TECHNICAL COMMITTEE ON
Electric Generating Plants
AGENDA
First Draft Meeting for NFPA 850 & 853
April 10th – 12th, 2018
Embassy Suites New Orleans Convention Center

1. Call to Order – Mark Boone, Chair

2. Introductions and Update of Committee Roster. (Attachment A)

3. Review of Previous Meeting Minutes (Attachment B)

4. Chairs Remarks

5. Staff Updates.
   a. Fall 2019 revision cycle schedule review (Attachment C)
   b. Staff Presentation

6. Guest Presentation

7. Reorganization of NFPA 850

8. Review Public Inputs (Attachment D)

9. Other/New Business (As needed)

10. Formation of Task Groups (As needed)

11. Discuss Options for Next Meeting

12. Adjournment

Attachment A: Technical Committee Roster

Mark S. Boone U 3/2/2010
Chair **ECG-AAA**
Dominion Resources Services Inc.
Corporate Risk Engineering
701 East Cary Street
One James River Plaza
Richmond, VA 23219
Edison Electric Institute
Alternate: Larry D. Shackelford

Richard O. Babb U 07/29/2013
Principal **ECG-AAA**
Luminant Power
103 Brookside Circle
Longview, TX 75604-1485

Steven M. Behrens I 7/16/2003
Principal **ECG-AAA**
Global Asset Protection Services, LLC
100 Constitution Plaza
Hartford, CT 06103
Alternate: Larry Dix

Daryl C. Bessa IM 7/26/2007
Principal **ECG-AAA**
F. E. Moran, Inc. Special Hazard Systems
2265 Carlson Drive
Northbrook, IL 60062
Alternate: James Bouche

Donald C. Birchler SE 1/1/1988
Principal **ECG-AAA**
FP&C Consultants
3770 Broadway
Kansas City, MO 64111

James Casey I 12/08/2015
Principal **ECG-AAA**
Marsh Risk Consulting
1692 Harrison Avenue
Cincinnati, OH 45214-1489
Alternate: William G. Gurry

Stanley J. Chingo SE 1/1/1989
Principal **ECG-AAA**
NISYS Corporation
1759 Deerhaven Court
Dacula, GA 30019

Tom V. Clark I 8/2/2010
Principal **ECG-AAA**
AEGIS Insurance Services, Inc.
1 Meadowlands Plaza
East Rutherford,, NJ 07073
Alternate: Dennis P. Mason

Larry M. Danner M 8/9/2011
Principal **ECG-AAA**
GE Power & Water
300 Garlington Road
GTTC Room 200D
Greenville, SC 29615-0648
Alternate: John Nathan Ihme

Russell A. Deubler I 10/28/2008
Principal **ECG-AAA**
HSB Professional Loss Control
19 Anna Louise Drive
Hudson, NH 03051-5401
Alternate: Regina M. Loschiavo

Kenneth W. Dungan SE 1/1/1979
Principal **ECG-AAA**
Performance Design Technologies
1310 Centerpoint Boulevard
Knoxville, TN 37932

Laurie B. Florence RT 7/14/2004
Principal **ECG-AAA**
UL LLC
333 Pfingsten Road
Northbrook, IL 60062-2096
Alternate: Blake M. Shugarman

Brian T. Ford **U** 08/11/2014
Principal **ECG-AAA**
Tennessee Valley Authority
1101 Market Street, BR 2l-C
Chattanooga, TN 37402

Ismail M. Gosla **SE** 1/1/1988
Principal **ECG-AAA**
Fluor Corporation
5555 Bluebrook Lane
Yorba Linda, CA 92887

Daniel D. Groff **I** 7/20/2000
Principal **ECG-AAA**
AIG Energy and Engineered Risk
2525 Country Side Lane
Wexford, PA 15090-7941
Alternate: Arthur M. Partin

Paul Hayes **IM** 08/03/2016
Principal **ECG-AAA**
American Fire Technologies
2120 Capital Drive
Wilmington, NC 28405

Fred L. Hildebrandt **M** 03/05/2012
Principal **ECG-AAA**
Amerex/Janus Fire Systems
1102 Rupcich Drive, Millennium Park
Crown Point, IN 46307
Fire Suppression Systems Association
Alternate: Timothy Pope

Rickey L. Johnson **I** 1/1/1989
Principal **ECG-AAA**
Liberty International Underwriters
55 Water Street
23rd Floor
New York, NY 10041-0024

David E. Kipley **SE** 1/18/2001
Principal **ECG-AAA**
JENSEN HUGHES
One Trans Am Plaza Drive, Suite 200
Oakbrook Terrace, IL 60181
JENSEN HUGHES
Alternate: Andrew Wolfe

Clinton Marshall **I** 11/30/2016
Principal **ECG-AAA**
FM Global
1151 Boston Providence Turnpike
Norwood, MA 02062
FM Global
Alternate: Todd E. Stinchfield

Steve Maurer **M** 10/23/2013
Principal **ECG-AAA**
Fuelcell Energy Inc.
3 Great Pasture Road
Danbury, CT 06813

