FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE COMMITTEE

MEMORANDUM

TO: NFPA 30 Technical Committee on Tank Storage and Piping Systems
FROM: R. P. Benedetti
DATE: August 13, 2015
SUBJECT: Agenda for NFPA 30 First Draft Meeting
         September 11, 2015 — 8:00 AM to 5:00 PM

Ladies and Gentlemen:

Attached is the Agenda for the NFPA 30, Flammable and Combustible Liquids Code, First Draft meeting of the NFPA 30 Technical Committee on Tank Storage and Piping Systems, to be held 8:00 AM to 5:00 PM, Friday, September 11, 2015, at the Crowne Plaza Hotel, Austin TX.

This Agenda will also be posted to the NFPA 30 Document Information Page at http://www.nfpa.org/30

If you have additional items for the Agenda, please bring them with you to the meeting.

rpb/
cc FLCC Meeting Folder
     FLCTAN/NM
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE COMMITTEE

AGENDA — NFPA 30 First Draft Meeting

NFPA 30 Technical Committee on Tank Storage and Piping Systems
Crowne Plaza Hotel, Austin TX
Friday, September 11, 2015, 8:00 AM to 5:00 PM

1. Call to Order.

2. Introduction of Attendees. Update of Committee Roster. [Attachment № A1]

3. Approval of Minutes of Last Meeting. [June, 2013, San Antonio TX] [Attachment № A2]

4. Report of Committee Chair.

5. Report of Staff Liaison.
   - Technical Committee Scope. [See Attachment № A3 for Proposed New Scope]
   - Technical Committee Membership Status.

6. Member Reports on Current Issues. [As Necessary]

7. Review and Act on Public Inputs to Amend the 2015 edition of NFPA 30
   - [Attachment № A5 – Public Inputs to Chapters 21, 22, and 27; Annex C]
   - [Attachment № A6 – Global Public Inputs: Low Pressure Containers; Reference Standards]

8. Old Business.
   - Revisit Action on U. S. Chemical Safety and Hazard Investigation Board Recommendation on Isolated Storage Tanks.
   - Clarification of Pressure Limitations for Storage Tanks – Task Group Project.
   - Technical Justification and Reevaluation of Storage Tank Separation Distances – Task Group Project.
   - Low Melting Point Piping Materials – Validity of Application to Thermoset Plastics

9. New Business. [NONE]

10. Schedule Next Meeting(s).

11. Adjournment.
# Address List

## Tank Storage and Piping Systems

### Flammable and Combustible Liquids

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Date</th>
<th>FLCTAN No.</th>
<th>Address</th>
<th>Phone/Cell</th>
<th>Fax</th>
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<tbody>
<tr>
<td><strong>Stephen W. Haines</strong></td>
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<tr>
<td>Name</td>
<td>Title</td>
<td>Address</td>
<td>Alternate Name</td>
<td>Phone/Cell</td>
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<td><strong>Tank Storage and Piping Systems</strong></td>
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<tr>
<td>Robert N. Renkes</td>
<td>M</td>
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<tr>
<td>John W. Richmond, Sr.</td>
<td>U</td>
<td>4/14/2005</td>
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<tr>
<td>Roland A. Riegel</td>
<td>RT</td>
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<td>Tim G. Schroeder</td>
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<td>10/18/2011</td>
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<td>Clark D. Shepard</td>
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<td>1/12/2000</td>
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<td>David B. Wechsler</td>
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<td>Peter J. Willse</td>
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<td>Sage Risk Solutions, LLC, Principal</td>
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<td>Petroleum Marketers Association of America, Alternate: Charles R. Plummer</td>
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<td>Husky Corporation, Principal</td>
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<td>Luis F. Arango, Phone/Cell: 860-293-7900, 860-460-1965</td>
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<td>David W. Owen, Phone/Cell: 703-846-3327</td>
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**Address List**

08/06/2015  
Robert P. Benedetti  
FLC-TAN
# Address List

## Tank Storage and Piping Systems

### Flammable and Combustible Liquids

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>FLC-TAN</th>
<th>Phone/Cell 1</th>
<th>Phone/Cell 2</th>
<th>Fax</th>
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<tr>
<td>John P. Woycheese</td>
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<td>Michael D. Butler</td>
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<td>Richard S. Kraus</td>
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<td>Timothy S. Murphy</td>
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<td>David W. Owen</td>
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<td><a href="mailto:david.w.owen@exxonmobil.com">david.w.owen@exxonmobil.com</a></td>
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Address List

Tank Storage and Piping Systems

Flammable and Combustible Liquids

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Email: anitabud61@msn.com
### Address List

**Tank Storage and Piping Systems**  
**Flammable and Combustible Liquids**

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Member Status</th>
<th>Date of Joining</th>
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</thead>
<tbody>
<tr>
<td>Brooke B. Smith, Jr.</td>
<td>Member Emeritus</td>
<td>FLC-TAN</td>
<td>1/1/1982</td>
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<tr>
<td>Robert P. Benedetti</td>
<td>Staff Liaison</td>
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<tr>
<td>Jack Woycheese</td>
<td>Member Emeritus</td>
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FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE COMMITTEE

Minutes of NFPA 30 Second Draft Meeting

NFPA 30 Technical Committee on Tank Storage and Piping Systems
Doubletree Hotel – San Antonio Downtown
San Antonio TX
Tuesday & Wednesday, June 18 & 19, 2013

I. Participation

S. P. Allwein, Morrison Brothers Company
T. D. Blackford, Chevron Energy Technology Company (Rep. American Petroleum Institute)
C. A. Davis, URS Corporation
C. V. De Taeye, Travelers Insurance Company
W. B. Geyer, Steel Tank Institute
S. W. Haines, Haines Fire & Risk Consulting Corp., CHAIR
D. H. Havens, Bechtel Marine Propulsion Corporation / Knowles Atomic Power Laboratory
D. C. Kirby, Baker Engineering & Risk Consultants, Inc.
G. D. Kirby, CYTEC Industries, Inc.
R. A. Riegel, UL LLC
J. R. Rocco, Sage Risk Solutions, LLC (Rep. Petroleum Marketers Association of America)
J. L. Scheffey, Hughes Associates, Inc. (Alternate to J. Woycheese)
R. J. Tanner, Michigan Department of Environmental Quality (Alternate to M. Poxson)
B. Tate, Office of the Fire Marshal – Ontario
J. J. Wanko, U. S. Occupational Safety and Health Administration
D. B. Wechsler, Lake Jackson TX (Rep. American Chemistry Council)
J. Woychester, Hughes Associates, Inc.

R. P. Benedetti, National Fire Protection Association, STAFF LIAISON

GUESTS: A. Burke, Restaurant Technologies, Inc.
G. Brennecke, Liberty Mutual (6/19 only)

Members Not in Attendance

L. F. Arango, XL Global Asset Protection Services (Alternate to P. Willse)
J. H. Bagnall, Burns & McDonnell Engineering Company
G. P. Bareta, Wisconsin Department of Commerce
J. V. Cignatta, Datanet Engineering Inc.
S. D. Curran, Fiberglass Tank & Pipe Institute
M. Doxey, HMT, Inc.
E. S. Goldhammer, Aon Fire Protection
T. S. Lentz, Aon Risk Services, Inc. (Alternate to D. Nugent)
P. A. McLaughlin, McLaughlin & Associates (Alternate to S. Curran) (Rep. Fiberglass Tank & Pipe Institute)
II. Minutes

1. The meeting was called to order at 8:00 AM on Tuesday, June 18, 2013 by Technical Committee Chair Steve Haines.

2. Attendees introduced themselves. The Technical Committee roster was corrected as needed. An updated roster will be posted on the Technical Committee’s web page.

