



Polar Cap 2 Roof System

The First Fully NFPA Compliant Retractable Containment Roof System



The patented Subzero Engineering Polar Cap 2 is the first fully NFPA compliant containment roof system that attaches to the top of the racks and forms a ceiling that prevents hot and cold air from mixing.

Most data center containment systems rely on the heat generated from a fire related incident to release the containment system, as it can pose an obstacle to the fire suppression agent. The NFPA has determined that it is important to have a faster response time and more importantly, a testable system.

The Subzero Polar Cap 2 retractable roof system is a fully electric roof system that retracts into a metal housing when the fire suppression system is alarmed. Having a pre-action system that reacts to a smoke detector will ensure that the containment roof is fully retracted long before the fire suppression system is discharged. Additionally, the roof material is made with the highest fire resistant standard of ASTM E-84 Class A rating.

Key Features

- Modular Design
- Retracting Cover
- Stock Sizes
- Custom Sizes

The Polar Cap 2 roof material is made with the highest fire rated standard of ASTM E-84 Class A rating.

The Polar Cap 2 can also be opened and closed when maintenance is required above the containment space. The Polar Cap 2 roof system is 5 feet wide and can be made up to 30 feet long. The aluminum profile is less than 6" high and thus it presents no problem with obstructions above the cabinets.

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Product Specifications

Frame

Physical Properties

Property	Material	Result
Tensile Strength	Aluminum	22,000 psi

Features

Modular Design	ASTM E84 Class A
Patented	NFPA 75 Compliant

Features

60" Width	30' Max Length
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30 Mil Polypropylene

Flammability

Property	Material	Result
Spread	ASTM E84	10
Smoke Dev.	ASTM E84	160

Physical Properties

2.5" Pleat
High Light Transfer Matte Finish
Light Transmittance 85%

Fire/Electrical System Interface

(The electrical line, power supply, and fire panel connections are not provided by Subzero.)

Power Supply Connection

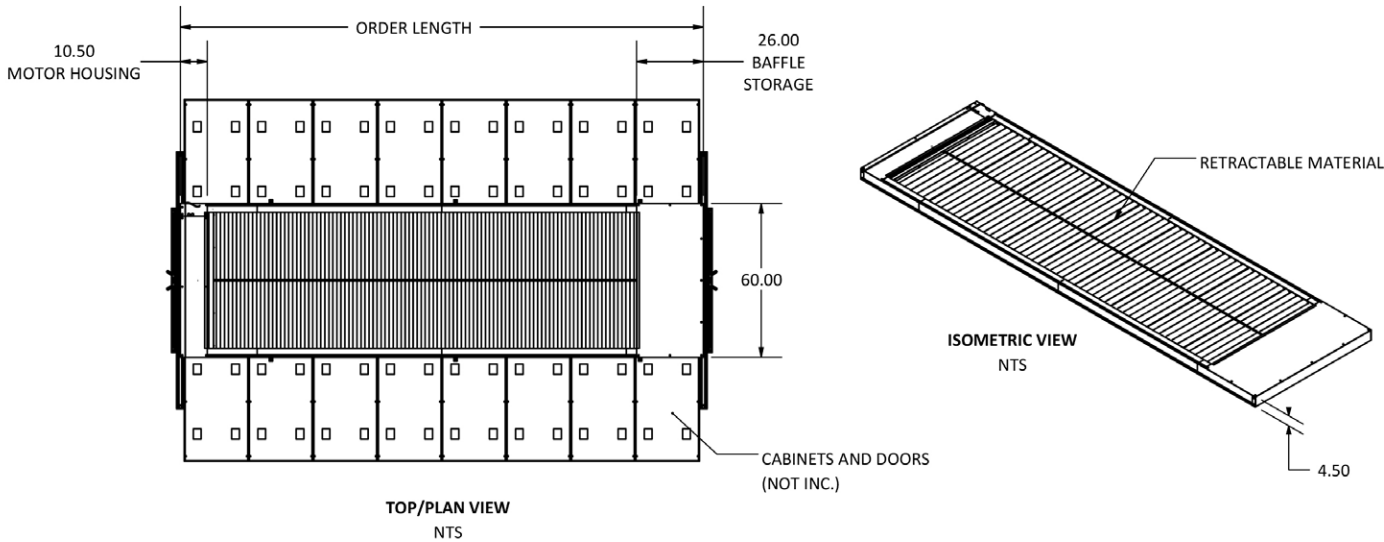
110/220VAC, 5A/2.5A, 50/60Hz Single Phase Supply*
*Subzero recommends connecting to a dedicated branch emergency backed up power supply circuit to insure that the Polar Cap 2 will operate during a facility power outage.

Fire System Interlock Connection

(Subzero recommends the fire protection contractor makes this connection.)

Polar Cap 2 provides a two-wire 24VDC signal that should be wired to customer's fire alarm control panel (FACP) normally open (N.O.) contact rated at 24VDC, .25A. Upon closure of the FACP N.O. contact, the Polar Cap 2 will automatically open to expose the server aisle to the fire extinguishing agent. Connection to a FACP "pre-act" contact will insure that the roof is fully open prior to the extinguishing agent discharge.

