Glanda Thomas

From: James Esposito [esposij@fdny.nyc.gov]
Sent: Wednesday, December 08, 2010 12:23 PM
To: Fatma Amer
Subject: Tower 3 & Tower 4 Standpipe Variance
Attachments: WTC Tower 3 & 4 Standpipe Proposals 12-3-10.PDF; Antifreeze.safety.alert.Aug.2010.PDF

Hello Fatma,
Attached is the request from the Port Authority for a variance to a temporary standpipe installation in buildings under construction at the World Trade Center. Also attached is some NFPA concerns on the glycol water mixture. Thanks,

James E. Esposito
Manhattan Borough Commander
F.D.N.Y.
Phone: 212-570-1518
Fax: 212-566-1313

James Colgate
Please review ASAP and Communicate w/ Chief Esposito
Keep in the loop

Barmas, Irina

From: Scott Thompson [SThompson@Silvprop.com]
Sent: Monday, November 22, 2010 1:03 PM
To: Barmas, Irina
Subject: FW: FW: WTC Towers 3 & 4 - Construction Standpipes
Attachments: 20101122110126.pdf

Version with only 1 Article 27 as requested.

World Trade Center - Tower 3 & 4
Proposed Construction Standpipe System Code Deviations

World Trade Center Towers 3 & 4 are both mega high-rise commercial office towers each rising over 1000' above street level. Both consist of four (4) Basement Levels below-grade and over 65 Levels above-grade.

The arrangement of the permanent building combination fire/standpipe systems within each tower are as follows:

The Below Grade Spaces (Levels B4, B3,B2 & B1) are protected by a combination fire/sprinkler standpipe system that is a part of the WTC Transportation HUB project and served by two (2) automatic fire pumps: one located within WTC Tower 2 in the East Bathtub and the other adjacent to Greenwich & Liberty Streets in the West Bathtub. This system is served by Siamese connections that are located on all four elevations of each tower.

The Above Grade Spaces (Ground Floor and up) are protected by an independent combination fire / sprinkler standpipe system for each respective Tower. Each tower contains its own automatic fire pumping systems and Siamese connections located on all four building elevations.

During the development of an arrangement for the standpipe systems to protect these towers throughout the construction process a number of challenges and concerns have come to light. These concerns pertain to implementing a viable system to protect the towers that meets the new code requirements that took effect in February 2010.

These new codes consist of the recently adopted Local Laws 27 & 28 which require that all construction standpipe systems be hydrostatically tested and monitored at all times by compressed air monitoring systems in order to be considered in "readiness."

As it pertains to the Below Grade Construction Standpipe Systems full compliance with code requirements is viable and the system shall be implemented accordingly.

As it pertains to the Above Grade Systems we are proposing slight deviations from code that will enable the implementation of a more robust system that will better serve its purpose to provide a reliable means of protecting the towers in the event of a fire at some point during the construction process and duration.

Most problematic is the requirement to hydrostatically test the entire standpipe system once the working deck reaches 75' and each 100' thereafter. The two most challenging issues that result from this requirement and that need to be addresses are how to avoid freeze-ups (as the construction

durations span several winter seasons) and the fact that while the required testing is underway the system is no longer in "readiness" and water pressures can render portions of the system unusable by FDNY . The testing duration on a project of this height will be excessive (it is anticipated that when nearing the top of the building these duration can take in excess of an entire work day day to fill, pressurize, repair any damages, re-pressurize, test , drain & restore to readiness).

The following is an outline containing background information, reference documents, concerns and proposed solution to enable the implementation of viable systems to protect these towers during their construction.

I. Current NYC DOB Construction Fire Standpipe Code Requirements

A. Current Applicable Codes: Local Law 63/09, Effective 2/4/10 (Pressure Testing)
Local Law 64/09, Effective 2/4/10 (Standpipe Press Alarm Systems)

Reference attached:

- ***Standpipes & Sprinklers New Safety Regulations Pamphlet***
  NYC Buildings: Construction Codes Update #27 (Local Law 63)
- ***NYC Buildings: Construction Codes Update #28 (Local Law 64)***

B. Requirements For Hydrostatic Testing

- System to be hydrostatically tested and in "readiness" once working deck reaches 75' in height
- Additional hydrostatically testing shall be performed @ 175' and each 100' thereafter
- Each hydrostatic pressure test shall be performed on the entire system

C. Requirements For Compressed Air Monitoring

- Pressure shall be maintained on the system at all times and shall not exceed 25 psig by utilizing nitrogen or compressed air with a dryer
- Supervisory pressure shall be monitored and an alarm shall be activated if pressure drops below supervisory pressure or exceeds 25 psi.
- In the event of an alarm FDNY shall be notified, the cause of the alarm identified and any necessary repairs made to restore e the system as soon as possible

II. Challenges / Concerns With Following Code In Mega-High Rise Tower Application

A. Freeze-Ups

- The project construction durations are such that the construction standpipe will be subject to multiple winter seasons where temperature conditions will drop below freezing
- Even if hydrostatic testing is ceased during periods of freezing temperatures, residual water in "trapped" elements of the standpipe from previous hydrostatic testing shall be subject to

freezing that could result in blockages or "slugs" that would not be detected by the standpipe monitoring system. Such blockages could render the standpipe system useless by preventing water flow past the blockage. There is no way to detect such a freeze-up.

