sprinkler head should be masked to prevent SPF or overspray from entering and/or interfering with the operable parts of the sprinkler head.

Full details of the ESC study can be found at the SPFA website www.sprayfoam.org and a Compatibility and Exotherm Position statement can be found on the Lubrizol website at:

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<http://www.lubrizol.com/cpvc/documents/blazemaster-blaster/spring-2010-blazemaster-blaster-newsletter.pdf>

The California State Fire Marshal also issued a bulletin in May 2014 addressing concerns regarding the use of SPF in contact with CPVC piping:

http://osfm.fire.ca.gov/informationbulletin/pdf/2014/IB_SprayPolyurethaneFoamApplication5-27-2014.pdf

ABOUT THE SPRAY POLYURETHANE FOAM ALLIANCE (SPFA)

Founded in 1987, the Spray Polyurethane Foam Alliance (SPFA) is the voice, educational and technical resource, for the spray polyurethane foam industry. A 501(c)6 trade association, the alliance is composed of contractors; manufacturers and distributors of polyurethane foam, related equipment and protective coatings; and consultants who provide inspections and other services. The organization supports the best practices and the growth of the industry through several core initiatives, which include educational programs and events, the SPFA Professional Installer Certification Program, technical literature and guidelines, legislative advocacy, research, and networking opportunities. For more information, please use the contact information and links provided in this document. www.sprayfoam.org

DISCLAIMER

THIS DOCUMENT WAS DEVELOPED TO AID CONTRACTORS AND INSTALLERS IN THE PROPER APPLICATION OF SPRAY-APPLIED POLYURETHANE FOAM SYSTEMS. THE INFORMATION PROVIDED HEREIN, BASED ON CURRENT CUSTOMS AND PRACTICES OF THE TRADE, IS OFFERED IN GOOD FAITH AND BELIEVED TO BE TRUE TO THE BEST OF SPFA'S KNOWLEDGE AND BELIEF.

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DOCUMENT HISTORY

Date	Sections Modified	Description of Changes
July 2016	New Document	
January 2020	New Format	New TechTip Format



TechTip I6 – SPF over Wiring and Plastic Pipe

Background

The chemical reaction that takes place during the application and curing of SPF will generate exothermic temperatures above the 120-130°F setpoint temperatures of the proportioner and hoses. Peak temperatures at the mid-thickness of a pass can exceed 200°F for several minutes and reach peak temperatures 250-275°F for a minute or two, especially for closed-cell SPF, when applied at the maximum pass thickness¹. At the substrate and free surface of the rising foam, the exothermic temperatures will be lower. An example of measured exothermic temperatures for a closed-cell SPF product using an HFC blowing agent applied to a heated sheet metal substrate is shown in Figure 1. It should be noted that newer closed-cell SPF formulations using HFO blowing agents may use different catalysts, which, in some foams, can increase the peak temperatures during curing to as high as 325°F for short periods and can delay the time to reach the peak temperature. Check with your foam manufacturer regarding exothermic temperature profiles.

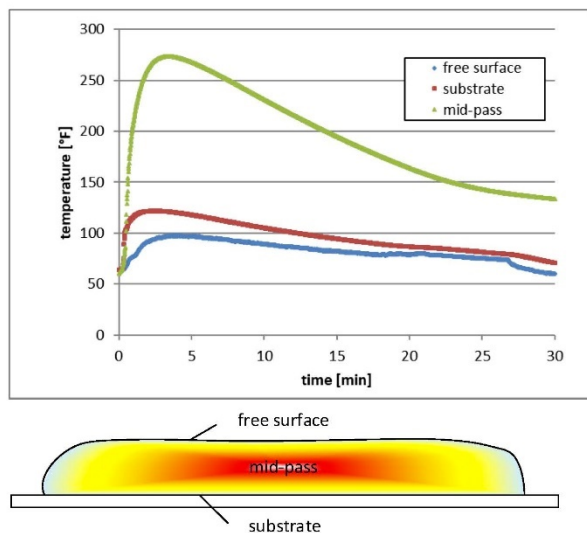


Figure 1 - Temperature versus time measured for a 2" lift of closed-cell SPF at the free surface, substrate and mid-pass. SPF applied to sheet metal substrate.

¹ Exothermic temperatures dependent on SPF product

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Building assemblies typically include wiring and plastic piping made from thermoplastic materials which can soften and melt at elevated temperatures. Electrical wiring such as NM-B (Romex) as well as low-voltage wiring for LAN cables, TV cables and speaker wires use thermoplastic PVC jacketing and insulation. Plastic piping and conduit are made from thermoplastic materials such as PVC, polyethylene (PEX) and ABS.

