

SPRAY POLYURETHANE

Meeting and Exceeding Code Requirements and Reducing Overall Carbon Footprint

June 19th, 2025



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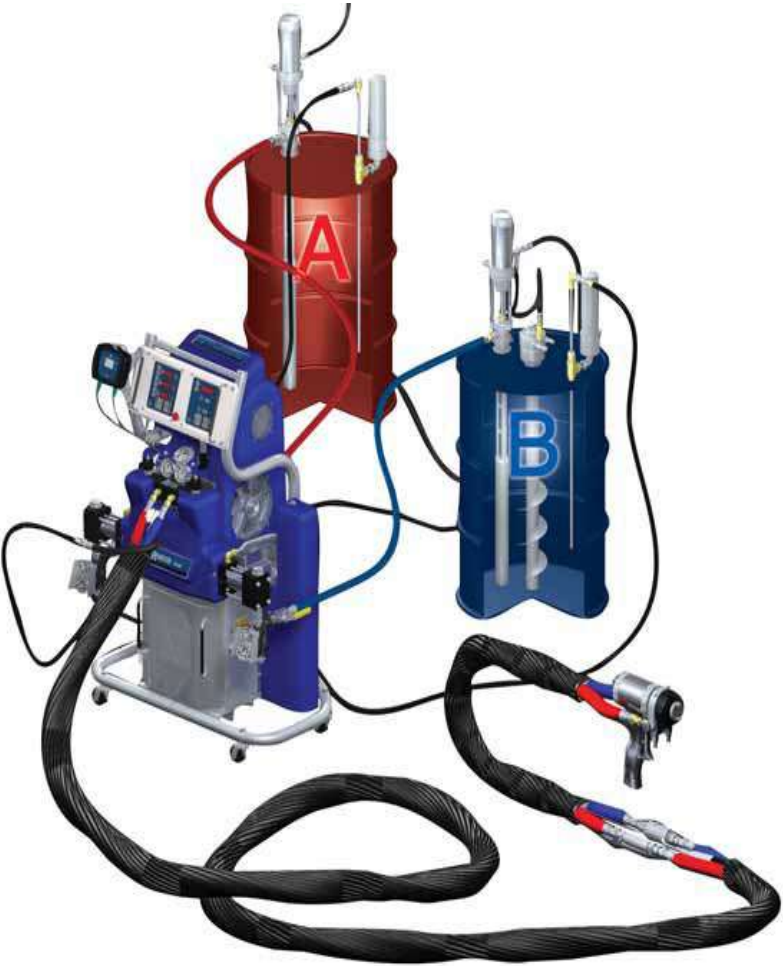
We create chemistry

Agenda

- New generation of spray foam
- Tested and code compliant systems
- Spray foam and carbon footprint
- Use of EPDs
- Resources and BASF Support



New Generation of Spray Foam



Isocyanate

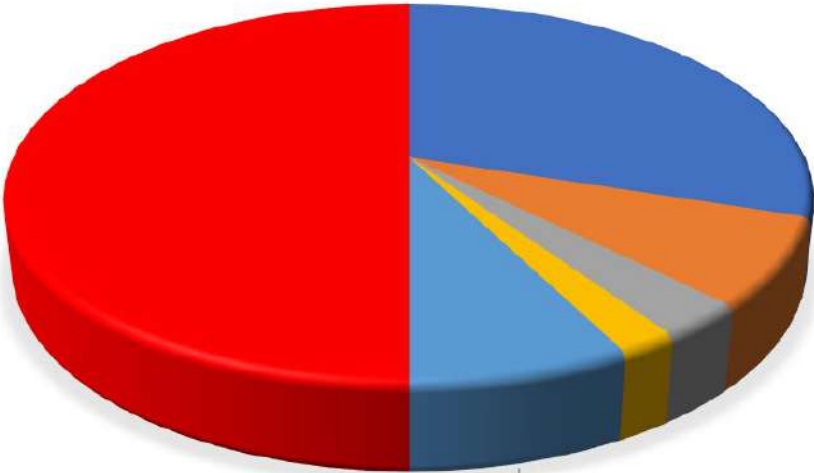


50%

Resin



50%

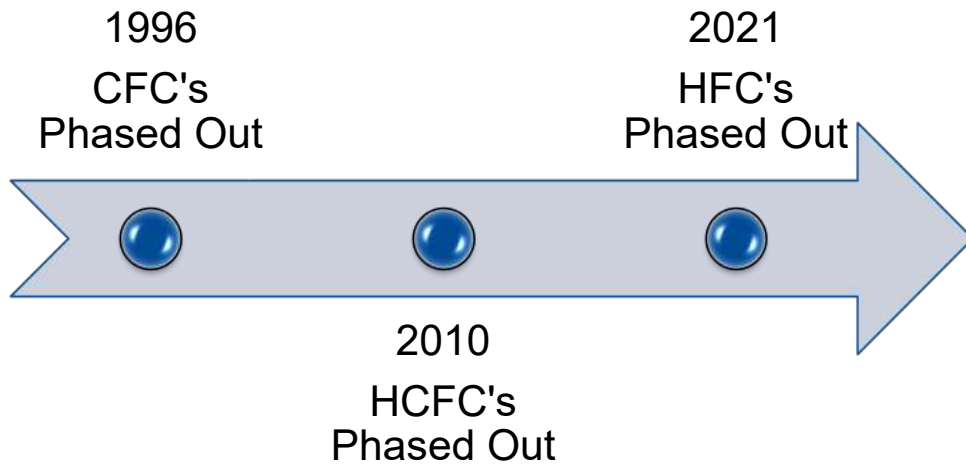


Blowing Agent

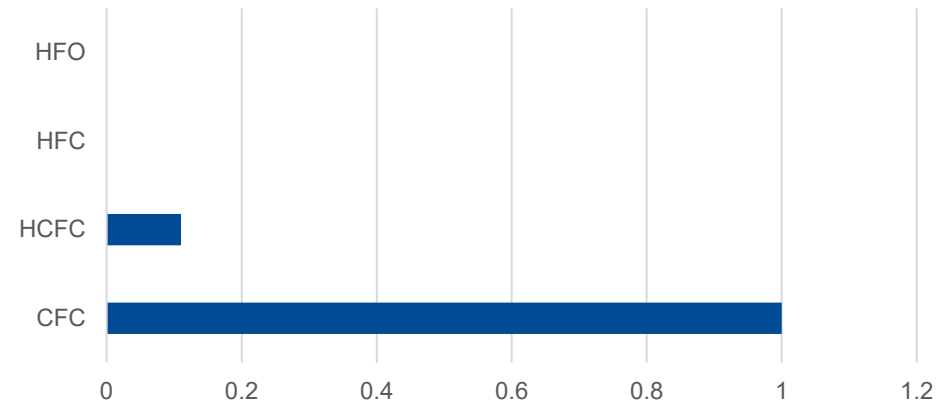
New Generation of Spray Foam

■ Blowing agents phase out

▶ Montreal Protocol 1987 – Ozone Depleting Potential (ODP)