B. Corrosion

- Repeated drain /fill operations with water that will occur throughout the long-term construction duration to comply with the hydrostatic testing requirement will expose the interior surfaces of the standpipe to oxidation and long-term corrosion

C. Unprotected Building Spaces During Periods of Hydrostatic Testing

- Due to the building heights and the requirement to conduct hydrostatic testing, water pressures within the piping system while testing is underway can be in excess of 700 psi (over 400 psi of this is attributable to pure gravity weight of water within the standpipe column)

  During the hydrostatic testing operation the system shall be taken out of "readiness" and rendered unusable by FDNY because these dangerously high pressures will preclude safe use of the Fire Hose Valves (code dictates that water pressure at any FHV cannot exceed 160 psi). FHV's undergoing these pressures will remain out of service until the testing is completed and the system is evacuated of water

  Due to building height and system volumes the time frames required to conduct the hydrostatic testing operation (fill, pressurize, drain) will be excessive resulting in an unprotected condition for the testing duration

D. Identifying Cause of a Low Pressure Alarm

- The low pressure alarm system simply alerts that there is a breach somewhere in the buildings standpipe system, but does not have any means of identifying the location of such a breach. Therefore in the event of an alarm condition the entire standpipe system needs to be inspected to determine the cause before the problem can be remediated. Conducting such an inspection can be a very time consuming process on buildings of such height

III. Proposed Solutions For WTC Tower 3 & 4 Installations

A. To address Item II-A (Freeze-Ups), we propose to use of a 40% Propylene Glycol / 60% water solution in lieu of plain water shall be used during system hydrostatic tests

Reference attached:

- ***Propylene Glycol USP Material Safety Data Sheet***

B. To address Item II-B (Corrosion), we propose to fill the system with the Glycol / Water Solution during the hydrostatic testing and leave the system charged with the solution (do not drain the

system between tests). In doing so the interior surfaces of the piping shall not be exposed to oxygen after drain down and therefore will not oxidize and corrode.

C. To address Item II-C (Protection During System Testing), we propose to leave the system charged with the Glycol / Water solution (do not drain the system between tests) and introduce the following into the Construction Standpipe System to ensure safe operating pressures at all FHV locations:

Reference attached:

- ***WTC Towers 3 & 4: Schematic Construction Standpipe Arrangement, dated 11-17-10***

Physical Elements

- Introduce temporary riser check valves in the riser system at locations vertically in order to ensure that they system static pressure imposed by gravity when filled with water never exceeds 160 psi (which is the maximum allowable pressure at a Fire Hose Valve)

Testing

- In lieu of filling with water and hydrostatically testing the entire system each time 100' of vertical standpipe is installed, and subsequently draining down the system and leaving it charged with air, we propose the following:
    - Test only the uppermost 100' of vertical riser each time that 100' of vertical standpipe is installed (in other words only test the newly installed piping above the riser isolation valves that are located at 100' intervals while leaving all of the previously installed piping charged with the Glycol / Water Solution). Such testing shall be performed on a single riser at a time and therefore during testing all elements of the system shall remain in "readiness" (that is charged with water, at acceptable operating pressures always below 160 psi and fully monitored throughout the testing duration) in the event of a fire

Monitoring

- In lieu of monitoring the standpipe system by maintaining supervised compressed air pressure on the system 24/7, monitor water pressure at the base of each of the six (6) 160 psi zone (that is the zones segregated by the riser check valves) 24/7

IV. Benefits Realized By Proposed Solutions

A. The construction standpipe system shall be filled with the Glycol / Water Solution at all times and therefore is fully charged and ready for FDNY use at all times

B. As the system is fully charged with the Glycol / Water mixture at all times there is no need for FDNY to bleed and vent the riser system of air and replace with water upon connection to the

Siamese connections and charging from fire trucks. This will save vital time in getting water up the building should the need occur

C. The system is not susceptible to freeze-ups and undetectable blockages
D. The system is not susceptible to corrosion on the interior surfaces of the piping elements
E. In the event of a system breach the specific riser (x2 risers) and specific zone (x3 per riser) of floors served by that riser shall be identifiable and therefore it shall narrow the search area for where a breach occurred. In turn this will save time in identifying the source of the breach and performing the necessary repairs and restoring the system to "readiness" – in essence shortening the time period while the system is out of "readiness."

This is opposed to what would be encountered with the compressed air monitoring system wherein an alarm only identifies that there is a breach in the system without narrowing the location where such a breach occurred.

Additionally, having six separate zones affords more flexibility in performing work on the system by allowing a single zone to be taken out of service while the remaining five (5) are still fully monitored and in "readiness".