Eric Prause **M** 12/06/2017
Principal **ECG-AAA**
Doosan Fuel Cell America
195 Governor's Highway
South Windsor, CT 06074

Scot Pruett **SE** 10/6/2000
Principal **ECG-AAA**
Black & Veatch Corporation
11401 Lamar Avenue
Overland Park, KS 66211-1508

Karen I. Quackenbush **M** 10/23/2013
Principal **ECG-AAA**
Fuel Cell & Hydrogen Energy Association
1211 Connecticut Avenue, NW
Washington, DC 20036
Alternate: Jay Keller

Ronald Rispoli **U** 1/10/2002
Principal **ECG-AAA**
Entergy Corporation
2414 West 5th Street
Russellville, AR 72801-5541
Alternate: Hugh D. Castles

Richard Ryan **E** 03/07/2013
Principal **ECG-AAA**
Rodeo/Hercules Fire Protection District
1121 Greenmont Drive
Vallejo, CA 94591
Alternate: Johnny Chung-Hin Young

Daniel J. Sheridan **IM** 1/1/1991
Principal **ECG-AAA**
Wolverine Engineering & Consulting Services
8067 North Dort Highway
Mount Morris, MI 48458

Donald Struck **M** 8/5/2009
Principal **ECG-AAA**
Siemens Fire Safety
8 Fernwood Road
Florham Park, NJ 07932-1906
National Electrical Manufacturers Association
Alternate: James H. Sharp

Robert D. Taylor **U** 10/29/2012
Principal **ECG-AAA**
PRB Coal Users Group
4377 Sandra Kay Lane
Newburgh, IN 47630-8596

Robert Vincent **IM** 1/10/2002
Principal **ECG-AAA**
Shambaugh & Son, L.P.
7614 Opportunity Drive
Fort Wayne, IN 46825-3363
National Fire Sprinkler Association
Contractor

Robert P. Wichert **SE** 4/17/2002
Principal **ECG-AAA**
Robert P. Wichert Professional Engineering Inc.
6342 Parkcreek Circle
Citrus Heights, CA 95621

James Bouche **IM** 10/29/2012
Alternate **ECG-AAA**
F. E. Moran, Inc.
Special Hazard Systems
2265 Carlson Drive
Northbrook, IL 60062
Principal: Daryl C. Bessa

Hugh D. Castles **U** 1/16/2003
Alternate **ECG-AAA**
Entergy Services, Inc.
213 Travis Trail
Madison, MS 39110
Principal: Ronald Rispoli

Larry Dix **I** 10/29/2012
Alternate **ECG-AAA**
Global Asset Protection Services, LLC
76 Kilbourn Road
Rochester, NY 14618-3608
Principal: Steven M. Behrens

William G. Gurry **I** 12/08/2015
Alternate **ECG-AAA**
Marsh Risk Consulting
410 Walnut Avenue
Sonoma, CA 95476-6115
Principal: James Casey

John Nathan Ihme **M** 11/30/2016
Alternate **ECG-AAA**
GE
300 Garlington Road
Greenville, SC 29607
Principal: Larry M. Danner

Jay Keller **M** 04/04/2017
Alternate **ECG-AAA**
Fuel Cell And Hydrogen Association
3534 Brunell Drive
Oakland, CA 94602
Principal: Karen I. Quackenbush

Regina M. Loschiavo **I** 04/05/2016
Alternate **ECG-AAA**
HSB Munich Re
1811 Laurel Brook Loop
Casselberry, FL 32707
Principal: Russell A. Deubler

Dennis P. Mason I 11/30/2016
Alternate ECG-AAA
AEGIS Insurance Services
Loss Control Division
4797 Jackson Street
Trenton, MI 48183
Principal: Tom V. Clark

Arthur M. Partin I 03/03/2014
Alternate ECG-AAA
AIG Energy & Engineered Risk
10207 Rubury Place
Tampa, FL 33626
Principal: Daniel D. Groff

Timothy Pope M 03/05/2012
Alternate ECG-AAA
Amerex/Janus Fire Systems
1102 Rupcich Drive, Millennium Park
Crown Point, IN 60443
Fire Suppression Systems Association
Principal: Fred L. Hildebrandt

Larry D. Shackelford U 08/03/2016
Alternate ECG-AAA
Southern Company
42 Inverness Center Parkway
Bin B411
Birmingham, AL 35242
Edison Electric Institute
Principal: Mark S. Boone

James H. Sharp M 10/23/2013
Alternate ECG-AAA
Siemens Energy
4400 Alafaya Trail
MC Q2 2s28-03
Orlando, FL 32817
National Electrical Manufacturers Association
Principal: Donald Struck

Blake M. Shugarman RT 8/9/2011
Alternate ECG-AAA
UL LLC
333 Pfingsten Road
Northbrook, IL 60062-2096
Principal: Laurie B. Florence

Todd E. Stinchfield I 3/4/2009
Alternate ECG-AAA
FM Global
33 Marian Lane
Woonsocket, RI 02895
FM Global
Principal: Clinton Marshall

Andrew Wolfe SE 11/30/2016
Alternate ECG-AAA
JENSEN HUGHES
3610 Commerce Drive, Suite 817
Baltimore, MD 21227
Principal: David E. Kipley