3. The Minutes of the previous meeting (August 2012, NFPA, Quincy MA) were unanimously approved as issued.

4. The Technical Committee Chair welcomed attendees and reviewed the Agenda.

5. The Staff Liaison reported on the following:
   - **Technical Committee Scope Statement.** The Technical Committee agreed to the need for a revised scope that accurately reflects the Technical Committee’s responsibilities. The Staff Liaison was directed to develop a revised scope statement for the committee’s review.
   - **Membership Status.** The Staff Liaison reported on recent changes to committee membership and on the balance of interests on the committees. At this time, there is no balance issue.
   - **Document Revision Schedule for NFPA 30-2012.** The Staff Liaison reviewed the Annual 2014 revision schedule for the 2015 edition of NFPA 30.

   - Mr. Riegel reported on the question of whether adaptors for Stage II vapor recovery nozzles and hoses represented a violation of listing. He also reported on testing of emergency vent devices.
   - The Technical Committee discussed issues of inspection of small storage tanks of the types used on farms and on isolated construction projects.

7. Committee Input No. 16 – Security of Unsupervised Tanks
   [Recommendation from the U. S. Chemical Safety and Hazard Investigation Board]

   Based on the development of guidance within the industry, the Technical Committee agreed to the development of a new annex statement for Paragraph 21.7.2.2 of NFPA 30.

8. Committee Inputs Nos. 11 and 12 – Pressure Limitations for Storage Tanks.

   The Technical Committee decided to defer this issue to the next document revision cycle.


   The Technical Committee determined that the table for vent reduction factors should remain as is.
10. Committee Input No. 15 – Capacity Limitations for Secondary Containment-Type Tanks.

   The Technical Committee decided there was no technical justification to limit the capacity of the primary vessel as shown in Table 22.11.4.1. The Technical Committee decided to apply the 50,000 gallon capacity limit to all secondary containment-type tanks for Classes I, II, and IIIA liquids and to delete Table 22.11.4.1.

11. Committee Input No. 17 – Low-Melting Point Piping Materials
[Recommendation from the U. S. Chemical Safety and Hazard Investigation Board]

   This issue was addressed by a Second Revision developed by the Technical Committee.

12. Public Comment No. 2 – Materials of Construction for Tanks

   This was rejected on the basis that it is already addressed in Chapter 27.

13. There was no Recent Correspondence requiring the Technical Committee's attention.

14. There was no Old Business requiring the Technical Committee's attention.

15. Under New Business:

   - Mr. Riegel presented an update on revisions to relevant UL standards.
   - The Technical Committee discussed the practicality of forming a Task Group to address federal regulatory issues. After discussion, the Technical Committee decided to address any future needs in ad hoc fashion.
   - The Technical Committee raised the issue of whether to prohibit weak roof-to-shell seam construction for tanks of 30 ft. diameter and less.

16. Scheduling of the next meeting was deferred.

17. The meeting adjourned at 10:30 AM, June 18, 2013.
Technical Committee on Tank Storage & Piping Systems

This Committee shall have primary responsibility for documents or portions of documents on safeguarding against the fire and explosion hazards associated with the storage of flammable and combustible liquids in fixed aboveground and underground tanks, including tanks in buildings or vaults, and with the installation of piping systems for flammable and combustible liquids. This Committee shall also have primary responsibility for documents or portions of documents on safeguarding against the fire and explosion hazards associated with the storage of flammable and combustible liquids in portable tanks whose capacity exceeds 3000 liters (793 gallons).

This Committee shall not have responsibility for the installation of storage tanks for flammable and combustible liquids where specifically covered by other NFPA documents.

Responsible for Chapters 21 through 27 and Annexes B and C of NFPA 30, Flammable and Combustible Liquids Code.
## 2017 ANNUAL REVISION CYCLE

*Public Input Dates may vary according to standards and schedules for Revision Cycles may change. Please check the NFPA Website for the most up-to-date information on Public Input Closing Dates and schedules at [www.nfpa.org/document #](http://www.nfpa.org/document #) (i.e. www.nfpa.org/101) and click on the Next Edition tab.

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| Tech Session Preparation | Notice of Intent to Make a Motion (NITMAM) Closing Date | 2/20/17 | 2/20/17 |
|& ISSUEANCE | Posting of Certified Amending Motions (CAMs) and Consent Standards | 4/17/17 | 4/17/17 |
| | Appeal Closing Date for Consent Standards | 5/2/17 | 5/2/17 |
| | SC Issuance Date for Consent Standards | 5/12/17 | 5/12/17 |

| Tech Session | Association Meeting for Standards with CAMs | 6/4-7/2017 | 6/4-7/2017 |

| Appeals and Issuance | Appeal Closing Date for Standards with CAMs | 6/27/17 | 6/27/17 |
| | SC Issuance Date for Standards with CAMs | 8/10/17 | 8/10/17 |

Approved: October 30, 2012

Revised________________________
For the purpose of this chapter, the term in this section shall have the definitions given. Following definitions shall apply:

Statement of Problem and Substantiation for Public Input

for clarification

Submitter Information Verification

Submitter Full Name: RICHARD KRAUS
Organization: APIPETROLEUM SAFETY CONSULTAN
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 22 12:01:36 EDT 2015
Tanks shall be of steel or other approved noncombustible material and shall meet the applicable requirements of 21.4.1.1 through 21.4.1.5 except as provided in 21.4.1.2.

Statement of Problem and Substantiation for Public Input

non combustible material allowed in accord with 21.4.1.2

Submitter Information Verification

Submitter Full Name: RICHARD KRAUS
Organization: APIPETROLEUM SAFETY CONSULTAN
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 22 12:04:02 EDT 2015
21.4.1.2
Tanks shall be permitted to be constructed of combustible materials when approved. Tanks constructed of combustible materials shall be limited to any of the following:

1. Underground installation
2. Use where required by the properties of the liquid stored
3. Aboveground storage of Class III B liquids in areas not exposed to a spill or leak of Class I or Class II liquid
4. Storage of Class III B liquids inside a building protected by an approved automatic fire-extinguishing system
5. Non-metallic tanks manufactured in compliance with and listed to UL SU 2258 shall be acceptable in indoor and outdoor aboveground installation for Class II and Class III liquids

Statement of Problem and Substantiation for Public Input

The addition to NFPA 30 (and by reference 30A) would allow tanks manufactured to UL SU 2258 to be applied in combustible liquids storage installations where specified per the scope of UL SU 2258 supported by the extensive and rigorous testing requirements of the standard. From Subject of Investigation 2258 Introduction- "1.1 These requirements cover nonmetallic or composite primary, secondary and diked type atmospheric tanks from 60-660 gallons (227-2500 L) intended primarily for the storage and supply of heating oil for oil burning equipment, or alternatively, the storage of diesel fuels for compression ignition engines and motor oils (new and used) for automotive service stations, in above ground installations. Based on the engineering scope and rigorous testing required by UL SU 2258, this standard should be incorporated into NFPA language addressing tanks manufactured of combustible materials as proposed.