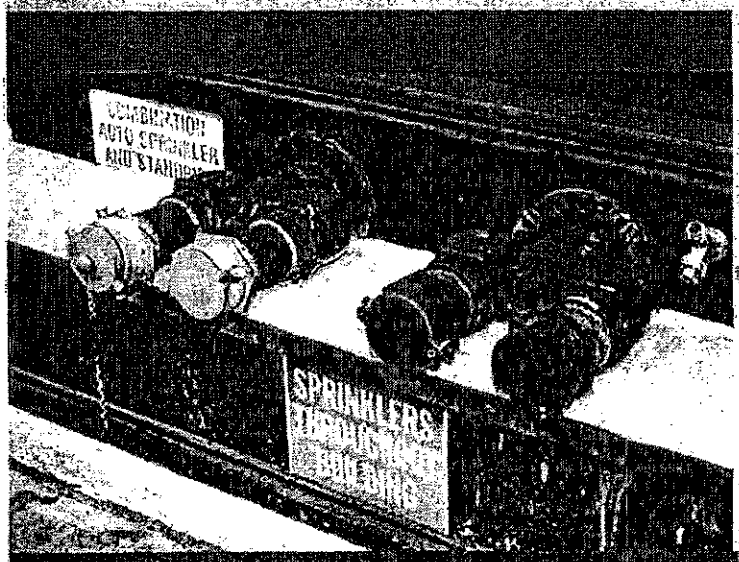
NYC Buildings

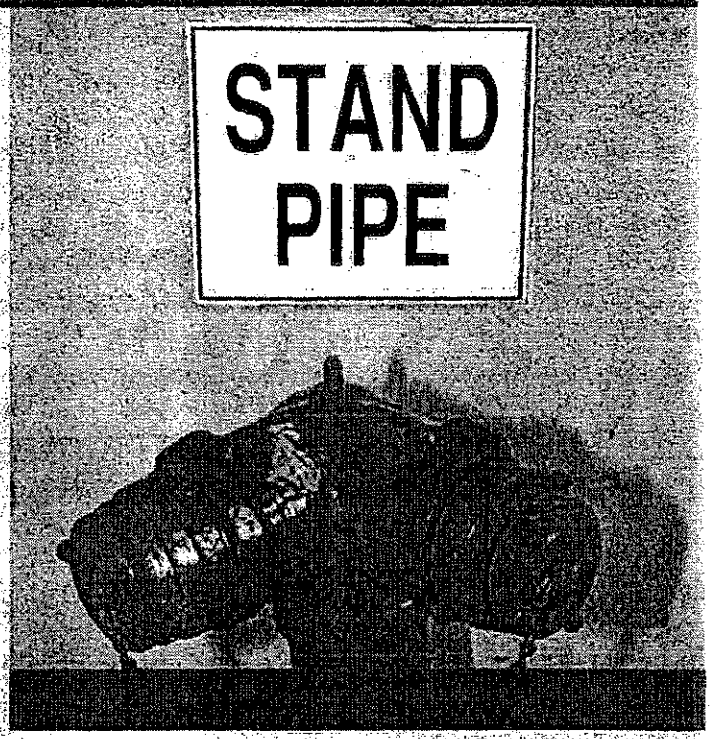
STANDPIPES + SPRINKLERS
New Safety Regulations

Pressure Testing
Local Law 63/09, effective 2/4/2010.

Freezing temperatures can damage a pressurized system. Compressors without air dryers generate moisture in the line, which can freeze. Exposed valves can also freeze – causing the system to depressurize and triggering the alarm.

- New or Altered Sprinkler Systems: A licensed master plumber or licensed fire suppression piping contractor must conduct hydrostatic pressure testing.
- New or Altered Standpipe Systems: A licensed master plumber or licensed fire suppression piping contractor must conduct hydrostatic pressure testing. (Read Local Law 63/09 for limited exceptions in freezing conditions.)
- Removing Stories: A licensed master plumber or licensed fire suppression piping contractor must conduct hydrostatic pressure testing before work begins.
- New Buildings Under Construction: An initial standpipe hydrostatic pressure test must be performed when the building reaches 75 feet high; additional tests are required when the building reaches 175 feet high and every 100 feet thereafter.
- Enlargement Triggering a New Standpipe System or Addition to an Existing Standpipe System: A hydrostatic pressure test is required at every 75 feet in height added to the system.





Standpipe Pressurized Alarm Systems
Local Law 64/09, effective 2/4/2010.

- Vacant Buildings Being Demolished: Existing standpipes must be dry standpipes and have an air-pressurized alarm.
- New Buildings Higher Than 75 Feet: Temporary and permanent dry standpipes must have an air-pressurized alarm.
- Prior Notification for Scheduled Work: Contractors must notify the Fire Department before any planned alarm deactivation.
- Out of Service Standpipes: Contractors must notify the Fire Department.
- Site Safety Manager's Log: Alarm activations, inspections and repairs must be logged.
- Installation Applications: A registered design professional must file the application.
- Installation Permits: A licensed master plumber or licensed master fire suppression piping contractor *and* a licensed electrician must have a permit.

Robert D. LiMandri, Commissioner | Michael R. Bloomberg, Mayor

CONSTRUCTION CODES UPDATE PAGE

Matter in plain text is unchanged. Matter underlined is new. Matter ~~stricken-through~~ is deleted.
Source: Local Law 63 of 2009, effective February 4, 2010.