These plastic materials can withstand continuous elevated temperatures. Most wiring is rated at 90°C (194°F) for continuous use but are tested to withstand sustained temperatures of 250°F for several days². The continuous use operating temperature of PEX varies with service pressure, as shown in Table 1³.

Table 1 – Pressure vs Temperature Rating for PEX

Continuous Operating Temperature (F)	Maximum Pressure Rating (psi)
200	80
180	100
120	130 (1/2" only)
73.4	160

It is important to understand that the short-term exothermic temperatures at the center of a SPF pass may exceed the maximum rated temperatures of wiring and plastic pipe, depending on the foam.

To avoid thermal damage to wiring and plastic piping, the installer should

1. Never exceed the maximum pass thickness defined in the manufacturer's installation instructions. Maximum pass thicknesses are provided by the manufacturer to control exothermic temperatures and assure that the cured foam has the material properties published in the technical data sheets.
2. For plastic water piping, it is best to have it filled with water if possible and de-pressurize the lines. The water helps to absorb the exothermic heat, and de-pressurization reduces the load on the pipe, greatly reducing the chance of damage if the exothermic temperatures soften the piping
3. Apply SPF so that wiring and piping is not positioned in the mid-thickness of the pass. Figure 2 shows an example.

² UL1581 - Reference Standard for Electrical Wires, Cables, and Flexible Cords

³ Uponor hydrostatic pressure ratings for PEX <https://www.uponor-usa.com/commercial-plumbing/engineer/faqs.aspx>

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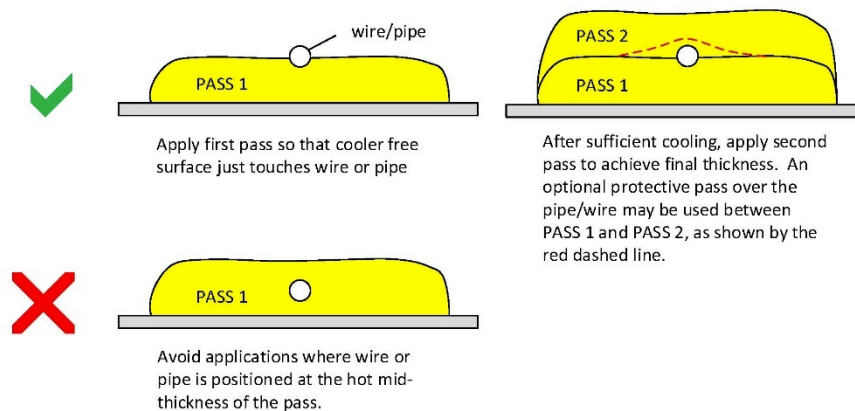


4. Pipes may contain air but must not be pressurized during the SPF application. Ensure all plastic pipes are not pressurized.

NOTE 1: Some plastic pipe manufacturers PROHIBIT the application of SPF over certain pipe fittings. The SPF can be applied to the pipe but the fittings must not be in direct contact with the foam. The SPF contractor needs to check on this prior to spraying foam around any plastic pipes. To avoid SPF chemical contact with fittings, the installer can wrap the fittings in aluminum foil prior to foam application to provide a chemical barrier.

NOTE 2: If any of the liquid A or B side is spilled on plastic pipes, the liquid must be cleaned off immediately. All of the liquid must be removed, until the pipe is clean and dry. Do not spray over a plastic pipe that has spilled chemical systems liquid on it.

NOTE 3: Water supply piping should not be located either outside or within the insulation inside exterior walls, especially in colder climates (e.g., ICC Climate Zones 5-8). These pipes may freeze during extreme cold temperatures. As a insulation contractor you should caution builders about location of any water piping positioned inside thermal insulation in exterior walls and suggest placing all water lines completely inside the thermal envelope of the building.



Customer callbacks to repair damaged wiring and piping can be very expensive. While exothermic damage to wiring and piping is not common for a properly installed SPF product, the precautions above can help to eliminate any possibility of damage to wiring and plastic piping.

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DOCUMENT HISTORY

Date	Sections Modified	Description of Changes
November 2019	New Document	
January 2020	New Format	New TechTip Format

2 APPENDIX 2: TPS AND POLYURATHANE FOAM



August 12, 2015

Polyurethane Foam Insulation and PVC Cable.

Dear Steve

You have asked if there is any compatibility issues when PVC cables and Building foam insulation are in contact with each other.