Submitter Information Verification

Submitter Full Name: BRUCE STOWE
Organization: ROTH INDUSTRIES INCORPORATED
Affiliation: No organizational affiliation beyond the scope of my employment at Roth Industries, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 01 14:08:30 EDT 2015
Atmospheric tanks shall be designed and constructed in accordance with recognized engineering standards. Atmospheric tanks that meet any of the following standards shall be deemed as meeting the requirements of 21.4.2.1:

1. API Specification 12B, *Bolted Tanks for Storage of Production Liquids*
2. API Specification 12D, *Field Welded Tanks for Storage of Production Liquids*
3. API Specification 12F, *Shop Welded Tanks for Storage of Production Liquids*
4. API Standard 650, *Welded Steel Tanks for Oil Storage*
5. UL 58, *Standard for Steel Underground Tanks for Flammable and Combustible Liquids*
6. ANSI/UL 80, *Standard for Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids*
7. ANSI/UL 142, *Standard for Fire Resistant Tanks for Flammable and Combustible Liquids*
8. UL 1316, *Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids*
9. ANSI/UL 1746, *Standard for Corrosion-Resistant Steel Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures*
10. UL 2080, *Standard for Fire Resistant Storage Tanks for Flammable and Combustible Liquids*
11. ANSI/UL 2085, *Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids*
12. UL SU 2258, *Outline of Investigation for Nonmetallic Tanks for Oil-Burner Fuels and other Combustible Liquids*

Statement of Problem and Substantiation for Public Input

The addition to NFPA 30 (and by reference 30A) would allow tanks manufactured to UL SU 2258 to be applied in combustible liquids storage installations where specified per the scope of UL SU 2258 supported by the extensive and rigorous testing requirements of the standard. From Subject of Investigation 2258 Introduction: "1.1 These requirements cover nonmetallic or composite primary, secondary and diked type atmospheric tanks from 60-660 gallons (227-2500 L) intended primarily for the storage and supply of heating oil for oil burning equipment, or alternatively, the storage of diesel fuels for compression ignition engines and motor oils (new and used) for automotive service stations, in above ground installations. Based on the engineering scope and rigorous testing required by UL SU 2258, this standard should be incorporated into NFPA language addressing tanks manufactured of combustible materials as proposed.

Submitter Information Verification

Submitter Full Name: BRUCE STOWE
Organization: ROTH INDUSTRIES INCORPORATED
Affiliation: No organizational affiliation beyond that of the scope of my employment at Roth Industries, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 01 13:57:27 EDT 2015
21.4.2.1.1

Atmospheric tanks shall be designed and constructed in accordance with recognized engineering standards. Atmospheric tanks that meet any of the following standards shall be deemed as meeting the requirements of 21.4.2.1:

1. API Specification 12B, *Bolted Tanks for Storage of Production Liquids*
2. API Specification 12D, *Field Welded Tanks for Storage of Production Liquids*
3. API Specification 12F, *Shop Welded Tanks for Storage of Production Liquids*
4. API Standard 650, *Welded Steel Tanks for Oil Storage*
5. UL 58, *Standard for Steel Underground Tanks for Flammable and Combustible Liquids*
6. ANSI/UL 80, *Standard for Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids*
7. ANSI/UL 142, *Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids*
8. UL 1316, *Standard for Glass-Fiber Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures*
10. UL 2080, *Standard for Fire Resistant Tanks for Flammable and Combustible Liquids*
11. ANSI/UL 2085, *Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids*

Statement of Problem and Substantiation for Public Input

corrects title

Submitter Information Verification

**Submitter Full Name:** RICHARD KRAUS  
**Organization:** APIPETROLEUM SAFETY CONSULTANT  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Mon Jun 22 12:11:20 EDT 2015
Atmospheric tanks shall be designed and constructed in accordance with recognized engineering standards. Atmospheric tanks that meet any of the following standards shall be deemed as meeting the requirements of 21.4.2.1:

1. API Specification 12B, *Bolted Tanks for Storage of Production Liquids*
2. API Specification 12D, *Field Welded Tanks for Storage of Production Liquids*
3. API Specification 12F, *Shop Welded Tanks for Storage of Production Liquids*
5. API Standard 650, *Welded Steel Tanks for Oil Storage*
6. UL 58, *Standard for Steel Underground Tanks for Flammable and Combustible Liquids*
7. ANSI/UL 80, *Standard for Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids*
8. ANSI/UL 142, *Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids*
10. ANSI/UL 1746, *Standard for External Corrosion Protection Systems for Steel Underground Storage Tanks*
11. UL 2080, *Standard for Fire Resistant Tanks for Flammable and Combustible Liquids*
12. ANSI/UL 2085, *Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids*

Statement of Problem and Substantiation for Public Input

adds requirements for these tanks commonly used in production. Spec 12P is referenced in the IFC and should be added to NFPA 30.

Submitter Information Verification

**Submitter Full Name:** RICHARD KRAUS  
**Organization:** APIPETROLEUM SAFETY CONSULTAN  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Mon Jun 22 13:42:28 EDT 2015
21.4.2.1.2
Except as provided for in 21.4.2.1.3 and 21.4.2.1.4, atmospheric tanks designed and constructed in accordance with Appendix F (Design of Tanks for Small Internal pressures) of API Standard 650, *Welded Steel Tanks for Oil Storage*, shall be permitted to operate at pressures from atmospheric to a gauge pressure of 1.0 psi (6.9 kPa). All other tanks shall be limited to operation from atmospheric to a gauge pressure of 0.5 psi (3.5 kPa).

Statement of Problem and Substantiation for Public Input

provides for specific identification in case future editions change numbering

Submitter Information Verification

**Submitter Full Name:** RICHARD KRAUS  
**Organization:** APIPETROLEUM SAFETY CONSULTAN  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Mon Jun 22 13:32:17 EDT 2015
21.4.2.1.3
Atmospheric tanks that are not designed and constructed in accordance with Appendix F (Design of Tanks for Small Internal Pressures) of API Standard 650, Welded Steel Tanks for Oil Storage, shall be permitted to operate at pressures from atmospheric to a gauge pressure of 1.0 psi (6.9 kPa) only if an engineering analysis is performed to determine that the tank can withstand the elevated pressure.

Statement of Problem and Substantiation for Public Input

see 21.4.2.1.2

Submitter Information Verification

Submitter Full Name: RICHARD KRAUS
Organization: APIPETROLEUM SAFETY CONSULTAN
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 22 13:34:28 EDT 2015
**Statement of Problem and Substantiation for Public Input**

The addition to NFPA 30 (and by reference 30A) would allow tanks manufactured to UL SU 2258 to be applied in combustible liquids storage installations where specified per the scope of UL SU 2258 supported by the extensive and rigorous testing requirements of the standard. From Subject of Investigation 2258 Introduction- “1.1 These requirements cover nonmetallic or composite primary, secondary and diked type atmospheric tanks from 60-660 gallons (227-2500 L) intended primarily for the storage and supply of heating oil for oil burning equipment, or alternatively, the storage of diesel fuels for compression ignition engines and motor oils (new and used) for automotive service stations, in above ground installations. Based on the engineering scope and rigorous testing required by UL SU 2258, this standard should be incorporated into NFPA language addressing tanks manufactured of combustible materials as proposed.