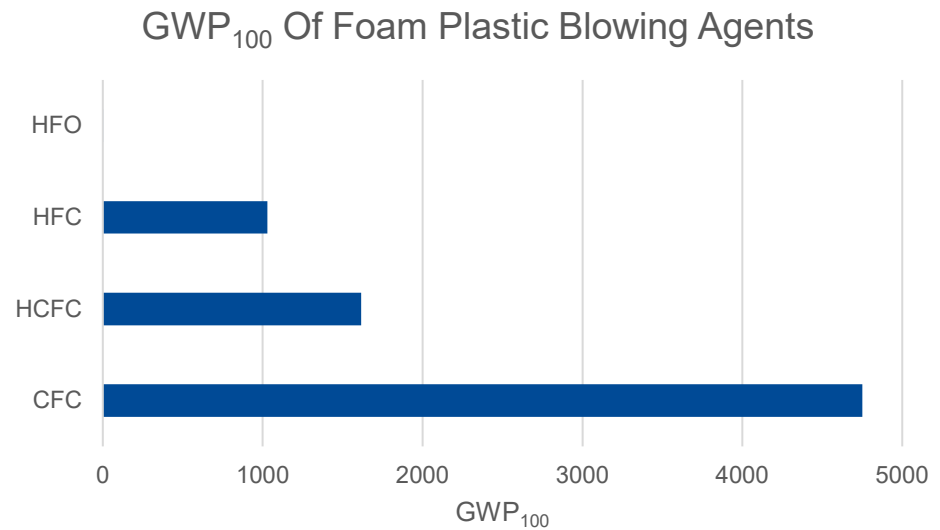
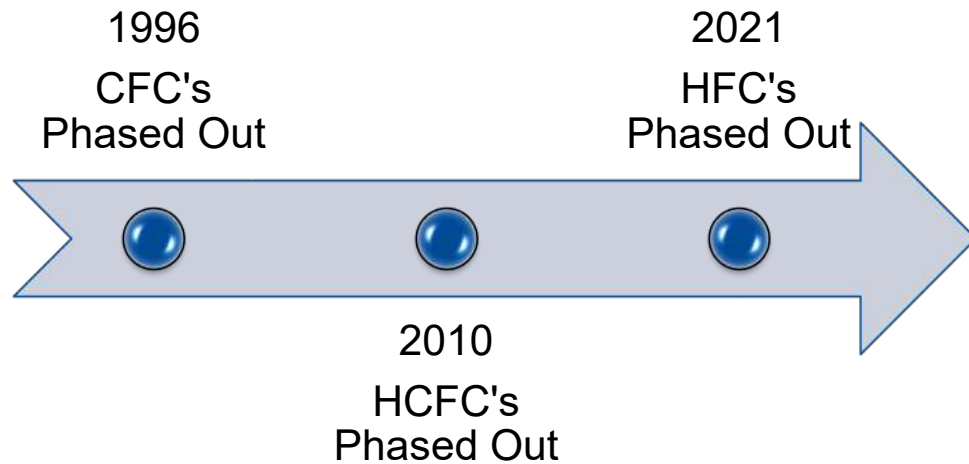
ODP Of Foam Plastic Blowing Agents



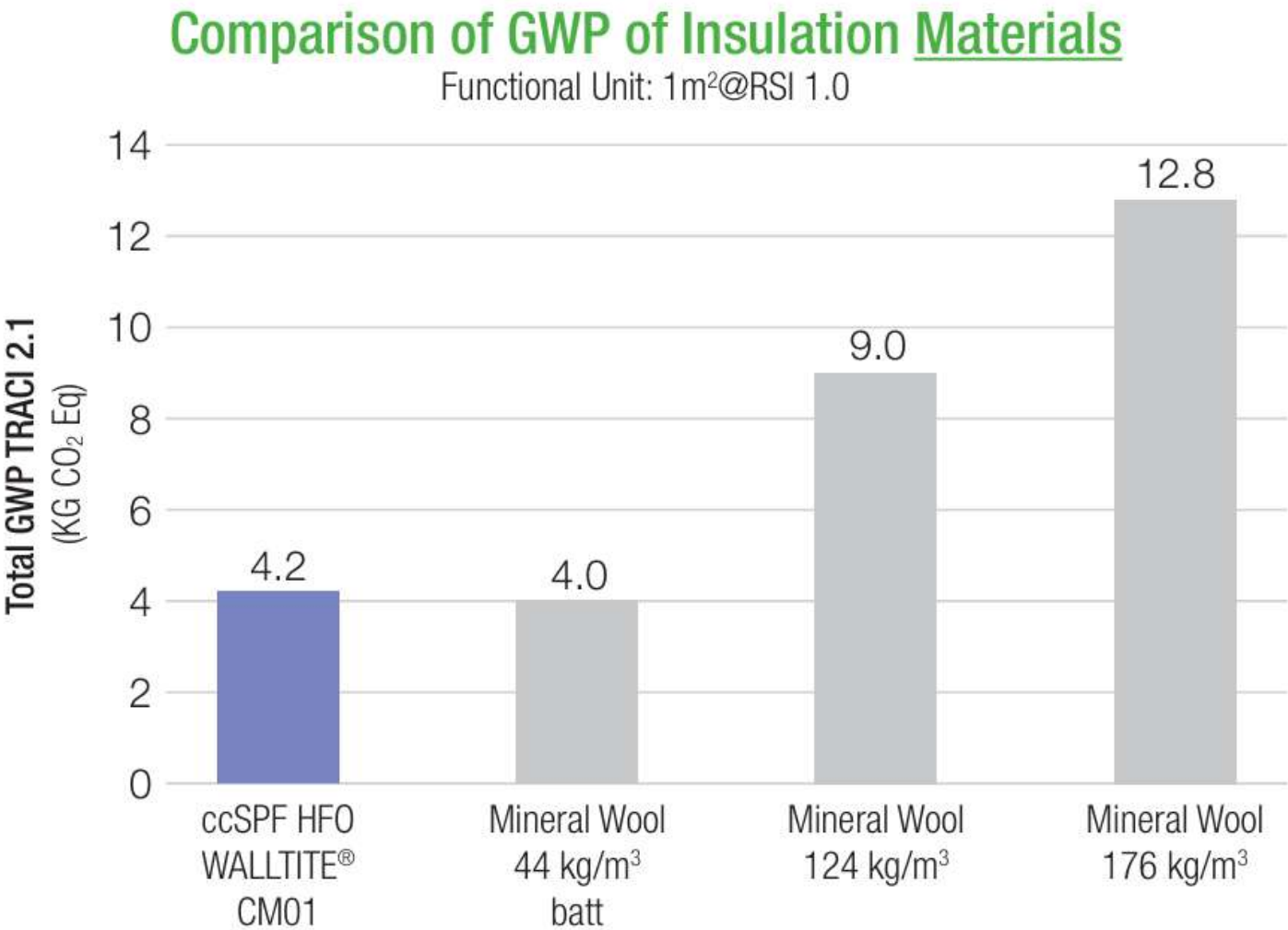
New Generation of Spray Foam

■ Blowing agents phase out

- ▶ Kigali Amendment to Montreal Protocol 2019 – Global Warming Potential (GWP)