The common insulation in NZ has been Polystyrene, GCNZ has analyzed the performance of PVC cables in contact with polystyrene. We have not conducted any long term testing on the impact of Polyurethane foam and PVC insulated cable.

The negative impact of PVC with Polystyrene foam is well understood however the chemical structure of polyurethane is different from that of Polystyrene.

Polystyrene in contact with PVC will quite rapidly absorb Plasticizer from the PVC. Noticeable changes such as the Polystyrene being sticky can be observed within a few months or less. Over a period of time this can lead to the PVC becoming less flexible and eventually lead to cracking if sufficient plasticizer is lost.

Plasticizers will also migrate into Polyurethane but at a very low rate. This would not be observable as the rate is so low.

In the USA polyurethane foams are commonly used as a building insulation material and the ingredients in the PVC cable formulations of the USA are similar to NZ cable formulations. So I would expect a similar performance for NZ made cables in contact with polyurethane foamed insulation.

Yours Sincerely

A handwritten signature in black ink that reads 'A M Stewart'.

Andrew Stewart
Laboratory Manager

General Cable New Zealand Ltd
Postal: PO Box 8044, Christchurch NZ 8440
Sales Tel: 0800 222 537 Sales Fax: 0800 242 267
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3 APPENDIX 3: A GUIDE TO RESPIRATORS – EXTRACT

(Occupational Safety and Health Service, Department of Labour, Wellington, New Zealand, November 1992)

ARCHIVE

Airline Respirators

There are two groups of airline respirators: fresh air hose respirators and compressed airline respirators.

Fresh air hose respirators draw air at atmospheric pressure through an air hose. (Electrically-operated air blowers may be used.) Compressed airline respirators supply air under pressure through an airline.

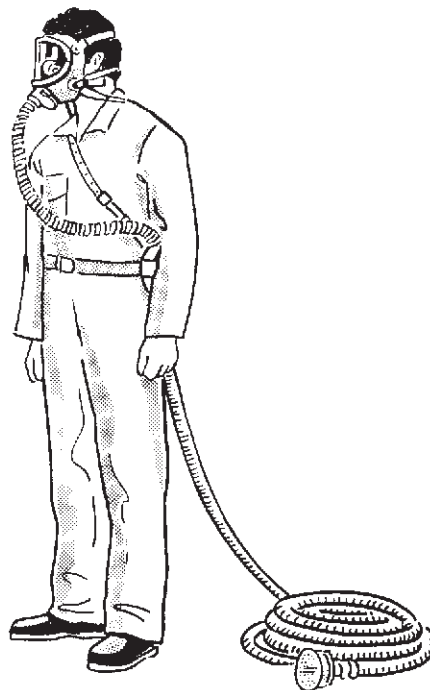
FRESH AIR HOSE RESPIRATORS

Air hose respirators consist of a facepiece connected to an air hose which has its free end anchored in an uncontaminated atmosphere. Air at atmospheric pressure is drawn through the hose by normal breathing. The resistance of the hose to the passage of air limits the length of the hose to about 15 metres. All connections should be tight to prevent contaminated air leaking into the air hose. See your supplier for more detailed information.

When longer hoses are used, air is supplied under slight pressure by a pump, blower or bellows which can be operated by an attendant. Leakage into the apparatus is prevented by a positive-pressure effect.

ARCHIVE

The blower should be sited so it supplies clean fresh air, through a strainer on the inlet end. Before the facepiece is put on, the blower should be operated rapidly to ensure that dust inside is blown out and clean air is being delivered to the facepiece. The ends of the hose should be sealed after use.



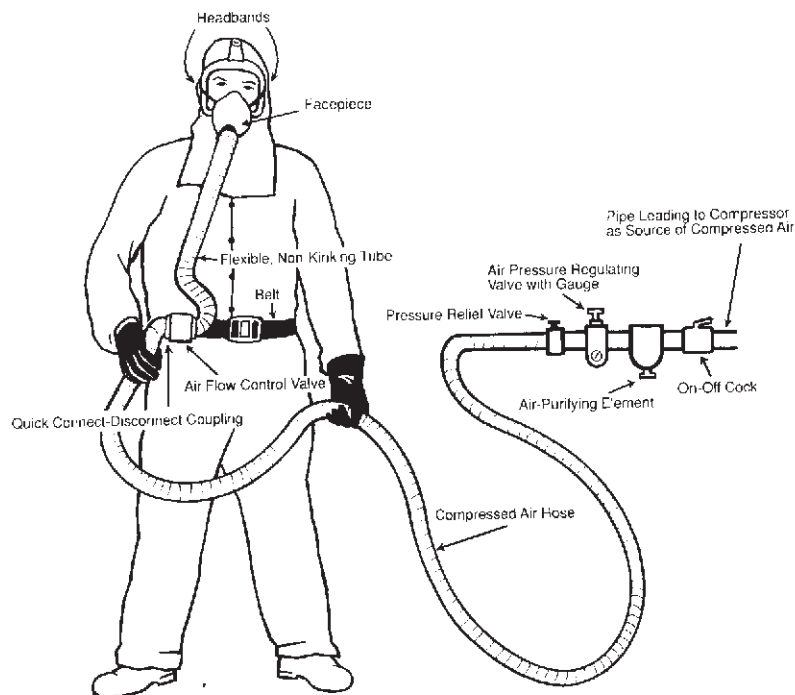
An air hose respirator provides clean air from a source remote from the contaminated area.