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<td>Organization</td>
<td>ROTH INDUSTRIES INCORPORATED</td>
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<td>Affiliation</td>
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21.4.2.2.1
Low-pressure tanks shall be designed and constructed in accordance with recognized engineering standards. Low-pressure tanks that meet either of the following standards shall be deemed as meeting the requirements of 21.4.2.2:

(1) API 620, *Recommended Rules for the Design and Construction of Large, Welded, Low-Pressure Storage Tanks*

(2) ASME *Code for Unfired Pressure Vessels*, Section VIII, Division 1

Statement of Problem and Substantiation for Public Input

correct title

Submitter Information Verification

**Submitter Full Name:** RICHARD KRAUS  
**Organization:** APIPETROLEUM SAFETY CONSULTAN  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Mon Jun 22 13:37:10 EDT 2015
21.6.3 Management of Fire and Explosion Hazards.
The extent of fire and explosion prevention and control procedures and measures provided for tank storage facilities shall be determined by an engineering evaluation of the installation and operation, followed by the application of recognized fire and explosion prevention and process engineering principles. The evaluation shall include, but not be limited to, the following:

(1) Analysis of fire and explosion hazards of the facility
(2) Analysis of local conditions, such as exposure to and from adjacent properties, flood potential, or earthquake potential
(3) Fire Facility, fire department or mutual aid response

Statement of Problem and Substantiation for Public Input

initial response in many facilities is by trained and equipped facility personnel and in place systems

Submitter Information Verification

Submitter Full Name: RICHARD KRAUS
Organization: APIPETROLEUM SAFETY CONSULTAN
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Mon Jun 22 13:54:53 EDT 2015
21.6.5.5
Emergency procedures shall be kept available in an operating area. The procedures shall be reviewed and updated whenever equipment, materials stored, personnel or other conditions change. (See 6.4.2.)

Statement of Problem and Substantiation for Public Input
changes other than the broad term "conditions" may occur

Submitter Information Verification

Submitter Full Name: RICHARD KRAUS
Organization: APIPETROLEUM SAFETY CONSULTAN
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 22 13:58:17 EDT 2015
21.7.4.3.1 General.
Underground tanks taken out of service or abandoned shall be emptied of liquid, rendered vapor-free, and safeguarded against trespassing in accordance with this section and in accordance with NFPA 326, Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair, or in accordance with API 1604, Closure of Underground Petroleum Storage Tanks or meet the requirements of the authority having jurisdiction, as applicable. The procedures outlined in this section shall be followed when taking underground tanks temporarily out of service, closing them in place permanently, or removing them. (See Annex C for additional information.)
27.4.6.2 Nonmetallic piping for underground use shall be built and used within the scope of their approvals or within the scope of listed and labeled in accordance with UL 971, Standard for Nonmetallic Underground Piping for Flammable Liquids.

- Metallic and composite piping for underground use shall be listed and labeled in accordance with UL 971A, Outline of Investigation for Metallic Underground Fuel Pipe.

Statement of Problem and Substantiation for Public Input

This proposal accomplishes the following items. (1) clarifies that UL 971 only applies to nonmetallic piping for underground use, (2) requires this piping to be listed and labeled in accordance with UL 971 and (3) introduces similar requirements for metallic and composite piping for underground use to be listed and labeled in accordance with UL 971A. There are ten companies with current listings to UL 971 or UL 971A.

Related Public Inputs for This Document

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<td>companion proposals</td>
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Submitter Information Verification

Submitter Full Name: HOWARD HOPPER
Organization: UL LLC
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Thu Jul 02 16:11:39 EDT 2015
A.22.5.2.4

(also add ASTM E1529 (2014a) to the annex section on informational ASTM references)

Statement of Problem and Substantiation for Public Input

ASTM E1529 is the equivalent ASTM standard to UL 1409. UL 1409 and ASTM E1529 are fire resistance standards associated with hydrocarbon fires and are much more severe than ASTM E119.

Submitter Information Verification

Submitter Full Name: MARCELO HIRSCHLER
Organization: GBH INTERNATIONAL
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jul 02 14:33:20 EDT 2015
C.4.3 Prepare a safe workplace by following the special safety precautions and cleaning and closure procedures in either of the following documents:

(1) API 1604, Removal and Disposal, Closure of Used Underground Petroleum Storage Tanks
(2) NEIWPCC, Tank Closure Without Tears: An Inspector’s Safety Guide
C.8 Resources.

Other resources to check for information related to safety during tank closure include the following:

1. API 1604, *Removal and Disposal: Closure of Used Underground Petroleum Storage Tanks*
2. API 1631, *Interior Lining of Underground Storage Tanks*
3. API 2015, *Cleaning Petroleum Storage Tanks*
4. API 2217A, *Guidelines for Work in Inert Confined Spaces in the Petroleum Industry*
5. API 2219, *Safe Operating Guidelines for Vacuum Trucks in Petroleum Service*
6. OSHA 2226, *Excavation and Trenching Operations*
7. NIOSH, *Criteria for Recommended Standard for Working in Confined Spaces*
9. NFPA 69, *Standard on Explosion Prevention Systems* (table with minimum oxygen levels necessary to support combustion for various products)
10. NFPA 77, *Recommended Practice on Static Electricity*
11. NFPA 326, *Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair*
12. NFPA 306, *Standard for the Control of Gas Hazards on Vessels* (practical procedures for vapor-freeing tanks and testing guidance)
13. NEIWPCC, *Tank Closure Without Tears: An Inspector’s Safety Guide*

Statement of Problem and Substantiation for Public Input

correct title

Submitter Information Verification

**Submitter Full Name:** RICHARD KRAUS  
**Organization:** APIPETROLEUM SAFETY CONSULTAN  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Mon Jun 22 15:47:27 EDT 2015
This Global Public Comment is a follow-up to Global Public Input No. 50 and all linked Public Inputs submitted to the First Draft, which proposed a change of containers from "containers, portable tanks, and intermediate bulk containers" to "containers, low pressure cylinders, portable tanks, and intermediate bulk containers". This simply added the designation of a 'low pressure cylinder' to the list of containers that were covered by NFPA 30.

The NFPA 30 Technical Committee was unsure whether this new designation of products should be listed in NFPA 30, NFPA 30B, NFPA 58, or a new section altogether. Due to only limited testing provided, it was decided that an inter-committee Task Group including members of NFPA 30, 30B, and 58 would determine the appropriate means to address this issue and make recommendations to the NFPA Standards Council. The test data supplied to NFPA was generated by 3rd parties (Intertek Group plc in conjunction with the University of Colorado) under contract by 3M.

Since the Technical Committee met to discuss the First Draft, new DOT legislation has been approved and put into place as of January 7, 2013 (See attached "Federal Register Vol. 78 No. 4"). Approved by the US DOT’s Pipeline and Hazardous Materials Safety Administration (PHMSA), this change echoes the changes in UN Classification on 'Chemical under pressure'. In the updated Federal Register, the Hazardous Materials Table (HMT) has been updated to include six specifications of "Chemical under pressure": UN3500-UN3505.

In the Register, PHMSA claims "The 'Chemical under pressure, n.o.s.' HMT entries are added to address shipments of liquids or solids (e.g. adhesives, coatings, and cleaners) combined with a gas or gas mixtures utilized to expel the contents from pressure vessels." Special Provision 362, which states that "classification of these materials is to be based on hazard characteristics of the components in the propellant, the liquid, or the solid forms", was amended to include the six new UN numbers that specify "Chemical under pressure".