New Generation of Spray Foam



Tested and Code Compliant Systems

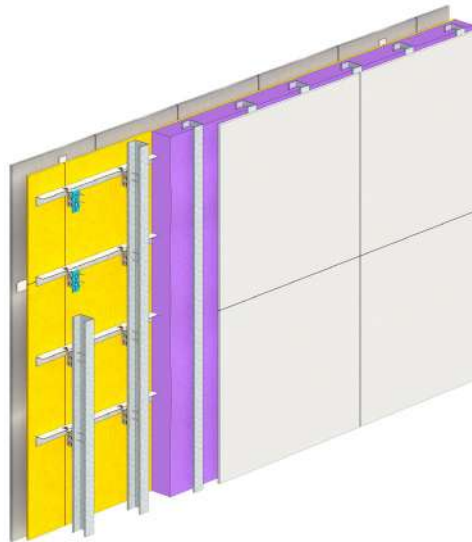
What do we test?

■ Proprietary systems:

- ▶ HP+ Walls – Residential
 - Fire testing, air barrier testing and engineering reports
- ▶ HP+ CFR – Commercial
 - Fire testing, air barrier testing

■ Generic systems:

- ▶ Fire rated assemblies
- ▶ Commercial air barrier systems
- ▶ Radon protection system



Tested and Code Compliant Systems

Fire Rated Assemblies – CAN/ULC 101

- “Standard Methods of Fire Endurance Tests of Building Construction and Materials”



Tested and Code Compliant Systems

Fire Rated Assemblies – CAN/ULC 101

■ Passing Criteria:

- ▶ Temperature rise not exceeding:
 - 140°C for average of thermocouples
 - 180°C for individual thermocouples
- ▶ No opening in assembly
- ▶ Structural integrity not compromised
- ▶ Hose stream test

■ Results of HP+ Walls

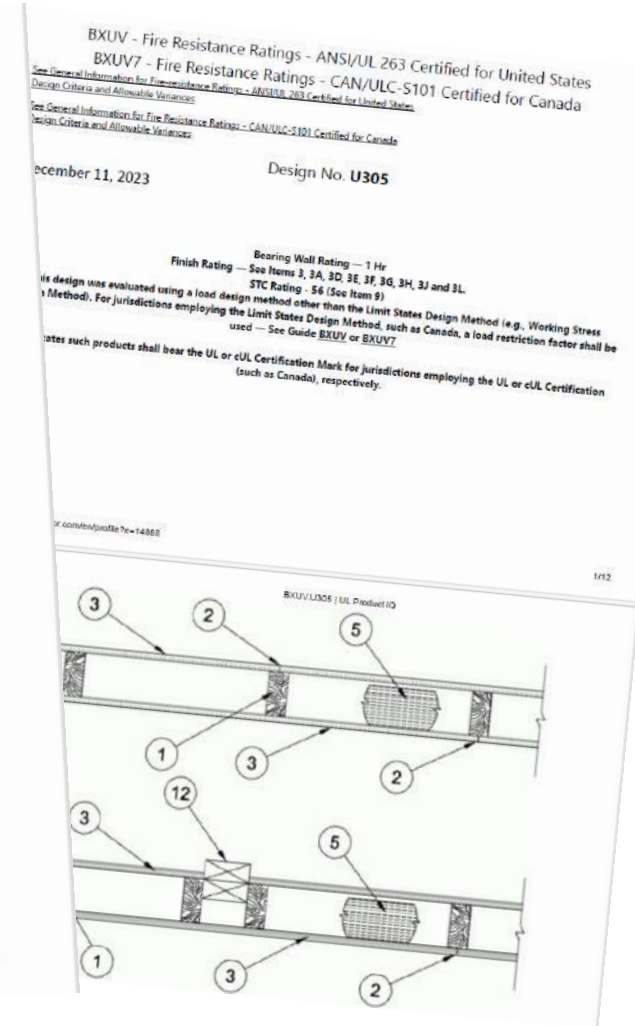
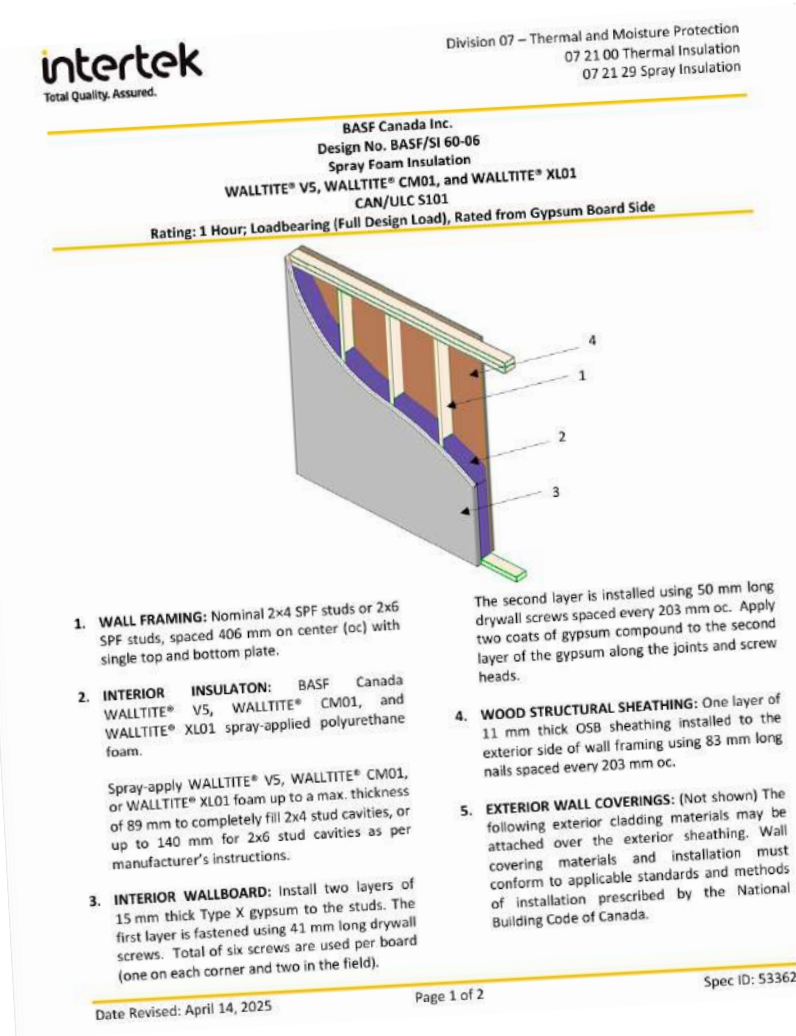
- ▶ Temperature recorded by end of test:
Between 20°C and 30°C

■ Thermoset plastics vs. thermoplastics

Tested and Code Compliant Systems

Fire Rated Assemblies – CAN/ULC 101

- Intertek designs: 7 walls
- UL Designs: 26 walls and 16 floors
 - ▶ Partition wall with 2-hour fire rating and STC
- Total of 49 fire-rated designs