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COMPRESSED AIRLINE RESPIRATORS

These consist of an airline from a compressed air source to a breathing tube attached to a facepiece on a wearer. The breathing tube connects with either a half facepiece, a full facepiece, a hood or a helmet. The flow of air to the half and full facepiece types may be either continuous or controlled by a demand valve. Where the air supply is also used in the industry process, the compressor should be capable of supplying 300 litres/minute to the first wearer and 170 litres /minute for each additional person. This is extra to the requirement for air-operated equipment.



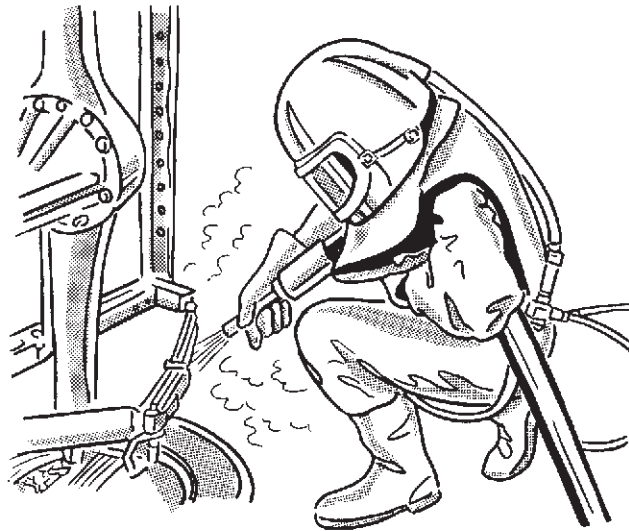
In the compressed airline respirator, a compressor creates a continuous flow of air to the facepiece or helmet.

ARCHIVE

The continuous flow of air creates a positive pressure inside the facepiece or helmet, which gives greater protection than a demand-type respirator. It also reduces fogging and cools the wearer's face. The flow rate can be adjusted by a belt-mounted regulator.

The demand-flow type lets air into the facepiece only when the worker is breathing in, which conserves compressed air.

Hood and helmet airline respirators are used when the head and neck must be protected. Because the efficiency of this type of respirator depends on maintaining a positive pressure inside the hood, the respirator must fit closely round the neck. Drawstrings or elasticised neckbands should be as tight as comfort allows. Simply tucking the cape or inner bib part of the hood inside your shirt or other garment is not recommended.



Sand blasting is one job that requires a helmet airline respirator.

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Increasing the air pressure above the manufacturer's recommendations will not necessarily increase the protection. In fact, it may create vortex currents and local areas of negative pressure within the hood, causing inward leakage of the contaminated atmosphere. Also, the extra noise the wearer is subjected to may be unacceptable.

The air intake to the compressors should be sited in an uncontaminated atmosphere. Particular care should be taken to ensure that this requirement is met if a portable air compressor is used to supply breathing air. Compressed air for breathing should comply with Appendix A (*Requirement for air quality compressors or cylinders for air-supplied respirators*) of NZS AS 1715:1991 (reproduced on pp. 49-51 of this booklet). Oil and water traps by themselves are not sufficient to make compressed air respirable. Seek advice from suppliers.



PRECAUTIONS FOR NORMAL USE

- All fresh air hose intakes should be supervised to ensure a continuous supply of fresh air.
- Compressor air intakes should be sited to avoid contamination (particularly by exhaust gases from internal combustion engines).
- Don't let the compressor run hot, as decomposition of the lubricating oils may produce dangerous amounts of carbon monoxide and other harmful substances.
- Remove water and pockets of stagnant air before you use an airline.