Johnny Chung-Hin Young E 12/06/2017
Alternate ECG-AAA
Contra Costa County Fire District
6428 Eagle Ridge Drive
Vallejo, CA 94591
Principal: Richard Ryan

Thomas C. Clayton SE 1/1/1979
Member Emeritus ECG-AAA
9211 West 76th Terrace
Overland Park, KS 66204

Leonard R. Hathaway I 1/1/1979
Member Emeritus ECG-AAA
1568 Hartsville Trail
The Villages, FL 32162

Brian J. O'Connor 1/18/2016
Staff Liaison ECG-AAA
National Fire Protection Association
One Batterymarch Park
Quincy, MA 02169-7471

Attachment B: Previous Meeting Minutes

NFPA 850/853 – *Technical Committee on Electric Generating Plants*

Pre-First Draft Meeting Minutes

October 4th - 5th, 2017

Attendees: See attached attendance sheet

Wednesday October 4th 2017

A one and a half day meeting was held at the Double Tree in Savannah, Georgia starting October 4th, 2017

1. Chairman Mark Boone called to the meeting to order at 1:00pm Eastern Time
2. NFPA Staff Liaison, Brian O'Connor, gave a presentation outlining the schedule of the document, emergency procedures for the building and legal matters.
3. Chairman Mark Boone presented the Chairman's report. The following was discussed:
    a. Recent plant fires
    b. Update of committee roster
    c. Review the reorganization of NFPA 850
4. Meeting minutes from the October 2017 Pre-First Draft Meeting in Denver were approved.
5. NFPA 855 Chair, James Biggins gave a presentation on the progress and contents of the NFPA 855 draft document.
6. Presentation by Victaulic on hybrid fire extinguishing systems and the new NFPA 770
7. The Technical Committee split up into 4 groups to work on the reorganization of NFPA 850 for the rest of the first day
    a. Task Group 1, led by Larry Dix: Chapters 4-6
    b. Task Group 2, led by Don Birchler: Chapter 7
    c. Task Group 3, led by Dan Sheridan: Chapters 8-9 & new alternative fuels chapter
    d. Task Group 4, led by Rickey Johnson: Chapters 10-17
8. Meeting Adjourned

Thursday October 5th, 2017

1. Chairman Mark Boone called the meeting to order at 8:00 AM Eastern Time
2. The Technical Committee split up into Task Groups once again.
3. Copies of Task Group notes were collected. Task Group Chairman to clean up notes and submit to Staff Liaison, Brian O'Connor
4. Staff Liaison, Brian O'Connor gave a presentation on NFPA 855
5. Technical Committee discussed the upcoming schedule.
6. Meeting adjourned.

Attendees:

Mark Boone, Chair

Brian O'Connor, Staff Liaison

Principals

Daryl Bessa

Donald Birchler

James Casey

Stanley Chingo

Tom Clark

Larry Danner

Laurie Florence (on phone)

Brian Ford

Daniel Groff

Paul Hayes

Rickey Johnson

David Kipley

Clinton Marshall

Karen Quackenbush (on phone)

Richard Ryan

Daniel Sheridan

Donald Struck

Robert Taylor

Alternates:

James Bouche

Larry Dix

Regina Loschiavo

Dennis Mason

Timothy Pope

Larry Shackelford

Todd Stinchfield

Andrew Wolfe

Jay Keller

Dennis Mason

Guests:

Dennis Eayes, Beecher Carlson

Jim Biggins, Global Risk Consultants

Ron Woodfin, ABS

David Thomas, Mitsubishi Hitachi Power Systems

Larry Carmen, Victaulic

Attachment C: F2019 Revision Schedule

Fall 2019 Revision Cycle

Process Stage	Process Step	Dates for TC	Dates for TC with CC
Public Input Stage (First Draft)	Public Input Closing Date*	1/04/2018	1/04/2018
	Final Date for TC First Draft Meeting	6/14/2018	3/15/2018
	Posting of First Draft and TC Ballot	8/02/2018	4/26/2018
	Final date for Receipt of TC First Draft ballot	8/23/2018	5/17/2018
	Final date for Receipt of TC First Draft ballot - recirc	8/30/2018	5/24/2018
	Posting of First Draft for CC Meeting		5/31/2018
	Final date for CC First Draft Meeting		7/12/2018
	Posting of First Draft and CC Ballot		8/02/2018
	Final date for Receipt of CC First Draft ballot		8/23/2018
	Final date for Receipt of CC First Draft ballot - recirc		8/30/2018
	Post First Draft Report for Public Comment	9/06/2018	9/06/2018
Comment Stage (Second Draft)	Public Comment Closing Date*	11/15/2018	11/15/2018
	Notice Published on Consent Standards (Standards that received no Comments) Note: Date varies and determined via TC ballot.		
	Appeal Closing Date for Consent Standards (Standards that received no Comments)		
	Final date for TC Second Draft Meeting	5/16/2019	2/07/2019
	Posting of Second Draft and TC Ballot	6/27/2019	3/21/2019
	Final date for Receipt of TC Second Draft ballot	7/18/2019	4/11/2019
	Final date for receipt of TC Second Draft ballot - recirc	7/25/2019	4/18/2019
	Posting of Second Draft for CC Meeting		4/25/2019
	Final date for CC Second Draft Meeting		6/06/2019
	Posting of Second Draft for CC Ballot		6/27/2019
	Final date for Receipt of CC Second Draft ballot		7/18/2019
	Final date for Receipt of CC Second Draft ballot - recirc		7/25/2019
	Post Second Draft Report for NITMAM Review	8/01/2019	8/01/2019
Tech Session Preparation (& Issuance)	**Notice of Intent to Make a Motion (NITMAM) Closing Date**	8/29/2019	8/29/2019
	Posting of Certified Amending Motions (CAMs) and Consent Standards	10/10/2019	10/10/2019
	Appeal Closing Date for Consent Standards	10/25/2019	10/25/2019
	SC Issuance Date for Consent Standards	11/04/2019	11/04/2019
Tech Session	Association Meeting for Standards with CAMs	6/17/2020	6/17/2020
Appeals and Issuance	Appeal Closing Date for Standards with CAMs	7/08/2020	7/08/2020
	SC Issuance Date for Standards with CAMs	8/14/2020	8/14/2020