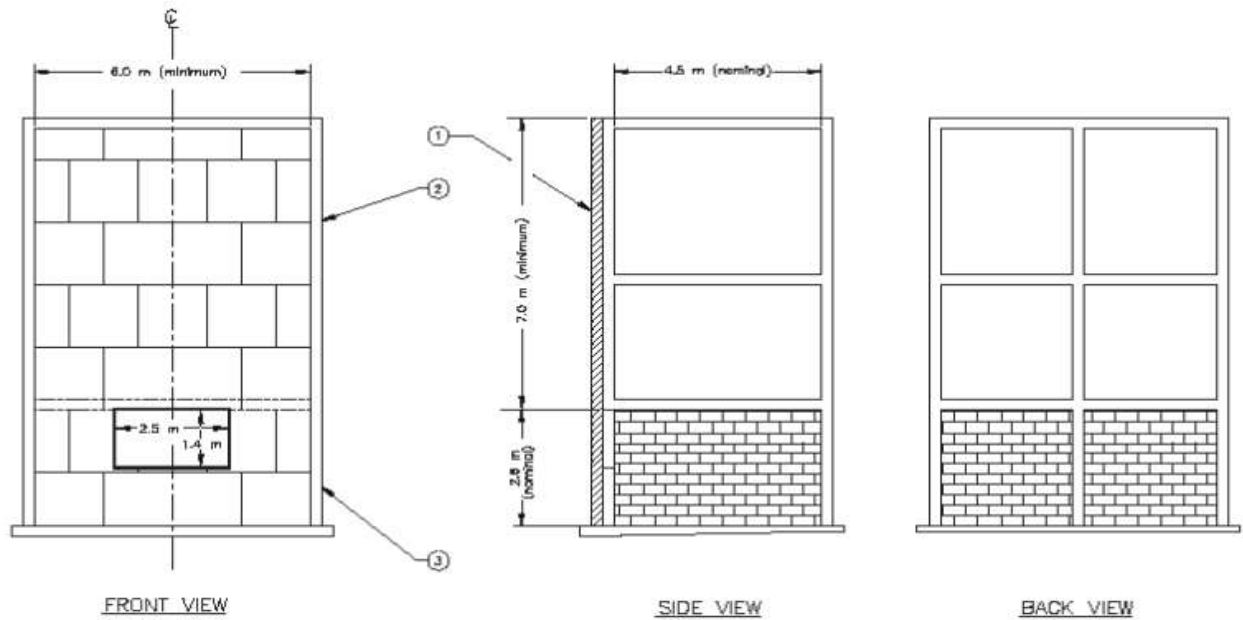
Tested and Code Compliant Systems

Exterior Fire Protection in Noncombustible Construction – CAN/ULC 134

- “Standard Method of Fire Test of Exterior Wall Assemblies”
- Required by Article 3.1.5.6
 - ▶ Acceptance criteria, when wall is tested in accordance with CAN/ULC 134:
 - flaming on or in the wall assembly does not spread more than 5 m above the opening
 - the heat flux during the flame exposure on the wall assembly is not more than 35 kW/m² measured at 3.5 m above the opening

Tested and Code Compliant Systems

Exterior Fire Protection in Noncombustible Construction – CAN/ULC 134



LEGEND

- 1 Test specimen
- 2 Specimen support
- 3 Combustion chamber

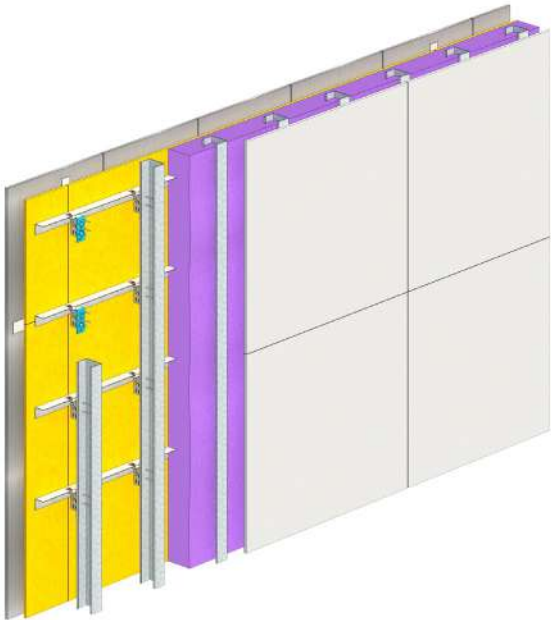
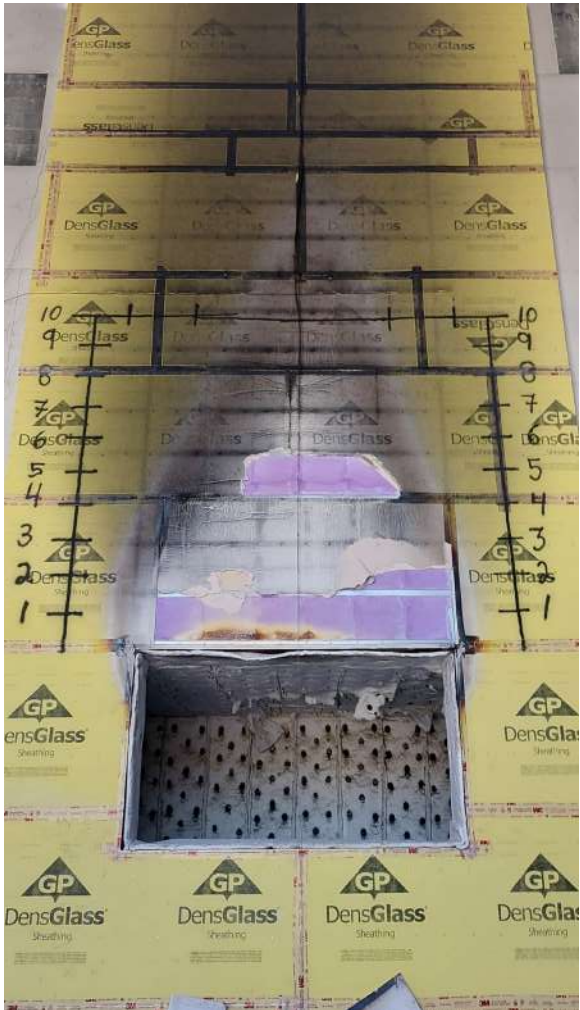


Tested and Code Compliant Systems

Exterior Fire Protection in Noncombustible Construction – CAN/ULC 134

■ Intertek listing: HP+ CFR Wall System

CAN/ULC-S134	
Acceptance Criteria	HP+ CFR Results
Maximum 5 m flame spread above opening	Maximum 2 m flame spread above opening
Maximum average heat flux	
35 kW/m²	16.43 kW/m²