BUILDING CODE

Insert between pages 366a and 367 of your bound volume.

Amend section 1704.22 and add section 1704.22.1 to read as follows:

1704.22 Standpipe system special inspection. New and altered standpipe systems shall be inspected in accordance with ~~Section~~ Sections 905 and 1704.22.1. The permit holder responsible for the standpipe work shall perform all required acceptance tests, and complete and sign the appropriate contractor's material and test certifications. The special inspector shall witness all required tests, verify that installation of all materials, fittings, hangers, assemblies and signage are in accordance with the approved construction documents, that painting of the standpipe system required by Section 905.11 of this code has been performed and that the contractor has transmitted required maintenance literature and instruction to the owner. The special inspector shall verify that the material and test certification forms have been transmitted to the Fire Department and the Department of Buildings‡.

Exception: ~~Special inspection of~~ The special inspector need not witness the hydrostatic pressure test ~~shall not be required~~ when such test is witnessed by the department.

1704.22.1 Hydrostatic pressure testing. All new or altered standpipe systems in buildings shall undergo successful hydrostatic pressure testing by a licensed master plumber or licensed fire suppression piping contractor in accordance with the requirements of this code, including Section 901.5, Sections 1704.22.1.1 through 1704.22.1.5 and NFPA 14.

Exception: When the standpipe system is exposed to freezing conditions, a hydrostatic pressure test required by this section may be postponed until such conditions no longer exist, notwithstanding any requirement that the standpipe be maintained in a state of readiness, provided that the system undergoes an interim test with dry nitrogen or air using a compressor in accordance with NFPA 14. Any such air pressure tests shall be witnessed by the special inspector unless witnessed by the department.

1704.22.1.1 New buildings under construction. For standpipes required to comply with Section 3303.8 of this code, an initial hydrostatic pressure test of the entire system shall be performed when the building reaches a height of 75 feet (22 860 mm) and additional successful hydrostatic pressure tests of the entire system shall be performed at 175 feet (53 340 mm), and at every 100 feet (30 480 mm) in

CONSTRUCTION CODES UPDATE PAGE

Matter in plain text is unchanged. Matter underlined is new. Matter ~~stricken-through~~ is deleted.
Source: Local Law 63 of 2009, effective February 4, 2010.

height thereafter. The permit holder shall perform a final acceptance test of the completed system in accordance with the requirements of Section 901.5 of this code.

1704.22.1.2 Enlargements or additions to existing system. Where there is an enlargement that triggers a new standpipe system or there is an addition to an existing standpipe system, hydrostatic pressure tests of the entire system shall be performed for every 75 feet (22 860 mm) of additional height added to the system. The permit holder shall perform a final acceptance test of the completed system in accordance with the requirements of Section 901.5 of this code.

1704.22.1.3 Removal of stories, including full demolitions. Where stories are removed from a building served by an existing standpipe system, hydrostatic pressure tests of the entire system shall be performed prior to the commencement of work.

1704.22.1.4 Alterations. For alterations not covered under Sections 1704.22.1.2 or 1704.22.1.3 above, the permit holder shall perform a final acceptance test of the completed system in accordance with the requirements of Section 901.5 of this code.

1704.22.1.5 Readiness. No standpipe system shall be considered in readiness until there has been a successful hydrostatic pressure test.

CONSTRUCTION CODES UPDATE PAGE

Matter in plain text is unchanged. Matter underlined is new. Matter ~~stricken through~~ is deleted.
Source: Local Law 64 of 2009, effective February 4, 2010.

BUILDING CODE

Insert between pages 602b and 603 of your bound volume.

Add the following new section 3303.8.1:

3303.8.1 Air pressurized alarm system for dry standpipe systems during construction or demolition operations. Air pressurized alarm systems shall be provided as set forth in Items 1 through 5 below. The provisions of NFPA 14, Chapter 12, as modified in Appendix Q, shall also apply.

1. Demolitions. In vacant buildings and structures undergoing demolition, all existing standpipes shall be maintained in a state of readiness as dry standpipes in accordance with Item 2 of Section 3303.8 and shall be provided with an air pressurized system.

2. New buildings and structures. All required permanent or temporary standpipes shall be in a state of readiness once the work reaches a height greater than 75 feet (22 860 mm) and shall contain an air pressurized alarm system.

3. Submission of application. An application to install an air pressurized alarm system shall be filed by a registered design professional and a permit obtained by a licensed master plumber or licensed master fire suppression piping contractor. A licensed electrician shall obtain all required electrical permits in accordance with Chapter 3 of Title 27 of the *Administrative Code*.

4. Specifications. The following provisions shall apply to the air pressurized alarm system:

   4.1. Pressure. Pressure shall be maintained in the standpipe and cross connections at all times and shall not exceed 25 psig (172 kPag) by utilizing nitrogen or an air compressor with an air dryer. The supervisory pressure shall be as determined by a registered design professional.