TC = Technical Committee or Panel
CC = Correlating Committee

As of 2/3/2017

Attachment D: NFPA 850 & 853
Public Input Reports

Public Input No. 14-NFPA 850-2017 [Global Input]

Please ADD reference of NFPA 551.

Type your content here ...

Statement of Problem and Substantiation for Public Input

Refernce to NFPA 551 shall be added as it provide guidance for fire risk evaluation.

Submitter Information Verification

Submitter Full Name: deepak Gharpure
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 08 04:15:57 EDT 2017

Public Input No. 38-NFPA 850-2018 [Section No. 2.3.7]

2.3.7 UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

~~ANSI/~~ UL 263, *Standard for Fire Tests of Building Construction and Materials*, 2011, revised 2015 .

~~ANSI/~~ UL 723, *Test for Surface Burning Characteristics of Building Materials*, 2008, revised ~~2010~~ 2013 .

~~ANSI/~~ UL 790, *Tests for Fire Resistance of Roof Covering Materials* 2004, revised ~~2008~~ 2014 .

~~ANSI/~~ UL 900, *Standard for Safety Test Performance of Air Filters*, ~~2004, revised 2011~~ 2015 .

~~ANSI/~~ UL 1479, *Standard for Fire Tests of Through-Penetration Firestops*, ~~2003, revised 2010~~ 2015 .

~~ANSI/~~ UL 1709, *Standard for Rapid Rise Fire Tests of Protection Materials for Structural Steel*, ~~2011~~ 2017 .

Statement of Problem and Substantiation for Public Input

Standard update to newest version of the standards. Many years ago, UL preferred the ANSI/UL reference because there was a transition of traditional UL standards towards an ANSI standards development process.

Now, years later, a large majority of UL Standards are ANSI approved and follow the ANSI development and maintenance process. However, sometimes readers are confused because they don’t understand the standards are actually UL standards, not developed by ANSI. There are many other references to standards promulgated by other standards development organizations where they are considered ANSI approved but do not include ANSI in the reference.

Submitter Information Verification

Submitter Full Name: Kelly Nicolello
Organization: UL LLC
Affilliation: UL LLC
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jan 03 10:59:55 EST 2018

Public Input No. 34-NFPA 850-2018 [Section No. 3.3.6]

3.3.6 Fast Depressurization System.

A passive mechanical system designed to ~~depressurize the transformer~~ depressurize an oil-filled transformer, reactor, bushing cable box, or load tap changer a few milliseconds after the occurrence of ~~an electrical fault.~~ an internal electrical arc, thereby preventing fire.

Statement of Problem and Substantiation for Public Input

This section clarifies the scope of the technology. Fast depressurization systems may be used on other oil-filled equipment besides transformers but are not applicable to dry-type transformers. Equipment such as an oil bushing cable box is vulnerable because of the short circuit risk associated with the high voltage leads. Likewise, tap changers also are good candidates for this technology. Based on the CIGRE A2.37 Transformer Reliability Survey of 2015, a study of 675 major transformers failures with voltage classes of at least 100 kV, among which the failure origin is known:

- Bushings were the source of failure for 48.5% of cases resulting in explosion or fire.
- Tap changers were the source of failure for 17.5% of cases resulting in explosion or fire.