Tested and Code Compliant Systems

Air Barrier Systems – CAN/ULC 742

- “Standard for Air Barrier Assemblies – Specification”
- Requirement: Air leakage $\leq 0.20 \text{ L/s}\cdot\text{m}^2$
- Classification:
 - ▶ A1: air leakage rate $\leq 0.05 \text{ L/s}\cdot\text{m}^2$
 - ▶ A2: air leakage rate $\leq 0.10 \text{ L/s}\cdot\text{m}^2$
 - ▶ A3: air leakage rate $\leq 0.15 \text{ L/s}\cdot\text{m}^2$
 - ▶ A4: air leakage rate $\leq 0.20 \text{ L/s}\cdot\text{m}^2$

Tested and Code Compliant Systems

Air Barrier Systems – CAN/ULC 742

- HP+ walls
 - ▶ E series, X series, XR-Series, XR-S Series
- HP+ CFR
- Commercial systems:
 - ▶ Steel studs
 - ▶ Concrete Masonry Units

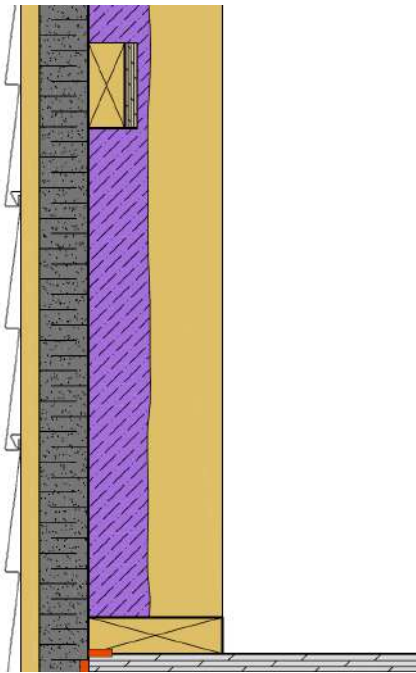
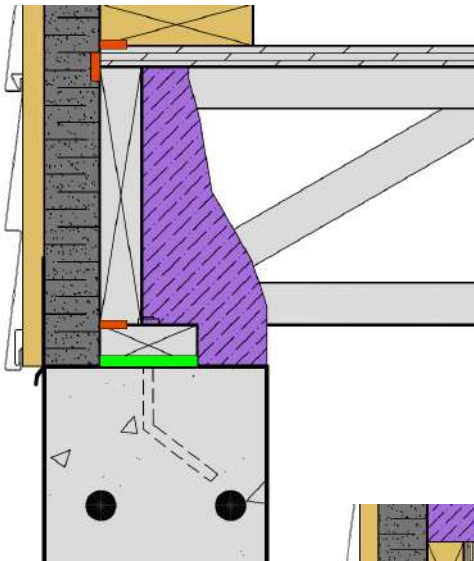
$$A1 \leq 0.05 \text{ L/s}\cdot\text{m}^2$$

Tested and Code Compliant Systems

Air Barrier Systems – CAN/ULC 742

- HP+ walls
 - ▶ E series, X series, XR-Series, XR-S Series

HP+ Wall Series	Description	ACH @50Pa
E	12 Unit Complex in Victoriaville, QC	0.52
XR	House in Riviere-Beaudette	1.56
XR	House in Leduc, AB	0.79
E	House in Saint-Adolphe-D'Howard	1.59
XR	House in Saint-Sauveur	0.87
XR	House in Lery, QC	1.24
XR	House in Lancaster, ON	0.53
XR	House in Hemmingford, QC	0.96
XR	House in Victoriaville, QC	0.59

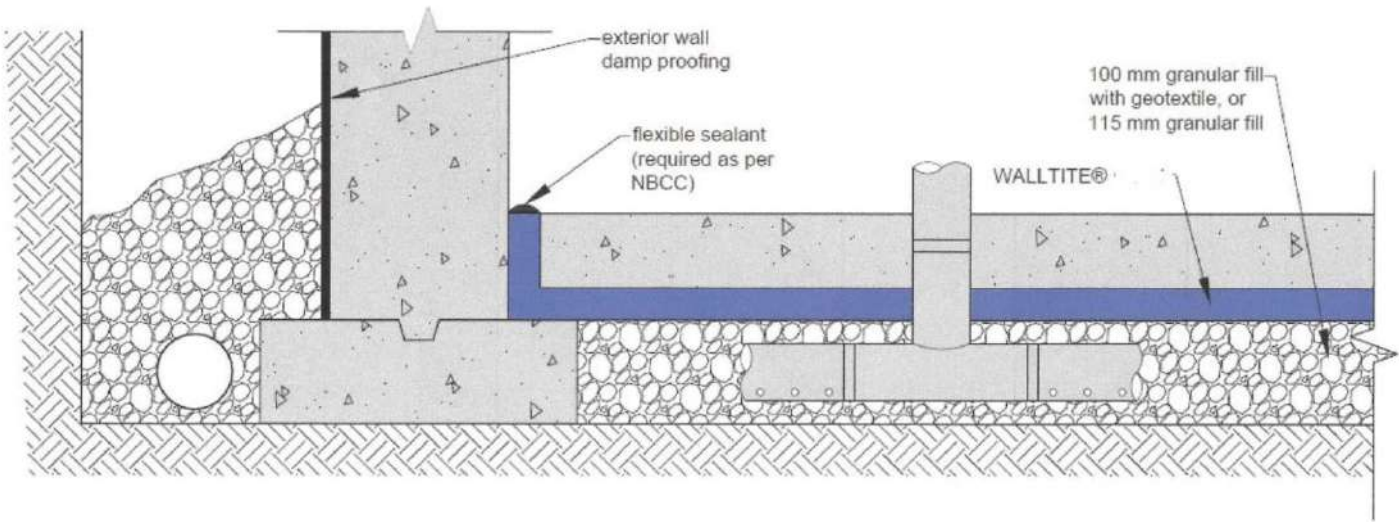


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Tested and Code Compliant Systems