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- If the air supply is used in a manufacturing process as well as for supplying an airline, take particular care to avoid contamination.
- A pressure regulator must be used with a compressed airline respirator.

Airline respirators provide reliable respiratory protection only if the air supply is continuous and efficient. An airline respirator should only be used in an atmosphere not immediately dangerous to life or health because failure of the air supply will expose the wearer to contaminated air. An exception to this is where the wearer carries an emergency air supply to allow enough time to escape (e.g. self-contained breathing apparatus).



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Requirements for Air Quality (Compressors or Cylinders) for Supplied Air Respirators

(Appendix A from NZS AS 1715: 1991 Selection, use and maintenance of respiratory protective devices)

A1 AIR SUPPLY The necessary capacity of any air service for personal protection shall be calculated on a minimum requirement of 300 litres per minute for the first person and at least 170 litres per minute for each subsequent person.

Air used to supply respirators shall-

- (a) have no objectionable or nauseous odour; and
- (b) contain no less than 19.5 percent and not more than 22 percent by volume of oxygen.

Additionally, at 15°C and 100 kPa absolute the air shall-

- (i) contain not more than 11 mg/m³ (10 p.p.m. by volume) of carbon monoxide;
- (ii) contain not more than 1400 mg/m³ (800 p.p.m. by volume) of carbon dioxide;
- (iii) contain not more than 1mg/m³ (1 p.p.m) of oil; and
- (iv) for cylinders, contain not more than 100 mg/m³ of water when sampled from a cylinder initially filled to a pressure of at least 12 MPa.

A1.2 Air temperature. Air supplied from a compressor to a facepiece, hood or helmet should be at a comfortable breathing temperature within the range 15 to 25°C.

A1.3 Avoidance of stale air or moisture. Arrangements should be made to avoid the pocketing of stale air in pipelines. The use of ring circuits and controlled draining helps to guard against this hazard.



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Couplings should be of the 'snap type' and should be of different design to those used for other compressed air services.

Provision should also be made, at appropriate places, to drain away water from any pipeline. Water traps should be drained prior to using the apparatus.

A1.4 Warning device. Where an 'inline' auxiliary (secondary) air supply has not been provided to guard against primary supply failure, the user of an air-supplied respirator shall be warned by an automatic device whenever an inadequacy in the air supply may represent an immediate hazard to the user.

A1.5 Compressors. Systems shall incorporate a receiver of sufficient capacity to reduce pulsations from compressor action and reduce compressor overheating. Compressors shall be well maintained and shall not be allowed to run hot, as harmful substances may be produced by the decomposition of the lubricating oils. Filters should be purged or replaced at regular intervals in accordance with the manufacturer's instructions. Consideration should also be given to the use of oil-free compressors.

The air intake to the compressors should be sited in an uncontaminated atmosphere. Particular care should be taken to ensure that this requirement is met if a portable air compressor is being used to supply breathing air.

The use of filters on any air intake should be of secondary importance when compared with the foregoing requirements.

A1.6 General works air supply systems. When the air supply is used in the manufacturing process as well as in the supply of respirable air, particular care should be taken to avoid the risk of contamination.

Where the air supply is used in the manufacturing process and there is a risk of contamination, the air supply should not



ARCHIVE

be used for personal protection unless it has been filtered to provide the air quality defined in paragraph A1.

In every instance it should be ensured that any back pressures from operating plants using the air supply will not cause contamination of the air used for personal protection.

Provision should be made to ensure that the airlines supplying the breathing apparatus receive an adequate supply of respirable air under all plant operating conditions.

Plant air supplies are not suitable for airline respirators unless special precautions have been taken for the elimination of scale, rust, water, oil mist, irritating ingredients and odours. It is preferable that a separate installation be provided for respiratory air purposes, and that it be designed to eliminate the above mentioned contaminants.

A2 COMPRESSED OXYGEN SUPPLY. Compressed oxygen of the dry breathing type should be odourless and contain not less than 99.5 percent by volume of oxygen.

At 15°C and 100 kPa absolute; it should contain-

(a) less than 11mg/m³ (10 p.p.m. by volume) carbon monoxide; and

(b) less than 1400 mg/m³ (800 p.p.m. by volume) carbon dioxide.

When sampled from a cylinder initially filled to at least 12 MPa, it should contain-

(i) less than 20 mg/m³ water; and

(ii) less than 1 mg/m³ (lp.p.m. by volume) oil.