In addition, this section clarifies that the technology is designed to prevent explosions due to internal electrical arcs, not other types of external faults or damages to the transformer tank that could result in fires.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 36-NFPA 850-2018 [Section No. A.5.1.4.2(9)]	related comments on same technology
Public Input No. 37-NFPA 850-2018 [New Section after D.2]	related comments on same technology
Public Input No. 35-NFPA 850-2018 [Section No. 5.1.5.2]	

Submitter Information Verification

Submitter Full Name: Anne Goj
Organization: Transformer Protector Corp.
Affilliation: Transformer Protector Corp.
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jan 02 12:10:33 EST 2018

Public Input No. 8-NFPA 850-2017 [Section No. 5.1.4.3]

5.1.4.3 *

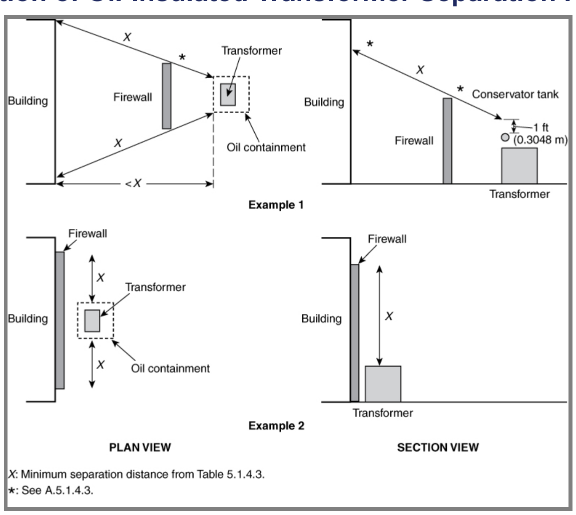
Unless consideration of the factors in 5.1.4.2 indicates otherwise, it is recommended that any oil-insulated transformer ~~containing 500 gal (1893 L) or more of oil~~ (inluding the edge of the postulated oil spill) be separated from adjacent structures by a 2-hour–rated firewall or by spatial separation in accordance with Table 5.1.4.3. Where a firewall is provided between structures and a transformer, it should extend vertically and horizontally as indicated in Figure 5.1.4.3._

-

Table 5.1.4.3 Outdoor Oil-Insulated Transformer Separation Criteria

Transformer Oil Capacity		
-		
Minimum (Line-of-Sight) Separation Without Firewall		
gal	**L**	
- ~~See~~		
	ft	**m**
<500	<1893	
-		
	5	
~~.1.4.2~~		
-		
500–5000	1893–18,925	
-		
	25	7.6
>5000	>18,925	
-		
50	15	

Figure 5.1.4.3 Illustration of Oil-Insulated Transformer Separation Recommendations.



Additional Proposed Changes

File Name	Description	Approved

NFPA_850_S5.1.4.3_S5.1.4.4_Comments.pdf

Statement of Problem and Substantiation for Public Input

Proposed deletion: section 5.1.4.3 starts by referencing/scoping that it is applicable to oil filled transformers with >500 gallons, but Table 5.1.4.3 includes a reference for <500 gallons. Deletion is proposed to address inconsistency in oil volume parameter vs. Table guidance.

Proposed modifications:

1. Table 5.1.4.3 had a reference error in the 2010 edition (referred to 5.2.4.2, which didn't exist). In the current edition, the table refers to section 5.1.4.2, but section 5.1.4.6 provides specific guidance for transformers with <500 gal (5.1.4.6) and requires a minimum of 5 feet or a firewall. Recommend integrating the recommendations included in section 5.1.4.6 into table 5.1.4.3.

2. Integration of section 5.1.4.6 into section 5.1.4.3. This will allow section 5.1.4.3 to be a one-stop-shop for oil filled transformer separation recommendations and allow the deletion of section 5.1.4.6.

The modifications are desired to provide alignment & guidance with the sections currently provided in NFPA 850.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 9-NFPA 850-2017 [Section No. 5.1.4.4]	Nealy identical in scope
Public Input No. 9-NFPA 850-2017 [Section No. 5.1.4.4]	
Public Input No. 10-NFPA 850-2017 [Section No. 5.1.4.6]	

Submitter Information Verification

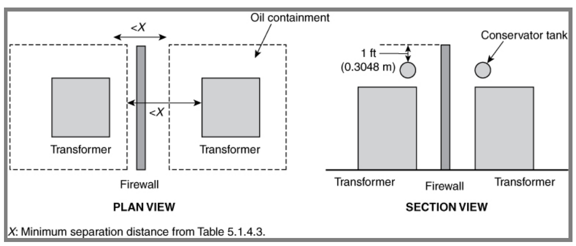
Submitter Full Name: Brendan Karchere
Organization: ConocoPhillips Alaska, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Fri Apr 21 17:54:38 EDT 2017

Public Input No. 9-NFPA 850-2017 [Section No. 5.1.4.4]

5.1.4.4

Unless consideration of the factors in 5.1.4.2 indicates otherwise, it is recommended that adjacent oil-insulated transformers ~~containing 500 gal (1893 L) or more of oil~~ be separated from each other by a 2 hour–rated firewall or by spatial separation in accordance with Table 5.1.4.3. When the oil containment, as shown in Figure 5.1.4.4, consists of a large, flat concrete containment area that holds several transformers and other equipment in it without the typical pit containment areas, specific containment features to keep the oil in one transformer from migrating to any other transformer or equipment should be provided. Subsection 5.5.7 can be used for guidance. Where a firewall is provided between transformers, it should extend at least 1 ft (0.31 m) above the top of the transformer casing and oil conservator tank and at least 2 ft (0.61 m) beyond the width of the transformer and cooling radiators, or to the edge of the containment area, whichever is greater. *(See Figure 5.1.4.4 for an illustration of the recommended dimensions for a firewall.)*

Figure 5.1.4.4 Outdoor Oil-Insulated Transformer Separation Criteria.