Furthermore, Special Provision TP40 and T50 provide more detailed instruction for correct transportation of "Chemical under pressure" in various circumstances.

Along with this new support, all claims made in Global Public Input No. 50 should be considered as well.

Attached to this Global Public Comment is the Updated Federal Register as well as a list of the Public Inputs submitted to the First Draft Report that this Global Public Comment affects; a summary of results generated by 3rd party tests have been attached (video was unable to attach to this Public Comment; however, this video is now a public document following the First Draft Report).

It is recommended that any change pertaining to this Public Comment be applied to all past Public Inputs.

Additional Proposed Changes

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
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<tr>
<td>NFPA_30_SWC_PC_16_Rejected_But_Held_to_be_emulated.pdf</td>
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<td>Michael_Jacobs_3M_First_Draft_Public_Input_List_Held.pdf</td>
<td>Public Input List</td>
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Statement of Problem and Substantiation for Public Input

NOTE: The following Public Input appeared as "Reject but Hold" in Public Comment No. 16 of the A2014 Second Draft Report for NFPA 30 and per the Regs. at 4.4.8.3.1.

Classifying flammable liquids under low pressure.

Submitter Information Verification

Submitter Full Name: TC ON FLC-SWC
Organization: NFPA
| **Street Address:** |  |
| **City:** |  |
| **State:** |  |
| **Zip:** |  |
| **Submittal Date:** | Thu Apr 09 11:29:08 EDT 2015 |
This Global Public Comment is a follow-up to Global Public Input No. 50 and all linked Public Inputs submitted to the First Draft, which proposed a change of containers from "containers, portable tanks, and intermediate bulk containers" to "containers, low pressure cylinders, portable tanks, and intermediate bulk containers". This simply added the designation of a 'low pressure cylinder' to the list of containers that were covered by NFPA 30.

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Furthermore, Special Provision TP40 and T50 provide more detailed instruction for correct transportation of "Chemical under pressure" in various circumstances.

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Additional Proposed Changes
Statement of Problem and Substantiation for Public Comment

Classifying flammable liquids under low pressure.
Related Item

Public Input No. 48-NFPA 30-2012 [Section No. 1.3.2]
Public Input No. 49-NFPA 30-2012 [Section No. 1.3.3]
Public Input No. 50-NFPA 30-2012 [Global Input]
Public Input No. 63-NFPA 30-2012 [Section No. 1.3.4]
Public Input No. 66-NFPA 30-2012 [Section No. 1.3.5]
Public Input No. 67-NFPA 30-2012 [Section No. 1.3.6]
Public Input No. 68-NFPA 30-2012 [Section No. 3.3.34]
Public Input No. 69-NFPA 30-2012 [Section No. 3.3.50]
Public Input No. 70-NFPA 30-2012 [Section No. 9.1.4]
Public Input No. 71-NFPA 30-2012 [Section No. 9.3.9 [Excluding any Sub-Sections]]
Public Input No. 72-NFPA 30-2012 [Section No. 9.3.9.1]
Public Input No. 73-NFPA 30-2012 [Section No. 9.3.9.2]
Public Input No. 74-NFPA 30-2012 [Section No. 9.3.10]
Public Input No. 75-NFPA 30-2012 [Section No. 9.4.3 [Excluding any Sub-Sections]]
Public Input No. 76-NFPA 30-2012 [Section No. 9.4.2 [Excluding any Sub-Sections]]
Public Input No. 77-NFPA 30-2012 [Section No. 9.12.1]
Public Input No. 78-NFPA 30-2012 [Section No. 12.3.5]
Public Input No. 79-NFPA 30-2012 [Section No. 12.6.2.2]
Public Input No. 80-NFPA 30-2012 [Section No. 12.8.1]
Public Input No. 81-NFPA 30-2012 [Section No. A.16.1.1]
Public Input No. 82-NFPA 30-2012 [Section No. 13.1]
Public Input No. 83-NFPA 30-2012 [Section No. 13.3.8]
Public Input No. 84-NFPA 30-2012 [Section No. 14.1]
Public Input No. 85-NFPA 30-2012 [Section No. 15.1]
Public Input No. 86-NFPA 30-2012 [Section No. 15.3 [Excluding any Sub-Sections]]
Public Input No. 87-NFPA 30-2012 [Section No. 15.3.2]
Public Input No. 88-NFPA 30-2012 [Section No. 15.4.1]
Public Input No. 89-NFPA 30-2012 [Section No. 16.1.1]
Public Input No. 90-NFPA 30-2012 [Section No. 16.2.3]
Public Input No. 91-NFPA 30-2012 [Section No. 16.4.1.1]
Public Input No. 92-NFPA 30-2012 [Section No. 16.4.1.2]
Public Input No. 93-NFPA 30-2012 [Section No. 16.4.1.3]
Public Input No. 94-NFPA 30-2012 [Section No. 16.5.2.1]
Public Input No. 95-NFPA 30-2012 [Section No. 16.5.2.2]
Public Input No. 96-NFPA 30-2012 [Section No. 16.5.2.3]
Public Input No. 97-NFPA 30-2012 [Section No. 16.5.2.4]
Public Input No. 98-NFPA 30-2012 [Section No. 18.4.8]
Public Input No. 99-NFPA 30-2012 [Section No. 18.4.9]
Public Input No. 100-NFPA 30-2012 [Section No. 18.5.2 [Excluding any Sub-Sections]]
Public Input No. 101-NFPA 30-2012 [Section No. 18.5.4.1]
Submitter Information Verification

Submitter Full Name: Michael Jacobs
Organization: 3M
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 02 08:58:56 EDT 2013