   4.2. Automatic air pressurized alarm activation. The alarm shall be automatically activated when the pressure drops below the supervisory pressure or rises above the maximum pressure of 25 psig (172 kPag). When the alarm is activated, notification shall be made to the Fire Department in accordance with Section 901.7.7 of the *New York City Fire Code*, all work at the site shall cease, except as provided in Item 4.2.1, and an investigation of the entire standpipe system and air compressor shall be immediately performed

CONSTRUCTION CODES UPDATE PAGE

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Source: Local Law 64 of 2009, effective February 4, 2010.

to determine the cause of the alarm. Unless authorized by the Fire Department, no construction or demolition work shall resume until the standpipe system is repaired and the appropriate pressure is restored, except that any repairs to the standpipe system needed to restore the required pressure shall be undertaken immediately and the standpipe system restored as soon as possible. There shall be compliance with the requirements of Section 901.7.7 of the *New York City Fire Code* while the standpipe system is out of service. Upon completion of repairs to the standpipe system a full inspection of such system shall be performed, which shall include, among other things, visually tracing the standpipe, including risers, cross connections and siamese connections to verify that no breach exists and checking all gauges of the standpipe system to ensure the standpipe system has been restored to a state of readiness.

4.2.1. Notwithstanding the provisions of Item 4.2, the activation of the alarm shall not require the cessation of work necessary for the completion of concrete pouring operations in progress at the time of alarm activation, where such cessation would cause a cold joint that would impair the structural integrity of the finished construction. The continuation of such operations shall be permitted only until an orderly termination of such operations can be effectuated. The site safety manager or coordinator shall record the names and locations of any employees necessary for the completion of the concrete pouring operations and provide them to the Fire Department personnel who arrive on the scene.

4.3. Air compressor. The air compressor shall be designed to automatically cut in and cut out at the supervisory pressure and shall be tied into the standpipe system between the siamese connections and the house check valves. The air compressor shall utilize an air dryer during times when freezing conditions exist to condition the air entering the dry standpipe system.

4.4. Alarm. The standpipe alarm system shall utilize pressure switches and control equipment to annunciate a local audible alarm on site that can be heard during working and non-working hours. The audible signal of the horn shall be at least 15 dBA above the ambient noise level but no more than 110 dBA.

4.5. Power supply. The standpipe alarm system shall be connected to an active, dedicated power supply at all times.

CONSTRUCTION CODES UPDATE PAGE

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Source: Local Law 64 of 2009, effective February 4, 2010.

4.6. Check valves. Check valves shall be installed to prevent water from entering the air compressor.

4.7. Locks and caps. All control valves shall be chained and locked in the appropriate position and shall be provided with capped outlets. All hose valves shall also be provided with capped outlets.

4.8. Fire Department connections. Three inch (76 mm) iron hose plugs with gaskets in Fire Department connection swivels shall be provided.

4.9. Drainage. Provisions shall be made to drain water in any trapped sections of the dry standpipe system that are subject to freezing.

4.10. Manual air release connection. A minimum 2.5-inch (64 mm) connection located immediately downstream of the Fire Department siamese connection check valve shall be provided and piped to a location immediately adjacent to the siamese connections. This line shall be fitted with a 2.5-inch (64 mm) hose valve and shall allow for release of the pressurized air from the dry standpipe system. The number of air release valves provided shall be such that the air pressure shall be released in no more than 3 minutes, which shall be verifiable by an actual air release test performed at the time of the initial installation.

4.11. Construction documents. Plans shall identify all standpipe risers, cross connections, siamese connections, any intermediate check valves that have to be removed, proposed location of the air release connections, designation of the supervisory pressure, complete information regarding the alarm system, and procedures for the safe pressurization and depressurization of the system.

4.12. Signage. Signage shall be provided at all siamese connections indicating that the dry standpipe system is pressurized and showing the location of the manual air release.

5. Planned removal from service of standpipe system and standpipe air pressurized alarm. Whenever the standpipe system is to be placed out of service for the addition of a new section to the system, removal of an existing section as demolition operations progress, or other planned event, the standpipe alarm may be temporarily deactivated subject to compliance with the requirements of Section 901.7.7 of the *New York City Fire Code*. Where a site safety manager or coordinator is required by Section 3310.5 of this code, all alarm activations,

CONSTRUCTION CODES UPDATE PAGE

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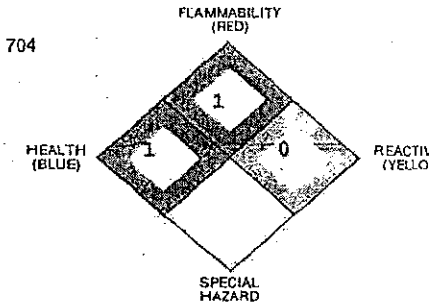
Source: Local Law 64 of 2009, effective February 4, 2010.

inspections, and repairs shall be logged into the log book maintained by such site safety manager or coordinator. If the standpipe system is not returned to a state of readiness and the alarm reactivated within 2 hours of such planned removal from service, all construction or demolition work at the site shall cease, unless otherwise approved by the Fire Department.