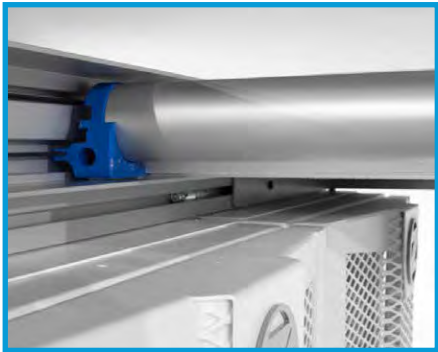
Drawings



The First Fully NFPA Compliant Retractable Containment Roof System

Retractable Roof

When activated the 30 mil polypropylene compresses into a secure housing.



Belt Driven

Neoprene belts ensure the roof retracts quietly and efficiently.



Low-Profile

The Polar Cap 2 is designed to be compact and functional.



Manual Operation

The Polar Cap 2 can be opened or closed manually for maintenance and annual inspection.



NYC Buildings Department
280 Broadway, New York, NY 10007

Rick D. Chandler, P.E., Commissioner



BUILDINGS BULLETIN 2016-014

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Director, Office of Technical Certification and Research

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Purpose: This bulletin establishes acceptance criteria for retractable-type horizontal cold aisle containment systems installed in information technology equipment areas.

Related Code/Zoning Section(s):	BC Ch.8	FC Ch.8	ECC AC101.3
	BC Ch.9	FC 2404.2	EC Art. 111, 2011
	NFPA 13-2013	NFPA 75-2013	NFPA 72-2010

Subject(s): Cooling load, thermal barrier; Cooling load, information technology area; Horizontal cold aisle containment system, retractable

Background: The installation of a retractable-type horizontal cold aisle containment system installed in information technology equipment areas (horizontal cold aisle containment system) is used to minimize the consumption of energy by providing an overhead thermal containment barrier used to create a cold aisle. However, the overhead containment barrier may obstruct the performance of code-required fire suppression systems (BC Chapter 9). This bulletin establishes acceptance criteria for horizontal cold aisle containment for compliance with the NYC Construction Codes.

Description: Horizontal cold aisle containment systems are attached to the top of IT equipment racks, and form a thermal barrier used to reduce power consumption of cooling loads. The thermal barriers retract into a metal housing when a smoke detector is activated or due to loss of primary power.

Evaluation Scope: NYC Construction Codes

Evaluation Criteria: Pursuant to the AC 28-113.2, the 2014 NYC Energy Conservation Code Section 101, and the 2011 NYC Electrical Code Article 110, the Office of Technical Certification and Research (OTCR) recognizes the use of horizontal cold aisle containment systems evaluated in accordance the following:

1. Listing for the electric motor in accordance with NYC Electrical Code.
2. Listing for addressable module (relays) in accordance with Chapter 23 of NFPA 72².

Uses: A horizontal cold aisle containment system is used to reduce cooling loads in information technology equipment areas.

Restriction: This bulletin does not recognize drop panel type horizontal cold aisle containment systems.

Conditions of Acceptance: A horizontal cold aisle containment system shall be designed, filed, installed, inspected and maintained in accordance with the NYC Construction Codes, NYC Electrical Code, and other applicable provisions including but not limited to the following:

A. Design

1. Horizontal cold aisle containment systems shall be designed in accordance with applicable sections of 2011 NYC Electrical Code.
2. The horizontal thermal barrier of the horizontal cold aisle containment system shall be constructed with a material having a flame spread index not greater than 50 and a smoke-developed index not greater than 450 when tested in accordance with ASTM E 84 or UL 723.
3. A horizontal cold aisle containment system shall be installed in rooms provided with approved smoke detection and fire suppression systems. The under floor area shall be provided with listed smoke detectors in accordance with NFPA 72.
4. Where horizontal cold aisle containment systems are to be installed in existing IT equipment room areas, a NYS Professional Engineer shall be required to confirm adequate coverage by the existing smoke detectors. The NYS Professional Engineer shall coordinate with the engineer or architect of record who shall provide the following:
 - A statement on the construction plans confirming adequate coverage by the existing smoke detectors, or
 - Submit an application for changes to the smoke detection system. The application shall include a statement on the plans confirming adequate coverage by the proposed smoke detectors.
5. A horizontal cold aisle containment system shall retract:
 - a. Upon activation of the any smoke detector in the IT equipment room area, or
 - b. In the event of loss of primary power.
6. A horizontal cold aisle containment system shall include a manual switch for opening and closing the retractable roof. The switch shall be accessible to the fire fighters and IT room personnel.
7. IT equipment areas shall comply with BC Chapter 9 and FC Chapter 9. The floor within the cold aisles shall be perforated to allow cold air to circulate through the computer racks.

B. Filing

File two separate applications for permit (PW1) with the Department of Buildings (DOB). The first application for permit shall be filed for a horizontal cold aisle containment system(s), and the second application for permit shall be filed for an addition to the base building existing fire alarm system.