Radon barrier

■ ULC ER41037-01



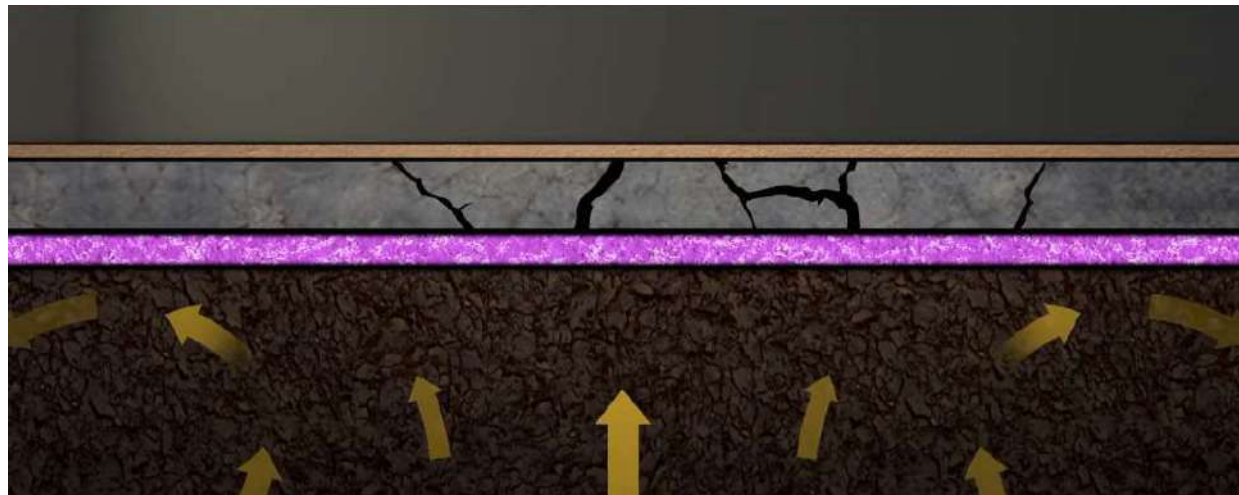
6.2 Radon resistance

The WALLTITE v.5 SPUF material was evaluated as a barrier to radon along with the NBCC acceptable solution of an overlapped 6-mil polyethylene sheet (CGSB 51.34-M Vapour Barrier, Polyethylene Sheet for Use in Building Construction), as reported in Table 2 Material Radon Performance. The WALLTITE v.5 demonstrated increased resistance to radon than the 6-mil polyethylene sheet. Testing indicated that WALLTITE v5 exceeded the performance of 6 mil poly for any thickness above 15 mm.

Table 2: Material Radon Performance (ISO 11665)	
Material	Radon Resistance
6-mil polyethylene	13.6 Ms/m
SPUF (WALLTITE v.5 @ 50mm thickness)	838 Ms/m

Tested and Code Compliant Systems

Radon barrier



Spray Foam and Carbon Footprint

How can spray foam reduce EMBODIED carbon?

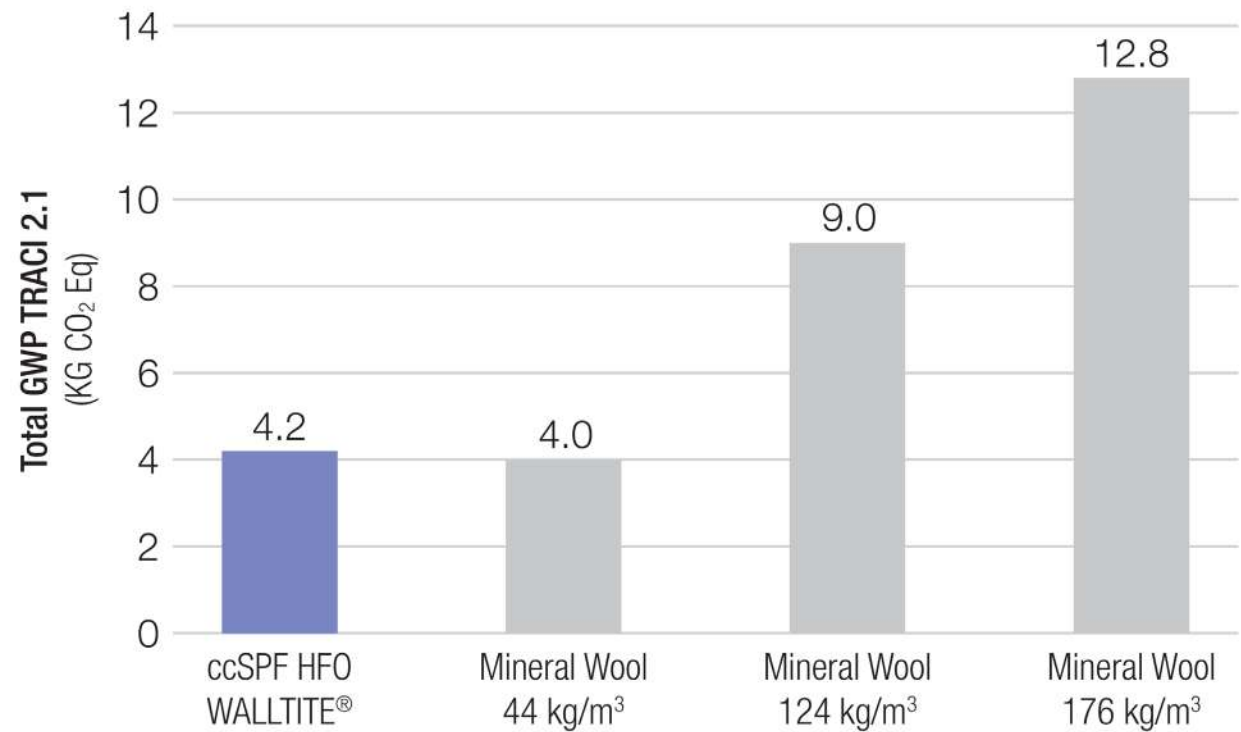
- Control layers
 - ▶ Rain control layer
 - ▶ Air control layer
 - ▶ Vapour control layer
 - ▶ Thermal control layer
- Unique properties of SPF
 - ▶ Second plane of drainage
 - ▶ Air barrier material
 - ▶ Vapour barrier material
 - ▶ Thermal insulation - High R value / inch

Versatile
product

Spray Foam and Carbon Footprint

Comparison of GWP of Insulation Materials

Functional Unit: 1m²@RSI 1.0

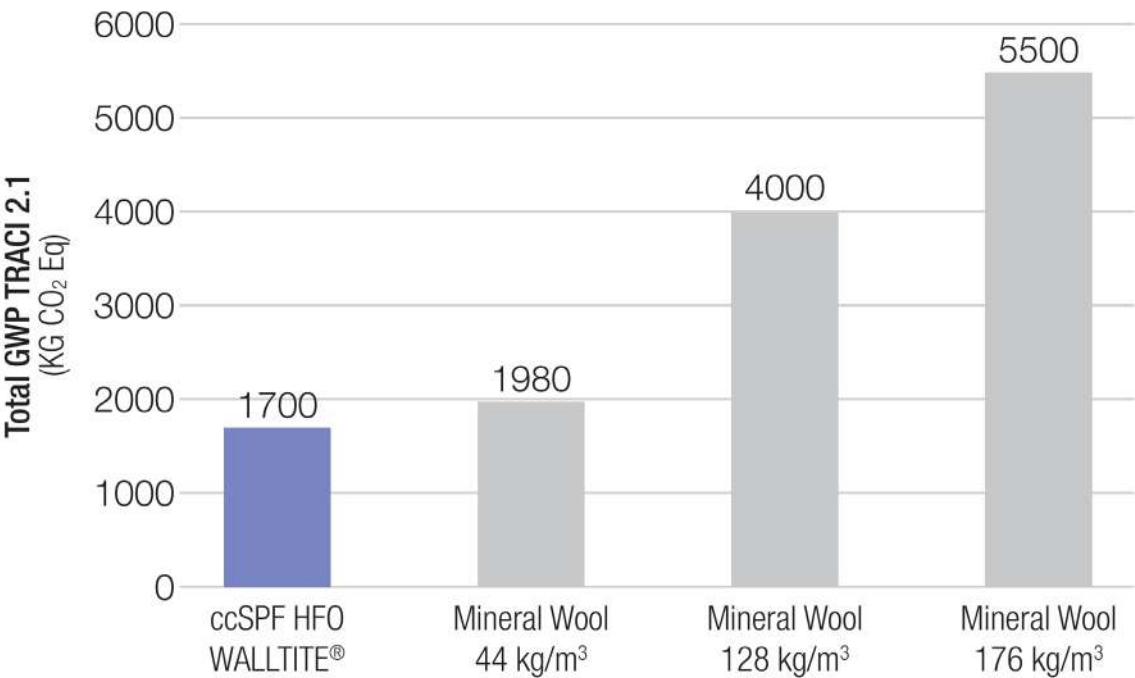


Comparison of GWP of Envelope Systems

Based on a Cavity Wall 100m²@RSI 4.0

WALLTITE CM01 with 10% transition membrane

All others with a 100% coverage air/vapour membrane



Spray Foam and Carbon Footprint

How can spray foam reduce OPERATIONAL carbon?