Additional Proposed Changes

File Name	Description	Approved
NFPA_850_S5.1.4.3_S5.1.4.4_Comments.pdf		

Statement of Problem and Substantiation for Public Input

Proposed deletion: Section 5.1.4.4 starts by referencing/scoping that it is applicable to oil filled transformers with >500 gallons, but refers to Table 5.1.4.3 which includes a reference for <500 gallons.

Table 5.1.4.3 refers to section 5.1.4.2 for transformers with <500 gallons, and as proposed in PI# 8-NFPA 850-2017, it is proposed to be modified to reference the criteria included in 5.1.4.6. Incorporating this deletion will allow consistency in guidance and application.

The modifications are desired to provide alignment & guidance with the sections currently provided in NFPA 850.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 8-NFPA 850-2017 [Section No. 5.1.4.3]	Identical in scope.
Public Input No. 8-NFPA 850-2017 [Section No. 5.1.4.3]	
Public Input No. 10-NFPA 850-2017 [Section No. 5.1.4.6]	

Submitter Information Verification

Submitter Full Name: Brendan Karchere

Organization: ConocoPhillips Alaska, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Fri Apr 21 18:03:01 EDT 2017

Public Input No. 10-NFPA 850-2017 [Section No. 5.1.4.6]

5.1.4.6

~~For transformers with less than 500 gal (1893 L) of oil and where a firewall is not provided, the edge of the postulated oil spill (i.e., containment basin, if provided) should be separated by a minimum of 5 ft (1.5 m) from the exposed structure to prevent direct flame impingement on the structure.~~

Statement of Problem and Substantiation for Public Input

Proposed deletion: if public comments 8-NFPA 850-2017 and 9-NFPA 850-2017 are accepted, there will no longer be a need for section 5.1.4.6 since the content currently contained in section 5.1.4.6 will already be included in table 5.1.4.3 (which is referenced by both sections 5.1.4.3 and 5.1.4.4).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 8-NFPA 850-2017 [Section No. 5.1.4.3]	Modification, if accepted, will allow deletion of 5.1.4.6
Public Input No. 9-NFPA 850-2017 [Section No. 5.1.4.4]	Modification, if accepted, will allow deletion of 5.1.4.6

Submitter Information Verification

Submitter Full Name: Brendan Karchere
Organization: ConocoPhillips Alaska, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Fri Apr 21 18:58:42 EDT 2017

Public Input No. 35-NFPA 850-2018 [Section No. 5.1.5.2]

5.1.5.2*

Oil-insulated transformers of greater than 100 gal (379 L) oil capacity installed indoors should be separated from adjacent areas by fire barriers of 3-hour fire resistance rating. Oil-insulated transformers installed indoors with larger capacities may also be equipped with fast depressurization systems to prevent fires caused by internal high energy arcing. The oil and gas outflow from these systems should be contained within an oil and gases separation tank, which retains the oil, and vents explosive gases away from electrical equipment and sources of ignition.

Statement of Problem and Substantiation for Public Input

When oil-filled transformers are located within structures, the damage from their fires can be significant, potentially much more larger than for transformers located outdoors. This addition is designed to increase awareness that the fast depressurization systems mentioned in 5.1.4 for outdoor oil-filled transformers may provide fire prevention for indoor transformers. We provide an example of the successful application of this technology for a 400 MVA transformer located within a hydroelectric plant later in the proposed input in Annex D.
The second sentence is proposed because a fast depressurization system with a direct exhaust to the atmosphere would lead to a high fire risk, rendering the system useless. A fast depressurization system is designed to quickly expel flammable oil and explosive gases generated by the arc, such as acetylene and hydrogen, from the transformer tank. When these gases mix with air, there is a high risk of combustion. Therefore, to minimize risk of fire, this outflow should be routed into an oil and gases separation tank, which safely contains the flammable oil, and vents the explosive gases to an area which is distant from electrical equipment and sources of ignition.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 34-NFPA 850-2018 [Section No. 3.3.6]	comment related to same technology
Public Input No. 36-NFPA 850-2018 [Section No. A.5.1.4.2(9)]	comment related to same technology
Public Input No. 37-NFPA 850-2018 [New Section after D.2]	comment related to same technology

Submitter Information Verification

Submitter Full Name: Anne Goj
Organization: Transformer Protector Corp
Affilliation: Transformer Protector Corp
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jan 02 12:15:39 EST 2018

Public Input No. 39-NFPA 850-2018 [Section No. 6.6.1]

6.6.1

Fire suppression systems and equipment should be provided in all areas of the plant as identified in Chapters 7 through 15 or as determined by the Fire Protection Design Basis Document. Fixed suppression systems should be designed in accordance with the following codes and standards unless specifically noted otherwise:

(1) NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*

(2) NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*

(3) NFPA 13, *Standard for the Installation of Sprinkler Systems*

(4) NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*

(5) NFPA 16, *Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems*

(6) NFPA 17, *Standard for Dry Chemical Extinguishing Systems*

(7) NFPA 750, *Standard on Water Mist Fire Protection Systems*

(8) *NFPA 770, Standard for Hybrid (Water and Inert Gas) Fire-Extinguishing Systems*