Committee Statement
Committee Action: Rejected but held
Resolution: At the August 2012 NFPA 30 First Draft Meeting, the NFPA 30 Technical Committee on Storage and Warehousing of Containers and Portable Tanks reviewed a series of Public Inputs (PI No. 50 et al) to the 2012 edition of NFPA 30 that would have included requirements for storage, handling, and use of low pressure containers used to dispense flammable and combustible liquids (e.g., for adhesives application, coatings application and similar uses) by means of a compressed gas. These low pressure containers are currently not within the scope of NFPA 30. In the course of its deliberations, the Technical Committee considered whether these types of containers would be better addressed in NFPA 30B, Code for the Manufacture and Storage of Aerosol Products. However, the current scope of NFPA 30B is limited in its application to aerosol products in “…metal..containers ..up to a maximum of 1000ml.”. Thus, neither document appears to address low pressure containers, as described in the original public inputs. At the time of the First Draft Meeting, the Technical Committee concluded that an intercommittee Task Group was needed to determine how best to address the subject. At the time, four options presented themselves: - Coverage under NFPA 30, Flammable and Combustible Liquids Code - Coverage under NFPA 30B, Code for the Manufacture and Storage of Aerosol Products - Coverage under NFPA 58, Liquefied Petroleum Gas Code - Establishing an entirely new code development project At the June 2013 Second Draft Meeting, the following product issues were discussed: The low pressure containers are typically significantly larger in size, and are now using U.S. Depat. of Transportation-approved containers. The products fall into four general categories: 1. Ignitable liquid – flammable propellant 2. Non-Ignitable liquid – flammable propellant These two categories are of most concern. There can be a substantial amount of flammable gas in one of these containers, creating a hazard similar to the filling operation of aerosols products. It may be appropriate to protect them that way. Currently, these containers are in storage at manufacturing sites, in warehouses, and at user locations, without clear guidance on the proper level of protection. 3. Ignitable liquid – non-flammable propellant. In this case, use of these containers appear to be no different than pressurized dispensing, which is already covered in NFPA 30. There is room for improvement for this category, but the bottom line is control of discharge, i.e., if container or piping vents, the result is limited to only discharge of the inert gas. 4. Non-ignitable liquid – non-flammable propellant. There appears to be no need of requirements from a fire protection standpoint for a product with a non-ignitable liquid and a non-flammable propellant. The Technical Committee on Storage and Warehousing of Containers and Portable Tanks has concluded that there are three options: 1. Amend the Scope of NFPA 30 to address low pressure containers. But, this would involve formation of a new Technical Committee (under the NFPA 30 project) to address the subject, because none of the current NFPA 30 technical committees have the appropriate expertise. Also, the new technical committee would need to include representation from the Technical Committee on Aerosol Products and representation by manufacturers of the containers and user industries. 2. Amend the Scope of NFPA 30B to include low pressure containers. It is not unlikely that NFPA 30B technical Committee has the appropriate expertise to deal with this issue, either. Likely, it, too, would have to create a new committee, as described above. 3. Create a new project to develop a new code or standard that would deal strictly with low pressure containers exclusively. This might function under either of the above-named technical committees or might require formation of an entirely new committee, depending on subsequent review of NFPA's Standards Council. Therefore, the Technical Committee on Storage and Warehousing of Containers and Portable Tanks has decided to first seek guidance from the NFPA Standards Council as to their preferred direction and then proceed accordingly.
I, Michael Jacobs, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Comment (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Comment in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Comment and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am Michael Jacobs, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature.
<table>
<thead>
<tr>
<th>Symbols</th>
<th>Hazardous materials descriptions and proper shipping names</th>
<th>Hazard class or division</th>
<th>Identification Nos.</th>
<th>PG</th>
<th>Label codes</th>
<th>Special provisions (§ 172.102)</th>
<th>Packaging (§ 173.***?)</th>
<th>Quantity limitations (see §§ 173.27 and 175.75)</th>
<th>Vessel stowage</th>
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<tr>
<td>(1)</td>
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<td>(3)</td>
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<td>Cartridges for weapons, blank or Cartridges, small arms, blank or Cartridges for tools, blank.</td>
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<td>2.2 UN3503 ... 2.2, 8 ..... 362, T50, TP40</td>
<td>None ....... 335 ....... 313 ....... Forbidden 100 kg ......</td>
<td>D ......... 40</td>
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<td>Chemical under pressure, toxic, n.o.s.</td>
<td>2.2 UN3502 ... 2.2, 6.1 ..... 362, T50, TP40</td>
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<td>D ......... 40</td>
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<td>Iodine monochloride, liquid.</td>
<td>8 UN3498 ... II ........ 8 ......... IB2, T7, TP2 .....</td>
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<td>Iodine monochloride, solid.</td>
<td>8 UN1792 ... II ........ 8 ......... B6, IB8, IP2, IP4, N41, T7, TP2.</td>
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<td>Krill meal</td>
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<td>Nitrites, solid, toxic, n.o.s.</td>
<td>6.1 UN3439 ... III ........ 6.1 ......... IB8, IP3, T1, TP33.</td>
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<td>A ......... 52</td>
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NFPA 30 First Draft Public Input #s with the related sections of NFPA 30 by Michael Jacobs of 3M Company:

- 48: Section 1.3.2
- 49: Section 1.3.3
- **50: Global**
- 63: Section 1.3.4
- 66: Section 1.3.5
- 67: Section 1.3.6
- 68: Section 3.3.34
- 69: Section 3.3.50
- 70: Section 9.1.3
- 71: Section 9.3.9
- 72: Section 9.3.9.1
- 73: Section 9.3.9.2
- 74: Section 9.3.10
- 75: Section 9.4.3
- 76: Section 9.4.2
- 77: Section 9.12.1
- 78: Section 12.3.4
- 79: Section 12.6.2.2
- 80: Section 12.8.1
- 81: Section A.16.1.1
- 82: Section 13.1
- 83: Section 13.3.8
- 84: Section 14.1
- 85: Section 15.1
- 86: Section 15.3
- 87: Section 15.3.2
- 88: Section 15.4.1
- 89: Section 16.1.1
- 90: Section 16.2.3
- 91: Section 16.4.1.1
Flammable and combustible liquids contained in a cylinder designed per DOT regulations and relief devices designed per CGA regulations at low internal working pressures (<260 psi @77F) exhibit fire hazards at high temperatures that are no greater than currently accepted receptacles that contain flammable liquids or portable tanks.

Science and test data have shown that under fire conditions flammable liquids in well designed cylinders under low pressure can be safely stored under the same code as Flammable liquids.
A well designed cylinder is constructed and certified to Dept of Transportation (DOT) standards and has pressure relief devices installed to Compressed Gas Association (CGA) standards.

Testing has shown that a cylinder constructed to DOT 39 and DOT4BW240 has walls and welded seams that can withstand an internal pressure increase until the relief devices open to lower the pressure. By standards this is at a minimum of four times the working pressure. This is would be two times the pressure under fire conditions. This is a very adequate safety margin.

Testing has shown that the two styles of relief devices (frangible disk and spring loaded valve) installed per CGA specification open at a minimum of four times the working pressure and two times pressure under actual fire conditions. This is a very adequate safety margin.

Testing has shown that the relief device orifice per CGA regulations are wide to allow internal pressure to vent at a high enough rate in CFM (cubic feet per minute) to prevent any pressure increase past the designated relief pressure limit. The cylinder seams will not burst because the relief device is adequately sized.

Testing has shown that the volume of flammable vapor expelled through the relief device does not dislocate the cylinder. Relief valve discharges do not dangerously "rocket" the cylinder as can happen with unchained high pressure cylinders (3,000 psi).

Science has shown that the product formulations in the cylinder cannot autoignite or create a boiling liquid expanding vapor explosion (BLEVE).

**MORE TESTING REPORTS WILL BE SUBMITTED AS A HARD COPY TO SUPPLEMENT THIS CHANGE AND ALL CHANGES LINKED TO THIS GLOBAL INPUT**
Flammable Liquid in a Low Pressure Cylinder Flame Test Report
Reference: NFPA 30, Global Public Input #50

Norm Sato

Michael Jacobs

June 2012
ABSTRACT

In this experiment, the behavior of low pressure cylinders containing flammable liquids in extreme situations of heat and open flame was studied. Three different sizes of low pressure cylinders – 5, 25, and 50 gallon – were put in direct contact with open flame to emulate the situation wherein the storage area for low pressure cylinders catches fire. Through testing, it was determined that low pressure cylinders containing flammable liquids behave in a manner equal to or less hazardous in a fire than flammable liquids in currently approved containers. The resulting data within NFPA 30 Global Public Input 50 and all linked Public Inputs, related to inclusion of low pressure cylinders in NFPA 30: Flammable and Combustible Liquids.