- High energy efficiency envelope results in reduced heating/cooling loads
 - ▶ High R value
 - ▶ Excellent air barrier properties

Monolithic application



Use of EPD

ENVIRONMENTAL PRODUCT DECLARATION

SPRAY POLYURETHANE FOAM INSULATION

CLOSED CELL USING HYDROFLUOROOLEFINS (CCSPF, HFO)



SPF products are commonly used in residential, light commercial, commercial, institutional, and certain industrial applications. Closed cell SPF (ccSPF) is applied to the interior or exterior side of the building envelope.



Founded in 1987, originally as the Polyurethane Foam Contractors Division, the Spray Polyurethane Foam Alliance (SPFA) is the collective voice, along with the educational and technical resource, for the spray polyurethane foam industry. Our experienced staff and member-comprised committees provide a wide variety of services to the industry.

SPFA develops tools designed to educate and influence the construction industry with the positive benefits of spray polyurethane foam roofing, insulation, coatings, and specialty installations.



Use of EPD

Spray Polyurethane Foam Alliance
Spray Polyurethane Foam (ccSPF, HFO)

According to ISO 14025,
ISO 21930:2017

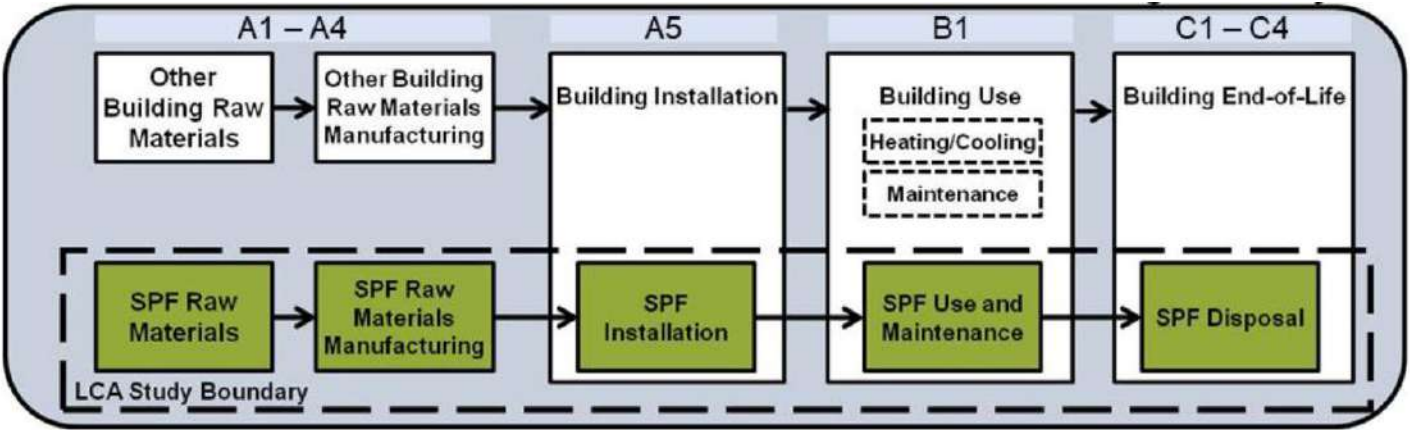
EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	ASTM INTERNATIONAL 100 BARR HARBOUR DR, WEST CONSHOHOCKEN, PA 19428, USA WWW.ASTM.ORG
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	ASTM Program Operator for Product Category Rules (PCR) and Environmental Product Declarations (EPDs), General Program Instructions, Version: 8.0, Revised 04/29/20
ASSOCIATION NAME AND ADDRESS	Spray Polyurethane Foam Association 11 Hope Rd, Suite 111 #308, Stafford, VA 22554
DECLARATION NUMBER	EPD 808
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	Spray polyurethane foam insulation (ccSPF, HFO), 1 m ² of installed insulation material with a thickness that gives an average thermal resistance of RSI = 1m ² ·K/W
REFERENCE PCR AND VERSION NUMBER	PCR Part A: UL Environment Building Related Products and Services. (UL Environment, 2022) and PCR Part B: UL Environment. Building-Related Products and Services. Building Envelope Thermal Insulation EPD Requirements (UL Environment, 2024)
DESCRIPTION OF PRODUCT APPLICATION/USE	Closed cell, HFO spray polyurethane foam (ccSPF, HFO) used in building and construction
MARKETS OF APPLICABILITY	North America
DATE OF ISSUE	11/11/2024
PERIOD OF VALIDITY	5 Years
EPD TYPE	Industry-average
RANGE OF DATASET VARIABILITY	N/A
EPD SCOPE	Cradle-to-grave
YEAR(S) OF REPORTED PRIMARY DATA	2022-2023
LCA SOFTWARE & VERSION NUMBER	LCA FE 10.9 (formerly GaBi Software)
LCI DATABASE(S) & VERSION NUMBER	Managed LCA Content 2024.2 (formerly GaBi Database, CUP 2024.2)
LCIA METHODOLOGY & VERSION NUMBER	IPCC AR6 + CML 2001 Aug 2016 + TRACI 2.1
The PCR review was conducted by:	ASTM International

Use of EPD

4. Life Cycle Assessment Results

Table 11. Description of the system boundary modules

EPD Type	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	MND



Use of EPD

TRACI v2.1	A1	A2	A3	A4	A5	B1	C2	C4
GWP 100 [kg CO ₂ eq]	2.17E+00	6.01E-02	1.28E-01	6.52E-02	2.74E-01	3.33E-03	1.04E-03	1.62E-02
ODP [kg CFC-11 eq]	1.27E-08	1.50E-16	1.20E-12	1.66E-16	3.94E-12	0.00E+00	2.64E-18	6.69E-16
AP [kg SO ₂ eq]	3.27E-03	6.54E-04	3.51E-04	2.74E-04	1.18E-03	0.00E+00	4.42E-06	7.24E-05
EP [kg N eq]	3.57E-04	3.27E-05	2.05E-05	2.51E-05	1.03E-04	0.00E+00	4.03E-07	3.11E-06
POCP [kg O ₃ eq]	6.07E-02	1.29E-02	7.04E-03	6.31E-03	4.00E-02	1.86E-03	1.02E-04	2.53E-03
ADP _{fossil} [MJ, LHV]	4.89E+01	7.67E-01	1.50E+00	8.55E-01	4.13E+00	0.00E+00	1.36E-02	2.05E-01