MATERIAL SAFETY DATA SHEET

NFPA Designation 704

DEGREE OF HAZARD
4 = EXTREME
3 = HIGH
2 = MODERATE
1 = SLIGHT
0 = INSIGNIFICANT



PROPYLENE GLYCOL USP

Effective Date: 02/12/08 Revised: Phone: (718)786-1110
Name and Address: Emergency Phone: INFO-TRAC (800) 535-5053
WESCO TECHNOLOGIES, INC.
36-06 43rd Avenue, LONG ISLAND CITY, NY 11101

PRODUCT NAME: PROPYLENE GLYCOL USP

1. INGREDIENTS: (% w/w, unless otherwise noted) Propylene glycol CAS# 000057-55-6 99%
This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200). In addition, other substances not 'Hazardous' per this OSHA Standard may be listed. Where proprietary ingredient shows, the identity may be made available as provided in this standard.

2. PHYSICAL DATA:

BOILING POINT:	370°F, 188°C	VAP PRESS:	0.22 mmHg @ 20°C, 68°F
VAP DENSITY:	2.62	SOL. IN WATER:	Complete
SP. GRAVITY:	1.038 20/20°C, 68°F	APPEARANCE:	Colorless liquid.
ODOR:	Odorless.		

3. FIRE AND EXPLOSION HAZARD DATA:

FLASH POINT:	218°F, 103°C	METHOD USED:	PMCC
FLAMMABLE LIMITS		LFL: 2.6%	UFL: 12.5%
EXTINGUISHING MEDIA:	Water fog, alcohol foam, CO_2, dry chemical.		
FIRE & EXPLOSION HAZARDS:	Not available.		
FIRE-FIGHTING EQUIPMENT:	Wear positive-pressure, self-contained breathing apparatus.		

4. REACTIVITY DATA:
STABILITY: (CONDITIONS TO AVOID) Stable under normal storage conditions.
INCOMPATIBILITY: (SPECIFIC MATERIALS TO AVOID) Oxidizing material.
HAZARDOUS DECOMPOSITION PRODUCTS: Propionaldehyde, carbon monoxide in the presence of limited oxygen in a fire situation.
HAZARDOUS POLYMERIZATION: Will not occur.

5. ENVIRONMENTAL AND DISPOSAL INFORMATION:
ACTION TO TAKE FOR SPILL/LEAKS:
Small spills: Cover with absorbent material, soak up and sweep into a drum.
Large Spills: Dike around spill and pump into suitable containers.
DISPOSAL METHOD: Reprocess or burn in an approved incinerator in accordance with all federal, state, and local requirements.

6. HEALTH HAZARD DATA:
Eye: May cause slight transient (temporary) eye irritation. Corneal injury is unlikely.
Skin Contact: Prolonged contact is essentially nonirritating to skin. Repeated exposure may cause slight flaking, tenderness, and softening of skin.
Skin Absorption: A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. The LD50 for skin absorption in rabbits is >10 g/kg.
Ingestion: Single dose oral toxicity is low. The oral LD50 for rats is 21-33.7 g/kg. No hazards anticipated from ingestion incidental to industrial exposure.

6. HEALTH HAZARD DATA: (CONTINUED)

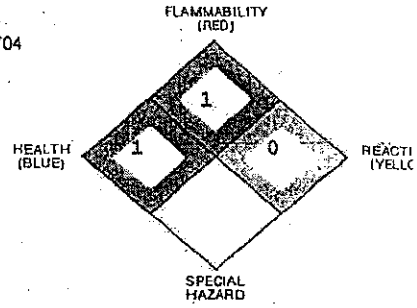
MATERIAL SAFETY DATA SHEET

PROPYLENE GLYCOL USP

NFPA Designation 704

DEGREE OF HAZARD

4 = EXTREME
3 = HIGH
2 = MODERATE
1 = SLIGHT
0 = INSIGNIFICANT



Inhalation: A single prolonged (hours) inhalation exposure is not likely to cause adverse effects. Mists are not likely to be hazardous.

Systemic and Other Effects: Repeated excessive ingestion may cause central nervous system effects. Did not cause cancer in long-term animal studies. Birth defects are unlikely. Exposures having no adverse effects on the mother should have no effect on the fetus. In animal studies, has been shown not to interfere with reproduction. Results of in vitro ("test tube") mutagenicity tests have been negative. Results of mutagenicity tests in animals have been negative.

7. FIRST AID:

Eyes: Irrigate immediately with water for at least 5 minutes.
Skin: Wash off in flowing water or shower.
Ingestion: No adverse effects anticipated by this route of exposure.
Inhalation: No adverse effects anticipated by this route of exposure incidental to proper industrial handling.
Note To physician: No specific antidote. Supportive care. Treatment based on judgement of the physician in response to reactions of the patient.

8. HANDLING PRECAUTIONS:

Exposure Guideline(S): AIHA WEEL is 50 ppm total; 10 mg/m^3 aerosol only. There is no OSHA PEL or ACGIH TLV for propylene glycol.
Ventilation: Good general ventilation should be sufficient.
Respiratory Protection: When airborne exposure guidelines and/or comfort levels may be exceeded, use an approved air-purifying respirator.
Skin Protection: Use impervious gloves when prolonged or frequently repeated contact could occur.