BACKGROUND AND PURPOSE

Innovative new products frequently do not fit established regulatory templates, creating inconsistent warehousing or storage conditions – see FAQs in Appendix A. Current liquid based spray adhesives products (larger than aerosol) covered by this submission is unique and required testing under two NFPA test methods: (1) the design of the cylinder to DOT standards; and (2) the design of the pressure relief devices to CGA standards. The resulting cylinder designs function in manner equal to or less hazardous in a fire than flammable liquids in currently approved containers.

The purpose of the testing, report, and submission to NFPA is to support the inclusion of flammable liquid adhesives in low pressure cylinders into NFPA 30: Flammable and Combustible Liquids. Video and photographic data is available to support this submission.

TEST MATERIALS, EQUIPMENT, AND PROCEDURE

The basic setup for this experiment, as shown in Figure 1, included a low pressure cylinder that was heated through direct contact with an open flame provided by propane torches. A pressure gauge was attached to the main valve opening of the low pressure cylinder. This gauge reports pressure to the test operator, allowing testing to be shut down if internal pressure was to exceed the relief valve specifications. Above the low pressure cylinder was another open flame provided by a propane torch. This was used as a ‘flare’ or ‘pilot light’ to ignite any of the material that escapes through the relief valves.

In addition to the basic setup, extra precautions were taken by building concrete retaining walls around three sides of the experiment and each low pressure cylinder tested was chained to the ground. Cameras were set up to record video of the test from distance. All testing was done outside.
Three different sizes of cylinders, as described in Appendix B, were tested: 5 gallon, 25 gallon, and 50 gallon cylinders. The 5 gallon cylinder has a “frangible disk” relief valve found on the cylinder wall itself. When the frangible relief disk fails (breaks), a 0.12 in² orifice should be opened providing an escape route for contents inside the cylinder. The 5 gallon cylinder used in this test has manufacturer specifications claiming the relief valve will open between 360 and 520 psig. Both the 25 and 50 gallon cylinders have a spring loaded relief valve found on the back side of the main valve. When the gauge pressure of the cylinder reaches a certain level, the spring should be stretched enough to open an orifice and let some of the pressure escape from the cylinder. After a noticeable amount of gas has been released, the pressure inside the cylinder will decrease, causing the spring close the orifice. Both cylinders used in this test have manufacturer specifications claiming the relief valves will open between 360 and 480 psig.

All cylinders were heated by the propane torches until either a relief valve opened or the internal pressure exceeded relief valve specifications. For the 5 gallon containing a frangible disk relief valve, propane torches used for heating were extinguished following rupture of the frangible disk. The test was continued with a 10 minute observation and cool down period. Water was used to speed the cooling of the cylinder following the 10 minute observation. For the low pressure cylinders containing a spring relief valve, propane torches used for heating were
extinguished following the second opening of the relief valve. The test was continued until the pressure relief valve would not re-open, followed by a 10 minute observation and cool down period. Water was used to speed the cooling of the cylinder following the 10 minute observation.

**RESULTS**

5 GALLON CYLINDER

Pressure was recorded once every second during the test. Figure 2 shows the change in pressure over time for the testing of the 5 gallon cylinder.

![Graph of Internal Pressure (psig) vs Time Elapsed (sec) during the testing of the 5 gallon cylinder.](image)

The maximum pressure reached during the testing was 360.1 psig, 193 seconds into the test. At this point, the frangible disk broke and a rush of gas escaped from the cylinder immediately, dropping the pressure to 181.7 psi, at 200 seconds. From then on, pressure gradually decreased as the liquefied propellant (dimethyl ether in this case) vaporized and escaped through the orifice under the frangible disk. Vapors that escaped from the relief valve caught on fire from the flare above.

25 GALLON CYLINDER

Pressure was recorded once every second during the test. Figure 3 shows the change in pressure over time for the testing of the 25 gallon cylinder.
The maximum pressure reached during testing was 410.0 psig, 283 seconds into the test. This was the first time the pressure relief valve opened. Propane torches were left on while gas escaped from the cylinder. Within two seconds of the relief valve opening, the spring loaded valve closed at a pressure of 352.2 psi. The cylinder continued heating and pressure increased again until the relief valve opened the second time at 397.7 psig, 302 seconds into the test. Following the second relief valve closure, propane torches were extinguished. Due to thermodynamic interia, the spring relief valve opened two more times to relieve pressure. Figure 4 shows, in more detail, change in pressure over time during with the spring relief valve opened and closed. Vapors that escaped from the relief valve caught on fire from the flare above.

FIGURE 3. Internal Pressure (psig) vs. Time Elapsed (sec) during the testing of the 25 gallon cylinder.
FIGURE 4. Internal Pressure (psig) vs. Time Elapsed (sec) during the testing of the 25 gallon cylinder.

50 GALLON CYLINDER

Pressure was recorded once every second during the test. Figure 5 shows the change in pressure over time for the testing of the 50 gallon cylinder.

The maximum pressure reaching during testing was 446.3 psig, 361 seconds into the test. This was the first time the pressure relief valve opened. Propane torches were left on while gas escaped from the cylinder. Within two seconds of the relief valve opening, the spring loaded
valve closed at a pressure of 387.9 psi. The cylinder continued heating and pressure increased again until the relief valve opened the second time at 441.8 psig, 398 seconds into the test. Following the second relief valve closure, propane torches were extinguished. Despite this, the spring relief valve opened two more times to relieve pressure. Figure 6 shows, in more detail, change in pressure over time during with the spring relief valve opened and closed. Vapors that escaped from the relief valve caught on fire from the flare above.

![Figure 6. Internal Pressure (psig) vs. Time Elapsed (sec) during the testing of the 50 gallon cylinder.](image)

**DISCUSSION AND CONCLUSIONS**

The pressure of the escaping vapor was determined to be low enough that the safety chains used are not needed.

Safety of the relief valves is confirmed; the data presented shows that relief devices specified by CGA open at 50% of the burst strength (see Appendix B) of the cylinders, allowing a very large safety margin.

Testing shows that the DOT cylinder construction is more than adequate in design to withstand fire situations listed under NFPA 30: Flammable and Combustible Liquids.
APPENDIX A: FAQs

1. Q: Why do existing regulations not clearly apply to cylinder spray adhesives?
   A: Cylinder spray adhesives consist of a spray gun connected by a flexible rubber hose to a metal tank that is filled with dissolved resin in a solvent, under gas pressure. This innovative product does not exactly fit into current UN and DOT transportation regulations or current NFPA warehouse and storage fire codes, causing confusion and questions as fire marshals, inspectors and insurance agents evaluate the underlying science. Understanding the product and revising current regulations is key to establishing safe and consistent storage conditions.

2. Q: Are all cylinder spray adhesives Flammable?
   A: No, flammability varies according to the product ingredients. Our products that contain both flammable and non-flammable solvents and propellants:

<table>
<thead>
<tr>
<th>Adhesive</th>
<th>Solvent</th>
<th>Propellant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Non Flammable</td>
<td>Flammable</td>
</tr>
<tr>
<td>2</td>
<td>Non Flammable</td>
<td>Non Flammable</td>
</tr>
<tr>
<td>3</td>
<td>Non Flammable</td>
<td>Flammable</td>
</tr>
<tr>
<td>4</td>
<td>Non Flammable</td>
<td>Non Flammable</td>
</tr>
</tbody>
</table>

3. Q: The final product is a solid glue, why not store it as a solid?
   A: This product, as stored, does not fit the definition of a solid. The solvents and propellant have dissolved the solid raw materials into a liquid mixture, so it can be sprayed. The 20-30% non flammable solid adhesive remains only after the carrier solvents and propellants have dissipated. The viscous mixture does lower the flammability characteristics of the pure solvent and the propellant gases.