(9) NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*

(10) NFPA 2010, *Standard for Aerosol Fire Extinguishing Systems*

Statement of Problem and Substantiation for Public Input

NFPA 770, covering Hybrid Fire Extinguishing Systems is now a recognized document, and Hybrid Fire Extinguishing Systems have been recognized by the industry as viable fire protection for the applications covered by NFPA 850

Submitter Information Verification

Submitter Full Name: Lawrence Carmen
Organization: Victaulic Company of America
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jan 03 15:43:43 EST 2018

Public Input No. 40-NFPA 850-2018 [Section No. 7.3.9.1]

7.3.9.1

Indoor fuel oil pumping or heating facilities, or both, should be protected with automatic sprinklers, water spray, water mist system, hybrid fire-extinguishing system, foam-water sprinklers, compressed air foam systems, or gaseous total flooding system(s). Local application dry chemical systems are permitted to be used in areas that normally do not have re-ignition sources, such as steam lines or hot boiler surfaces.

Statement of Problem and Substantiation for Public Input

Hybrid Fire Extinguishing Systems have been recognized by the industry as viable fire protection and listed for use in applications covered by this section

Submitter Information Verification

Submitter Full Name: Lawrence Carmen
Organization: Victaulic Company of America
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jan 03 15:59:54 EST 2018

Public Input No. 41-NFPA 850-2018 [Section No. 7.5.1.1]

7.5.1.1

Boiler-furnaces with multiple oil-fired burners or that use oil for ignition should be protected with automatic sprinkler, water spray, hybrid fire-extinguishing systems, foam, foam-water sprinkler systems, or compressed air foam systems covering the burner front oil hazard.

Statement of Problem and Substantiation for Public Input

Hybrid Fire Extinguishing Systems could be used for the protection of boiler-furnaces.

Submitter Information Verification

Submitter Full Name: Lawrence Carmen
Organization: Victaulic Company of America
Street Address:
City:
State:
Zip:

Submittal Date: Wed Jan 03 16:06:31 EST 2018

Public Input No. 28-NFPA 850-2017 [Section No. 7.6.8.1]

7.6.8.1

Noncombustible liners should be used where practical. *(See Annex C for fire tests.)*

Noncombustible Borosilicate Glass Lining Systems have been used succesfully in the past to protect against fire (See Annex A for Stack Fire Loss Experience)

Additional Proposed Changes

File Name	Description	Approved
Exponent_-_Chimney_fire_study.pdf	Exponent Study on large power plant fires	
I.R._01_131_-_Vasilikos_Power_Station_14.06.43.pdf	Vasilikos Power Station fire study	
I.R._01_132_-_Vinh_Tan_4_Power_Station_14.06.45.pdf	Vinh Tan 4 Power Station fire study	

Statement of Problem and Substantiation for Public Input

Within the current NFPA-850 document it is our stance that further detail is required to educate the end user with regards to fire risks and protective measures which should be taken in order to protect the structural integrity of ducts/chimneys from fire. As an effect of our proposed change our additions would further clarify necessary steps to fire protection concerning downstream applications in the ductwork and chimneys of generating facilities. We would provide studies which detail the success of the Pennguard Block Lining System (Borosilicate Glass Block Lining System) and its ability to protect the structural integrity of said ducts/chimneys for the technical committees review.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 29-NFPA 850-2017 [Section No. C.5.1]	FM Global lab testing versus real world occurences
Public Input No. 33-NFPA 850-2018 [New Section after A.7.6.5]	

Submitter Information Verification

Submitter Full Name: Gary Gerba
Organization: Hadek Protective Systems
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 27 09:59:28 EDT 2017

Public Input No. 42-NFPA 850-2018 [Section No. 7.7.4.1]

7.7.4.1 Turbine-Generator Area.

7.7.4.1.1*

All areas beneath the turbine-generator operating floor that are subject to oil flow, oil spray, or oil accumulation should be protected by an automatic sprinkler, hybrid fire-extinguishing system or foam-water sprinkler system. This coverage normally includes all areas beneath the operating floor in the turbine building. The sprinkler system beneath the turbine-generator should take into consideration obstructions from structural members and piping and should be designed to a density of 0.30 gpm/ft^2 (12.2 mm/min) over a minimum application of 5000 ft^2 (464 m^2).

7.7.4.1.2

Lubricating oil lines above the turbine operating floor should be protected with an automatic sprinkler system or hybrid fire-extinguishing system covering those areas subject to oil accumulation including the area within the turbine lagging (skirt). The automatic sprinkler system should be designed to a density of 0.30 gpm/ft^2 (12.2 mm/min).

7.7.4.1.3*

Lubricating oil reservoirs and handling equipment should be protected in accordance with 7.7.4.1.1. If the lubricating oil equipment is in a separate room enclosure, protection can be provided by a total flooding gaseous extinguishing system or a hybrid fire-extinguishing system .