4 APPENDIX 4: TECHNICAL DATA SHEET FOR HEATLOK HFO



HEATLOK® HFO HIGH LIFT TECHNICAL DATA SHEET

Heatlok® HFO High Lift is a two component, closed cell, spray applied, rigid polyurethane foam system. This product uses recycled plastic materials, rapidly renewable soy oils, and the blowing agent has zero ozone depleting potential. Heatlok HFO High Lift complies with the intent of the International Code Council's residential and commercial building codes and is commonly used as a thermal insulation, air barrier, vapor retarder and water resistive barrier in above grade, below grade, interior and exterior applications.

PHYSICAL PROPERTIES			
ASTM D 1622	Core Density	2.0 – 2.4 lb/ft³	32.0 – 38.4 kg/m³
ASTM C 518	Aged Thermal Resistance	1" = 6.3 ft²h°F/BTU 3.5" = 26 ft²h°F/BTU	1" = 1.10 Km²/W 3.5" = 4.57 Km²/W
ASTM E 283	Air Leakage @ 75 Pa @ 1"	< 0.02 L/sm²	
ASTM E 2178	Air Permeance @ 75 Pa @ 1"	< 0.02 L/sm²	
ASTM E 96	Water Vapor Permeance Class III vapor barrier per IBC Section 202 @ 1"	1.56 perms	89.25 ng/Pa•s•m²
	Class II vapor barrier @ ≤ 1 perm	1.875"	47.63mm
ASTM D 2842	Water Absorption (volume)	0.87%	
ASTM D 1621	Compressive Strength	34.8 psi	240 kPa
ASTM D 1623	Tensile Strength	101.3 psi	698 kPa
ASTM D 2126	Dimensional Stability @ 158°F (70°C) 97% R.H. (168 hours)	-3.7 (% volume change)	
VOC Emissions	UL Environment (Greenguard Gold)	Meets Criteria	
ASTM C 1338	Fungi Resistance	No fungal growth	
ASTM D 2856	Closed Cell Content	91%	
ASTM C 1029	Standard specification for spray applied rigid cellular polyurethane thermal insulation	Type II Compliant	

FIRE TEST RESULTS		
ASTM E 84	Surface Burning Characteristics, 4" thick Flame Spread Index Smoke Developed	Class I 10-15 350 – 400
AC 377 Appendix X	Ignition Barrier – Compliant with 2009, 2012 & 2015 IBC and IRC, and ICC-ES AC-377 Appendix X, for use in attics and crawl spaces without a prescriptive ignition barrier or intumescent coating.	Pass
NFPA 286	Thermal Barrier – Compliant with the 2009, 2012 & 2015 IBC and IRC, as an interior finish without a 15 minute thermal barrier when coated with DC-315 at 18 mils wet film thickness, 12 mils dry film thickness, or Blazelok™ TBX at 18 mils wet film thickness, 12 mils dry film thickness.	Pass
ASTM D 1929	Ignition Properties (spontaneous ignition temperature)	766°F (408°C)

RECYCLED & RENEWABLE CONTENT	
Recyclable Content	19%
Renewable Content	6%

REACTIVITY PROFILE			
Cream Time 0 – 1 seconds	Gel Time 2 seconds	Tack Free Time 3 – 4 seconds	End of Rise 3 – 4 seconds

LIQUID COMPONENT PROPERTIES		
PROPERTY	A-PMDI ISOCYANATE	HEATLOK HFO HIGH LIFT RESIN
Color	Brown	Blue
Viscosity @ 77°F (25°C)	180 – 220 cps	500 – 800 cps
Specific Gravity	1.24	1.17 – 1.21
Shelf Life of unopened drum properly stored	12 months	6 months
Storage Temperature	50 – 100°F (10 – 38°C)	59 – 77°F (15 – 25°C)
Mixing Ratio (volume)	1:1	1:1

*See SDS for more information.

RECOMMENDED PROCESSING CONDITIONS*		
Initial Primary Heater Setpoint Temperature	105 – 115°F	41 – 46°C
Initial Hose Heat Setpoint Temperature	105 – 115°F	41 – 46°C
Initial Processing Setpoint Pressure	1200 – 1400 psi	8274 – 9653 kPa
Substrate & Ambient Temperature	Summer > 50°F Winter > 15°F	Summer > 10°C Winter > -9°C
Moisture Content of Substrate	≤19%	≤19%
Moisture Content of Concrete	Concrete must be cured, dry and free of dust and form release agents.	