Eye Protection: Use safety glasses. Where contact with liquids is likely, chemical goggles are recommended because eye contact with this material may cause pain, even though it is unlikely to cause injury.

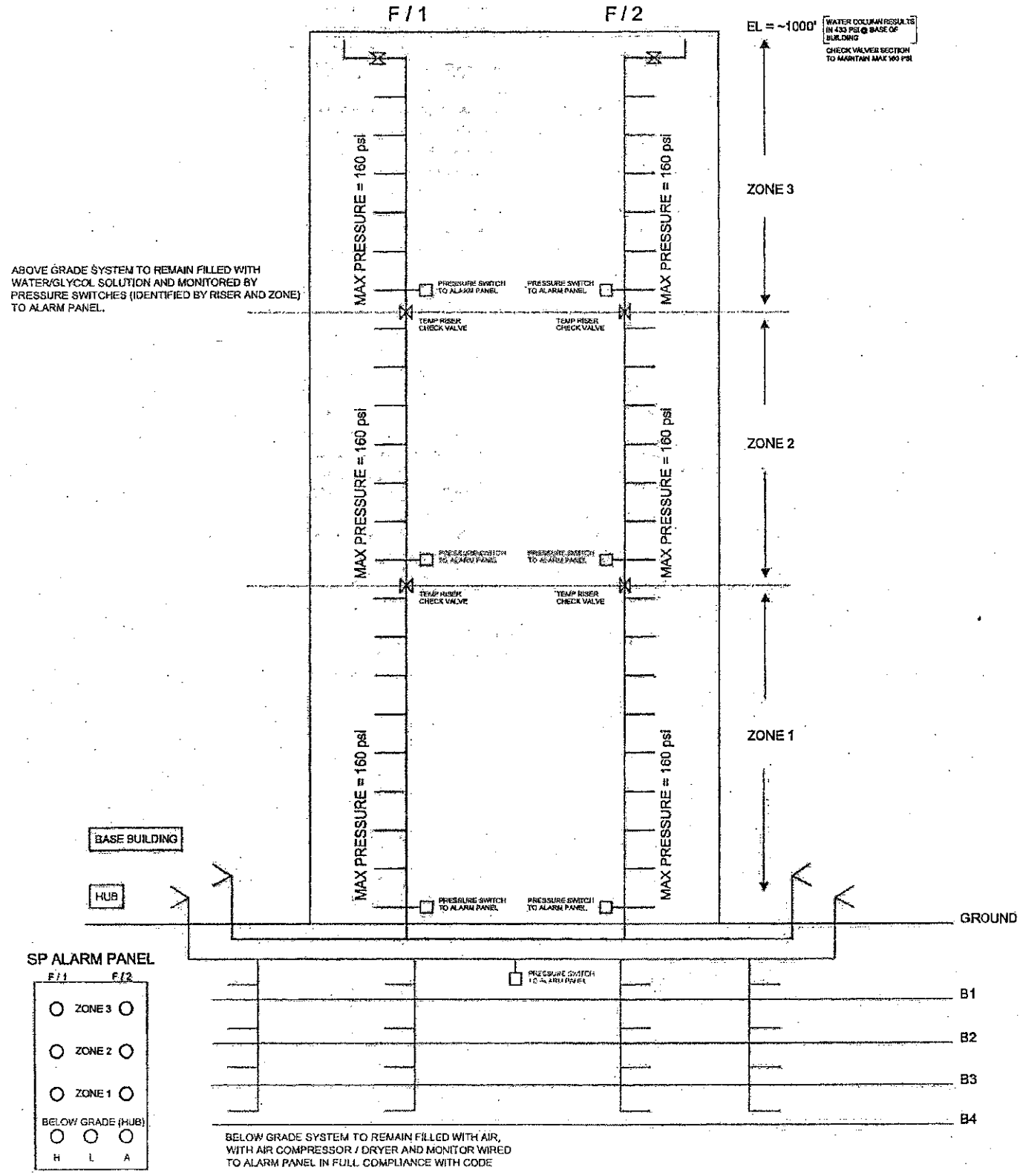
9. ADDITIONAL INFORMATION:

REGULATORY REQUIREMENTS:
SARA HAZARD CATEGORY: This product has been reviewed according to the EPA 'Hazard Categories' promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

Not to have met any hazard category
SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:
Exercise reasonable care and caution.

MSDS STATUS: Revised Section 9.

The Information Herein Is Given In Good Faith, But No Warranty, Express or Implied, Is Made.



WTC TOWERS 3 & 4: SCHEMATIC CONSTRUCTION STANDPIPE ARRANGEMENT 11/17/2010

Updated August 2010

NFPA Safety Alert Regarding Antifreeze in Residential Fire Sprinkler Systems

Background

Automatic fire sprinkler systems with antifreeze solutions have more than 60 years of successful use in commercial applications and an equally successful experience since they have been in use in residential applications. Most fire fatalities occur in the home, and when home sprinklers are present, the risk of dying in a home fire decreases by 83%. NFPA supports and urges the expanded use of residential sprinkler systems as the most effective way to prevent fire injury and death in the home and other residential occupancies.