- Key Points:
 - ▶ System boundaries are not the same for all products
 - ▶ Spray foam serves more than one function

RECAP

- Walltite v.5 has gone through extensive testing to meet and exceed code requirements
 - ▶ Fire rated assemblies – CAN/ULC 101
 - ▶ Combustible component in noncombustible construction – CAN/ULC 134
 - ▶ Air barrier systems
 - ▶ Radon system

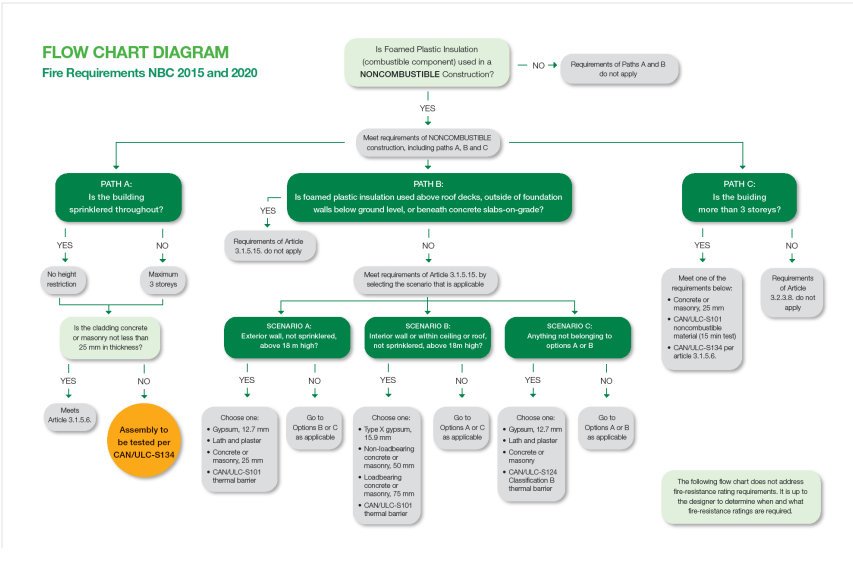


WALLTITE[®]_{MD}

Resources and BASF Support

- Documentation:
 - ▶ Product IQ: UL Designs
 - ▶ Intertek Building Directory: Intertek Designs
 - ▶ Third party approvals
 - ▶ Technical drawings and details (walltite.basf.ca)
 - ▶ Tech tips and bulletin (walltite.basf.ca)

- BASF support
 - ▶ Technical support
 - ▶ Lunch & Learns



Fire Requirements in NBC 2015 and 2020 for Foamed Plastics

This bulletin aims to mention the main articles and their intents concerning the protection of foamed plastics in the National Building Code (NBC) 2015 and 2020. Each article has a specific and different intent. It is important to note that all articles are applicable and must be complied with unless it is clearly stated that there are exemptions. In the case of exemptions to an article, additional information as to when those exemptions can occur will also be provided.

COMBUSTIBLE CONSTRUCTION

Unlike the use of a combustible component in a noncombustible construction which can cause some confusion, the requirement governing the use of foamed plastics in combustible construction are straight forward.

Article 3.1.4.2. Protection of Foamed Plastics

Intent of article:
To limit spread of a fire inside the building.

Requirement Overview:

This article requires foamed plastic used in a wall or ceiling assembly to be covered from adjacent spaces in the building, other than adjacent concealed spaces within attic or roof spaces, crawl spaces, and wall and ceiling assemblies. The acceptable thermal barriers are listed in the article.

The foamed plastic used in article 3.1.4.2, must have a flame-spread rating of not more than 500, as per Article 3.1.4.1.

NONCOMBUSTIBLE CONSTRUCTION

Noncombustible construction has different requirements than combustible construction. The following are some of the main articles addressing fire safety when using foamed plastic insulation in noncombustible construction.

Article 3.1.5.6. Combustible components in Exterior Walls

Intent of article:

To reduce the risks of a vertical fire spreading on the facade of a building in which the fire originates from outside or from inside spreading through an opening, such as a window.

Requirement Overview:

This article applies to combustible components used in an exterior wall assembly and has two requirements that need to be met. The first requirement is that the building must be sprinklered throughout or be limited to no more than 3 storeys in height. The second requirement is that the wall assembly must meet the acceptance criteria of Clause 3.1.5.5.(1)(b) when tested to CANULC-S134, or be protected by masonry or concrete cladding not less than 25 mm thick.

Clause 3.1.5.5.(1)(b) states that when tested in accordance with CANULC-S134, the wall assembly satisfies the following criteria for testing and conditions of acceptance:

- flaming on or in the wall assembly does not spread more than 5 m above the opening, and
- the heat flux during the flame exposure on the wall assembly is not more than 35 kW/m² measured at 3.5 m above the opening.

Article 3.1.5.15. Foamed Plastic Insulation

Intent of article:

To limit spread of a fire inside the building.

Requirement Overview:

This article applies to use of foamed plastic insulation in noncombustible construction. It allows its use above roof decks, outside of foundation walls below ground level, and beneath concrete slabs-on-ground without requirements.

As for uses other than those mentioned above, the requirement is to protect the insulation from adjacent spaces in the building, other than concealed spaces with wall assemblies, by a thermal barrier. The foamed plastic must have a flame-spread rating not more than 500 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction. The acceptable thermal barriers are listed in the article.

Article 3.1.7.1. Determination or Ratings

Intent of article:

Methodology to determine the fire resistance rating of a material, assembly of materials or a structural member that is required to have a fire resistance rating.

Requirement Overview:

The fire-resistance rating shall be determined on the basis of the results of tests conducted in conformance with CANULC-S101, or be assigned a fire-resistance rating on the basis of Appendix D. However, Appendix D does not include foamed plastics, and therefore, assemblies containing

foamed plastics generally need to be tested in conformance with CANULC-S101 as an assembly.

Article 3.2.3.8. Protection of Exterior Building Face

Intent of article:

To limit the probability of a fire to and/or from a neighbouring building.

Requirement Overview:

Where the maximum permitted area of unprotected openings is greater than 10% of the exposing building face, foamed plastic insulation used in an exterior wall of a building more than 3 storeys in building height shall be protected on its exterior surface by:

- concrete or masonry not less than 25 mm thick, or
- noncombustible material that complies with the criteria for testing and the conditions of acceptance stated in Sentence (2) when tested in conformance with CANULC-S101.

IMPORTANT NOTE: Sentence (3) of this article states that the requirements of this article are waived for wall assemblies that comply with the requirements of Article 3.1.5.5.

Also note that Article 3.1.5.6, refers to the passing criteria in Article 3.1.5.5. Therefore, an assembly that meets Article 3.1.5.6, is exempt from Article 3.2.3.8.



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