*Foam application temperatures and pressures can vary widely depending on temperature, humidity, elevation, substrate, equipment and other factors. While processing, the applicator must continuously observe the characteristics of the sprayed foam and adjust processing temperatures and pressures to maintain proper cell structure, adhesion, cohesion and general foam quality. It is the sole responsibility of the applicator to process and apply Heatlok HFO High Lift within specification.

General Requirements: Equipment must be capable of delivering the proper ratio (1:1 by volume) of polymeric isocyanate (PMDI) and polyol blend at adequate temperatures and spray pressures. Substrate must be at least 5 degrees above dew point, with best processing results when ambient humidity is below 80%. Substrate must also be free of moisture (dew or frost), grease, oil, solvents and other materials that would adversely affect adhesion of the polyurethane foam. Applicators should limit the application of this product to no more than a thickness of 6.5" (165mm) per pass (after expansion) to avoid fire hazards (including spontaneous combustion) resulting from excessive heat generation. If subsequent passes are needed, applicators should wait until the core temperature of the foam has dropped below 100°F to allow any reaction heat to dissipate from the prior applications before attempting to reapply the product.

RECOMMENDED MAXIMUM PASS THICKNESSES		
Ambient Temperature	Maximum Pass	Dual Pass (x" + x")
≤70°F (21°C)	6.5"	3.25" + 3.25"
>70°F (21°C); <80°F (27°C)	4"	3.25" + 3.25"
>80°F (27°C)	3.25"	3.25" + 3.25"

Heatlok HFO High Lift must be separated from the interior of the building by an approved thermal barrier or an approved finish material equivalent to a thermal barrier in accordance with applicable codes. Heatlok HFO High Lift must be sprayed at a minimum thickness of 1" per pass. This product must not be used when the continuous service temperature of the substrate or foam is below -60°F (-51°C) or above 180°F (82°C). Heatlok HFO High Lift should not be used to cover flexible ductwork.

Disclaimer: The information herein is to assist customers in determining whether our products are suitable for their applications. We request that customers inspect and test our products before use and satisfy themselves as to contents and suitability. Nothing herein shall constitute a warranty, expressed or implied, including any warranty of merchantability or fitness, nor is protection from any law or patent inferred. All patent rights are reserved. The foam product is combustible and must be protected in accordance with applicable codes. Protect from direct flame and spark contact, around hot work for example. The exclusive remedy for all proven claims is replacement of our materials.



5 APPENDIX 5: TECHNICAL DATA SHEET FOR HEATLOK SOYA HFO



HEATLOK® SOYA HFO™ TECHNICAL DATA SHEET New Zealand Version

Heatlok Soya HFO / Polarfoam Soya HFO are two component, low GWP, closed cell, spray applied, rigid polyurethane foam systems. This foam product has been tested by an independent recognized laboratory and is the first product that surpasses the requirements outlined in **the most recent and stringent standard CAN/ULC S705.1-15** "Standard for thermal insulation – Spray applied rigid polyurethane foam, medium density – Material Specification". Heatlok Soya HFO/ Polarfoam Soya HFO material complies with the requirements of the National Building Code of Canada and is listed by the National Research Council Canada under CCMC Listing 14078-L, since 2017 as an insulation product. This product is commonly used as a thermal insulation product, air barrier, vapour retarder for interior, exterior applications above and below grade. Heatlok Soya HFO / Polarfoam Soya HFO uses recycled plastic materials, rapidly renewable soy oils, and 4th generation blowing agent with zero ozone depleting potential and < 1 global warming potential. This product meets all the requirements of the Paris, Kyoto and Montreal protocols. Heatlok Soya HFO is a GREENGUARD GOLD certified insulation material and it also carries its own Environmental Product Declaration (EPD)". Heatlok Soya HFO/ Polarfoam Soya HFO is applied exclusively by CALIBER QAP licensed installers and contractors in accordance with the standard CAN/ULC S705.2.

RECOMMENDED PROCESSING PROCEDURES		
In-field Density	ASTM D 1622	32.0-38.4 kg/m ³
Mixing Ratio A/B (volume)	1/1	
Mixing Dynamic Pressure (minimum)	5516 kPa	800 psi
Moisture Content of Substrate (wood)	<19%	<19%
Maximum Thickness Per Pass	50 mm	2"
Maximum Thickness of Successive Passes	100 mm	4"
Minimum cooling time period before applying over 100 mm (4") thick application	30 min	
Maximum Thickness in 24 h	200 mm	8"