4. Q: Could this product be covered under the Aerosol codes per NFPA 30B?
   A: This product has been described as a cost effective alternative to the aerosol spray can for the high volume user. This product does not exactly fit the definition of an aerosol container as the size is too large.
   “NFPA 30B 3.3.2 Aerosol Container: A metal can or plastic container, up to a maximum size of 1000 ml (33.8 fl oz).”

5. Q: Could this product be covered as a Gas, as the cylinders resemble my backyard BBQ liquid propane tanks?
   A: The tanks we use are very similar because the US Department of Transportation (DOT) regulates the construction, shipment, inspection and storage during transport of pressurized metal cylinders. All of our non-refillable cylinders are certified to DOT 39 construction requirements per 49 CFR 173. This includes the materials and burst strength of the cylinder.
wall, the main valve and the pressure relief disks and valves. Our cylinders are shipped and stored during transport as a GAS under current DOT regulations as this is the most expeditious.

6. Q: If it is shipped as a Flammable Liquified Gas, why not store it as a gas under NFPA 55?

A: We believe that DOT shipping regulations and NFPA storage codes for Gas cylinders are too restrictive and inappropriate for this product line. This product does not exactly fit the definition of a Liquefied Gas. The gas propellant is usually in the formula at less than 15% by weight. Gas is present in the small “headspace” above the liquid resin. 85% of the container is the non-volatile solid adhesive dissolved in a flammable liquid solvent. The small amount of gas propellant is at a low pressure of about 200 psi as it does not take much pressure to force the liquid out of the container. Some of the gas has mixed with the liquid, much like a carbonated soda can.

7. Q: If DOT shipping regulations are inappropriate for this product line is DOT considering amendments to those regulations?

A: Europe has already rewritten its regulations to contain new United Nation (UN) shipping codes which very closely fit our product line (UN3501). We hope that DOT will accept the UN codes and rewrite applicable DOT regulations in the near future. The UN3501 shipping codes are already included in the 2012 Emergency response guidebook.

8. Q: Is this product a flammable liquid?

A: This product does not exactly fit the definition of a liquid but it is close as 85% of the container volume is liquid. The remaining 15% headspace allows the propellants to come to equilibrium with the solution. The headspace allows for a safety margin in the event of a fire which can cause the internal pressure to increase.

“NFPA 30 4.3.1 Flammable liquids, (1) Class IA Liquid —Any liquid that has a flash point below 73°F (22.8°C) and a boiling point below 100°F (37.8°C)”

9. Q: Could this product be covered under the NFPA 30 Flammable Liquid regulations?

A: Yes, we believe our product is a stable Class 1A flammable liquid under low pressure and this might be the current best fit. There is precedent. Aerosol spray cans were stored as Flammable liquids under this code before NFPA 30B was created in 1990.

“Prior to 1990 the storage of flammable aerosols were set forth in NFPA 30, Flammable and Combustible Liquids Code, where they were treated as Class IA flammable liquids. NFPA 30 2011 pp4”

10. Q: Is this product a viscous flammable liquid?
A. The primary product is a viscous liquid with a viscosity over 100 cps. A viscous mixture does lower the flammability characteristics of the pure solvents as acknowledged in NFPA 30 16.2.5.

11. Q: Does NFPA 30 allow the storage of US-DOT approved Metal containers?

A: Yes, storage of US-DOT approved Metal containers is allowed, “NFPA-30 Chapter 9.4.1 Only the following approved containers, intermediate bulk containers, and portable tanks shall be used for Class I, Class II, and Class IIIA liquids:

(1) Metal containers, metal intermediate bulk containers, and metal portable tanks meeting the requirements of and containing products authorized by the U.S. Department of Transportation Hazardous Materials Regulations in Title 49, Code of Federal Regulations, Parts 100–199, or by Part 6 of the UN Recommendations on the Transport of Dangerous Goods”

12. Q: Does NFPA 30 or DOT consider this product a Portable tank?

A: We do not believe our cylinders fit the definition of a Portable Tank because our product has a capacity less than 1,000 lbs and less than 60 gallons.

“NFPA-30 Chapter 9 Definitions, Cylinder means a pressure vessel designed for pressures higher than 40 psia and having a circular cross section. It does not include a portable tank,”

“NFPA 30 3.3.47.5 Portable Tank. Any vessel having a liquid capacity over 60 gal (230 L) intended for storing liquids and not intended for fixed installation.”

“DOT-49CFR171.8 Portable tank means a bulk packaging (except a cylinder having a water capacity of 1,000 pounds or less)”

13. Q: Would this product qualify as Bulk Packaging under NFPA 30?

A: We do not believe our cylinders fit the definition of Bulk Packaging as tanks are too small.

“Table 9.4.3 Maximum Allowable Size: bulk packaging has a maximum capacity greater than 450 L (119 gallons) as a receptacle for a liquid. Non-bulk packaging means a packaging which has: (1) A maximum capacity of 450 L (119 gallons) or less as a receptacle for a liquid.”
### APPENDIX B: Cylinder Specifications

Table 2. Cylinder Specifications

<table>
<thead>
<tr>
<th>Cylinder Characteristic</th>
<th>5 Gallon</th>
<th>25 Gallon</th>
<th>50 Gallon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity (lbs H2O)</td>
<td>48.77</td>
<td>238</td>
<td>476</td>
</tr>
<tr>
<td>Volume (cf)</td>
<td>0.78125</td>
<td>3.81</td>
<td>7.63</td>
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<tr>
<td>Working Pressure (psig)</td>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Burst Pressure (psig)</td>
<td>650</td>
<td>960</td>
<td>960</td>
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<tr>
<td>Relief Type</td>
<td>Frangible Disk</td>
<td>Spring Relief</td>
<td>Spring Relief</td>
</tr>
<tr>
<td>Relief Pressure (psig)</td>
<td>360-520</td>
<td>360-480</td>
<td>360-480</td>
</tr>
<tr>
<td>Relief Area (orifice)</td>
<td>0.120&quot; +/- 0.005&quot;</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Relief Capacity (CFM Air)</td>
<td>n/a</td>
<td>240</td>
<td>240</td>
</tr>
<tr>
<td>CGA Relief Requirement (CFM Air)</td>
<td>80.32</td>
<td>362.63</td>
<td>725.27</td>
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<tr>
<td>Estimated or Known CGA Relief Capacity</td>
<td>67.913</td>
<td>240</td>
<td>240</td>
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</table>
Throughout standard remove references to the following and replace with the following:

(1) ANSI/UL and replace with UL.
(2) API Specification and replace with API SPEC.
(3) API Standard and replace with API STD.
(4) ANSI/ASME B31.3 and replace with ASME B31.3.
(5) ANSI Z129.1 and replace with ANSI Z400.1/Z129.1.
(6) API # and so on and replace API STD # or API RP #.

Statement of Problem and Substantiation for Public Input

Recommended updates to correlate with PI-5 and PI-7.

Related Public Inputs for This Document

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Submitter Information Verification

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