1. First application for permit (PW1) for cold aisle containment systems shall be

filed as follows:

- A. Section 5. Horizontal cold aisle containment system shall be filed as an 'Alteration Type 2.'
- B. Section 6. Select 'OT- Other, describe' in section (6D). Please type 'Horizontal cold aisle containment systems' in box (6D)

6 Work Types <i>Select all that apply but no more than allowed by job and filing type. "OT" required on al</i>			
6A <input type="checkbox"/> BL - Boiler PW1C	<input type="checkbox"/> FS - Fuel Storage PW1C	<input type="checkbox"/> PL - Plumbing PW1B	6E
<input type="checkbox"/> FA - Fire Alarm	<input type="checkbox"/> FP - Fire Suppression	<input type="checkbox"/> SD - Standpipe PW1B	6F
<input type="checkbox"/> FB - Fuel Burning PW1C	<input type="checkbox"/> MH - Mechanical	<input type="checkbox"/> SP - Sprinkler PW1B	
6B <input type="checkbox"/> EQ - Construction Equipment 15	6C <input type="checkbox"/> OT/GC - General Construction	6D <input checked="" type="checkbox"/> OT - Other, describe: retractable-type horizontal cold aisle containment unit	

- C. Section 11 or Section 24. Provide the following statement in the Job Description box: 'Horizontal cold aisle containment systems to be installed to reduce power consumption.'

- 2. Second application for permit (PW1) for an addition to the base building fire alarm system shall be filed as follows:
 - A. Section 5. An addition to the base building fire alarm system shall be filed as an 'Alteration Type 2.'
 - B. Section 6. Select 'FA-Fire Alarm' in section (6A).

6 Work Types <i>Select all that apply but no more than allowed by job and filing type. "OT" required on al</i>			
6A <input type="checkbox"/> BL - Boiler PW1C	<input type="checkbox"/> FS - Fuel Storage PW1C	<input type="checkbox"/> PL - Plumbing PW1B	6E
<input checked="" type="checkbox"/> FA - Fire Alarm	<input type="checkbox"/> FP - Fire Suppression	<input type="checkbox"/> SD - Standpipe PW1B	6F
<input type="checkbox"/> FB - Fuel Burning PW1C	<input type="checkbox"/> MH - Mechanical	<input type="checkbox"/> SP - Sprinkler PW1B	
6B <input type="checkbox"/> EQ - Construction	6C <input type="checkbox"/> OT/GC - General	6D <input type="checkbox"/> OT - Other, describe	

- C. Section 11 or Section 24. Provide the following statement in the Job Description box: 'Addition to the base building fire alarm system for horizontal cold aisle containment.'

C. Installation

1. Installation requirements shall be in accordance with the manufacturer's instructions.
2. Installation and use shall comply with all applicable requirements of the New York City Construction Codes, New York City Fire Code and manufacturer's installation guidelines.
3. FDNY shall review and approve the fire alarm interlock to be installed with the horizontal cold aisle containment system(s). The system installation shall be performed by a licensed Electrician.
4. The power supply connection shall be from an approved secondary emergency power source in accordance with chapter 27 of NYC BC.
5. Fire alarm interlocking and power connections shall be monitored by the fire alarm system. A supervisory signal for fire alarm interlocking and power connections shall be sent to the fire alarm system if either connection is disabled.

D. Special Inspections

1. Pursuant to section BC 1704.14, the installation of horizontal cold aisle containment systems shall be subject to special inspection requirements of Chapter 17 of the Building Code and Department Rules covering special inspection. Special Inspectors of horizontal cold aisle containment shall:
 - a. Maintain the same qualification requirements for the Smoke Control Systems category as defined in 1 RCNY section 101-06, Appendix A.
 - b. Have duties and responsibilities to verify compliance with approved plans, witness complete retraction of the unit; and
 - c. Complete the statement of special inspection by referencing this Bulletin under the Special Inspection Item for 'Alternative Materials' in section 3.0 of the TR1 form.

TR1

<input type="checkbox"/>	<input type="checkbox"/>	Mastic and Intumescent Fire-resistant Coatings	BC 1704.12	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Exterior Insulation and Finish Systems (EIFS)	BC 1704.13	
<input type="checkbox"/>	<input type="checkbox"/>	Alternative Materials - OTCR Buildings Bulletin #	BC 1704.14	
<input type="checkbox"/>	<input type="checkbox"/>	Smoke Control Systems	BC 1704.15	
<input type="checkbox"/>	<input type="checkbox"/>	Mechanical Systems	BC 1704.16	
<input type="checkbox"/>	<input type="checkbox"/>	Fire/Nil Straps and Fire/Nil Pinna Systems	BC 1704.17	

Use this line to identify
BB 2016-014

2. Addition to the base building fire alarm system related to horizontal cold aisle containment shall be inspected and approved by the FDNY.
3. Maintenance
Horizontal cold aisle containment systems and all connected fire alarm systems shall comply with NYC FC section 901.6.

Reference Standards:

1. NFPA 70-14 – *National Electrical Code (NEC), 2014 Ed*
2. NFPA 72-10 – *National Fire Alarm and Signaling Code*
3. NFPA 75-13 – *Standard for the Fire Protection of Information Technology Equipment*