While NFPA emphasizes that residential sprinkler systems are and remain reliable and effective, a recent fire incident involving a sprinkler system that contained a high concentration antifreeze solution has raised concerns about the combustibility of antifreeze solutions in residential sprinkler systems. The incident involved a grease fire in a kitchen where a sprinkler system with a reported 71.2% concentration of antifreeze deployed. The fire resulted in a single fatality and serious injury to another person. (Recently, NFPA received a report of another incident, this time in a living room, which may have been exacerbated by the presence of an antifreeze solution.)

Following the first incident, NFPA initiated a research project with the Fire Protection Research Foundation (Foundation) and an initial set of fire tests was also conducted by Underwriters Laboratories. Based on information learned from these efforts, NFPA issued an interim safety alert and recommendations in July 2010 and began additional research to gain further information on antifreeze solution performance under various fire scenarios.

The Foundation has completed this additional research in a report entitled "Antifreeze Solutions in Home Fire Sprinkler Systems: Phase II Research Interim Report" (2010), and NFPA is providing updated safety information and guidance based on the test results (see the box below).

Key findings of fire tests

- Antifreeze solutions with concentrations of propylene glycol exceeding 40% and concentrations of glycerin exceeding 50% have the potential to ignite when discharged through automatic sprinklers.
- Both the 40% propylene glycol and 50% glycerin solutions demonstrated similar performance to that of water alone for fire control throughout the series of tests.
- Based on the results of this research, antifreeze solutions of propylene glycol exceeding 40% and glycerin exceeding 50% are not appropriate for use in residential fire sprinkler systems.
- Consideration should be given to reducing the acceptable concentrations of these antifreeze solutions by an appropriate safety factor.

NFPA Standards Council Action

Based on the Foundation report, the NFPA Standards Council, the body that oversees the NFPA standards development process, issued tentative interim amendments (TIA) to NFPA 13, *Standard for the Installation of Sprinkler Systems*; NFPA 13D, *Standard for Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*; and NFPA 13R, *Standard for Installation of Sprinkler Systems in Residential Occupancies Up To and Including Four Stories in Height* banning the use of antifreeze in sprinkler systems in new construction of residences and in the dwelling unit portions of other occupancies. (8/16/10)

Important safety information and NFPA guidance regarding antifreeze in residential fire sprinkler systems

New Systems

For now, and until any further action by NFPA consensus standards committees, NFPA sprinkler standards prohibit the use of antifreeze in new residential fire sprinkler systems.

NFPA standards prohibit the use of antifreeze in residential fire sprinkler systems in new construction following the August 16, 2010, issuance of tentative interim amendments (TIA) to NFPA 13, NFPA 13D, and NFPA 13R. If you are putting in a new residential fire sprinkler system (including all NFPA 13D applications and the dwelling-unit portions of NFPA 13 and NFPA 13R systems), refer to the latest editions of NFPA 13, NFPA 13D and NFPA 13R, as amended by TIAs 1000, 995, and 994.

Existing Systems

NFPA sprinkler standards are installation standards and do not currently address the problem of antifreeze in existing systems. NFPA, in its role as a safety advocate, believes that owners and contractors should take immediate steps to review the status of their existing residential sprinkler systems and take appropriate action. A complete ban on antifreeze is appropriate for new systems during the period that the NFPA standards committees review the Fire Protection Research Foundation reports and determine whether limited use of antifreeze in these systems is appropriate. A more difficult problem presents itself, however, with existing systems, some of which cannot be easily retrofitted or redesigned so as to avoid the need for antifreeze. Because of the lifesaving benefit of these systems, simply shutting down these systems should not be an option. For owners and contractors who now must determine how to handle these systems, NFPA is offering the following guidance regarding existing systems:

- Residential fire sprinklers are extremely effective fire protection devices, significantly reducing deaths, injuries, and property loss from fire. These systems should not be disconnected.
- Existing residential fire sprinkler systems, whenever possible, should not contain an antifreeze solution.
- If you have, or are responsible for, an existing residential occupancy with a fire sprinkler system, contact a sprinkler contractor to check and see if there is antifreeze solution in the system.
- If there is antifreeze solution in the system, determine if other means, such as insulation, can be used to provide adequate freeze protection.
- If there is no viable alternative to antifreeze solutions, NFPA recommends the following:
  - Use only propylene glycol or glycerin antifreeze solution.
  - The antifreeze solution should be the lowest possible concentration required for the needed freeze potential, but under no circumstance should the antifreeze solution exceed a maximum concentration of 40% of propylene glycol or a maximum concentration of 50% of glycerin. Consideration should be given to reducing these concentrations by an additional safety factor.
  - The antifreeze solution should only be a factory pre-mixed solution; use of factory pre-mixed solutions is essential to ensure the proper concentration level and solution integrity.
  - Antifreeze solutions should only be used with the approval of the local authority having jurisdiction.

For more information, including copies of the Foundation reports and the TIAs, and to stay up to date on any further guidance or information that NFPA may provide on this issue, regularly consult www.nfpa.org/antifreeze.

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