PHYSICAL PROPERTIES - CCMC 14078-L - CAN/ULC S705.1-15			
ASTM D 1622-14	Apparent Core Density	2.21 lb/ft ³	35.49 kg/m ³
CAN/ULC S770-09	Long Term Thermal Resistance LTTR		
	100 mm	R-24	4.14 RSI
	75 mm	R-17	3.00 RSI
	50 mm	R-11	1.94 RSI
ASTM D 1621-16	Compressive Strength (@ 10% deflection)	24.8 lb./in ²	171 kPa
ASTM D 1623-09	Tensile Strength	58.16 lb./in ²	401 kPa
ASTM D 6226-15	Open Cell Content	5 %	
ASTM D 2842-12	Water Absorption by volume	.64 %	
ASTM E 96-A-16	Water Vapour Permeance (50 mm thick, top skin removed)	0.23 perm	13 ng/Pa.s.m ²
ASTM E 2178-13	Air Permeance @ 75 Pa (30.7 mm thick, top skin removed)	0.0021 L/(s.m ²)	
CAN/ULC S102-10	Flame Spread Index Corner wall test Required and Declared Value (building code)	245	
ASTM D 2126-15	Dimensional Stability (28 days) (% volume change, sample without any substrate) @ -20°C @ +80°C @ +70°C & 97±3% R.H.	-1.4	
		+13	
		+9.4	
CAN/ULC S774-09 (R2014)	Time of Occupancy (VOC)	1 day	
ASTM C 1338-14	Fungi Resistance	No Fungal Growth	

PHYSICAL PROPERTIES – Additional Testing			
CAN/ULC S770-03	Long Term Thermal Resistance LTTR 100 mm 75 mm 50 mm	R-25 R-19 R-12	4.24 RSI 3.26 RSI 2.03 RSI
UL Greenguard	Interior Air Quality	Certified Gold	
CAN/ULC S101	UL LISTED design wall FW FO7, 150mm (NBC 2010-15 art: 3.2.3.8)	Pass	
CAN/ULC S101	UL LISTED design wall FWFO7, 204mm (NBC 2010-15 art: 3.2.3.8)	Pass	
K124/02/95* (ISO/TS 11665-13)	Radon gas resistance coefficient (for 50mm) Radon gas diffusion coefficient	17410.10 ⁶ s/m 1.3.10 ⁻¹⁰ m ² /s	

*829 times better than a 0.15mm polyethylene sheet at a thickness of 50mm.

RECYCLED & RENEWABLE CONTENT	
Recycled Content	18%
Renewable Materials Content	4%

REACTIVITY PROFILE			
Cream Time	Gel Time	Tack Free Time	End of Rise
0 - 1	3 seconds	5 - 6 seconds	5 - 6 seconds

LIQUID COMPONENT PROPERTIES *		
PROPERTY	ISOCYANATE	RESIN
Colour	Brown	Heatlok Soya HFO: Blue Polarfoam Soya HFO: Orange
Viscosity @ 25°C	150 – 350 cps	200 – 300 cps
Specific Gravity	1.20 – 1.24	1.19 – 1.21
Shelf Life*	6 months	6 months
Mixing Ratio (volume)	100	100
Vapour Pressure @ 25°C	10 ⁻¹ psi	8 – 9 psi
Components system storage temperature recommendation	15 @ 25°C (59 @ 77°F)	15 @ 25°C (59 @ 77°F)

PRODUCT VERSION		
	VERSION APPLICATION TEMPERATURES (AIR, SUBSTRATE & CURING)	LIQUID TEMPERATURE
Summer Version	30 @ 10°C (50 @ 86°F)	35 @ 46°C (95 @ 115°F)
Winter Version	10 @ -10°C (50 @ 14°F)	38 @ 49°C (100 @ 120°F)

General Information: It is recommended that the foam be covered with an approved thermal barrier in accordance with the applicable building code when used in buildings and covered by a UV coating when used outside. This product should not be used when the continuous service temperature of the substrate is outside the range of -60°C to 80°C (-76°F to 180°F). Do not apply excessive thickness in one application it may cause spontaneous combustion of the foam hours after the application. Respect the recommended procedures. Heatlok Soya HFO is green in color. Polarfoam Soya HFO is orange in color.

Disclaimer: The information herein is to assist customers in determining whether our products are suitable for their applications. We request that customers inspect and test our products before use and satisfy themselves as to contents and suitability. Nothing herein shall constitute a warranty, expressed or implied, including any warranty of merchantability or fitness, nor is protection from any law or patent inferred. All patent rights are reserved. The foam product is combustible and must be protected in accordance with applicable codes. Protect from direct flame and spark contact, around hot work for example. The exclusive remedy for all proven claims is replacement of our materials.



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