7.7.4.1.4*

Protection for pedestal-mounted turbine generators with no operating floor can be provided by recommendations 7.7.4.1 through 7.7.4.3 and by containing and drainage of oil spills and providing local automatic protection systems for the containment areas. In this type of layout, spray fires from lube oil and hydrogen seal oil conditioning equipment and from control oil systems using mineral oil, if released, could expose building steel or critical generating equipment. Additional protection such as enclosing the hazard, installing a noncombustible barrier between the hazard and critical equipment, or use of a water spray system over the hazard should be considered.

7.7.4.1.5*

Foam-water sprinkler systems installed in place of automatic sprinklers described in Chapter 7 should be designed in accordance with NFPA 16, including the design densities specified in Chapter 7.

7.7.4.1.6

Electrical equipment in the area covered by a water or foam-water system should be of the enclosed type or otherwise protected to minimize water damage in the event of system operation.

Statement of Problem and Substantiation for Public Input

Hybrid Fire Extinguishing systems may be applied as either local application or total flooding systems for the fuels that are used in these applications. Hybrid systems have been tested as a local application on Class B pool fires.

Submitter Information Verification

Submitter Full Name: Lawrence Carmen

Organization: Victaulic Company of America
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jan 03 16:15:12 EST 2018

Public Input No. 7-NFPA 850-2017 [Section No. 7.7.4.1.1]

7.7.4.1.1*

All areas beneath the turbine-generator operating floor that are subject to oil flow, oil spray, or oil accumulation should be protected by an automatic sprinkler, *water spray, water mist (Total Flooding, Local Application), compressed air foam systems* or foam-water sprinkler system. This coverage normally includes all areas beneath the operating floor in the turbine building. The sprinkler system beneath the turbine-generator should take into consideration obstructions from structural members and piping and should be designed to a density of 0.30 gpm/ft^2 (12.2 mm/min) over a minimum application of 5000 ft^2 (464 m^2).

Statement of Problem and Substantiation for Public Input

Introduction of new fire suppression system for the Steam Turbine Area based on the Equivalency Assumption (Chapter 1.4), in order to reduce the impact on Steam Turbine Foundation, Oil Pipe Trenches, Concrete Curbs.
Water Mist (Total Flooding and Local Application), and Compressed Air Foam System are already recommended fire suppression system for Combustion Turbines and Internal Combustion Engines (Chapter 8).

Submitter Information Verification

Submitter Full Name: Alberto Cusimano
Organization: General Electric (Switzerland)
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jan 16 10:43:15 EST 2017

Public Input No. 11-NFPA 850-2017 [Section No. 7.7.4.1.2]

7.7.4.1.2

Lubricating oil lines above the turbine operating floor should be protected with an automatic sprinkler system, water spray,water mist (Total Flooding, Local Application), compressed air foam systems, covering those areas subject to oil accumulation including the area within the turbine lagging (skirt). The automatic sprinkler system should be designed to a density of 0.30 gpm/ft^2 (12.2 mm/min).

Statement of Problem and Substantiation for Public Input

Introduction of new fire suppression system for the Steam Turbine Area based on the Equivalency Assumption (Chapter 1.4), in order to reduce the impact on Steam Turbine Foundation, Oil Pipe Trenches, Concrete Curbs.
Water Mist (Total Flooding and Local Application), and Compressed Air Foam Systems are already recommended fire suppression system for Combustion Turbines and Internal Combustion Engines (Chapter 8).

Submitter Information Verification

Submitter Full Name: Alberto Cusimano
Organization: General Electric Switzerland
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jun 06 04:57:39 EDT 2017

Public Input No. 43-NFPA 850-2018 [Sections 7.7.4.2, 7.7.4.3]

Sections 7.7.4.2, 7.7.4.3

7.7.4.2* Turbine-Generator Bearings.

7.7.4.2.1*

Turbine-generator bearings should be protected with an automatic closed-head sprinkler system utilizing directional nozzles. Automatic actuation is more reliable than manual action. Fire protection systems for turbine-generator bearings should be designed for a density of 0.25 gpm/ft^2 (10.2 mm/min) over the protected area of all bearings.

7.7.4.2.2*

Accidental water discharge on bearing points and hot turbine parts should be considered. If necessary, these areas can be permitted to be protected by shields and encasing insulation with metal covers.

7.7.4. 2. 3

A hybrid system installed in accordance with NFPA 770 and the manufacturer's design and installation manual is permitted to be used.

7.7.4.3 Exciter.

The area inside a directly connected exciter housing should be protected with a hybrid fire-extinguishing system or a total flooding automatic carbon dioxide system.

Statement of Problem and Substantiation for Public Input

Hybrid fire extinguishing systems have been recognized as viable protection for turbine generators. Hybrid systems use less water and can be considered for applications where there is concern about water discharge on bearings.

Submitter Information Verification

Submitter Full Name: Lawrence Carmen
Organization: Victaulic Company of America
Street Address:
City:
State:
Zip:

Submittal Date: Wed Jan 03 16:28:12 EST 2018

Public Input No. 12-NFPA 850-2017 [Section No. 7.7.4.2.1]

7.7.4.2.1*

Turbine-generator bearings should be protected with an automatic closed-head sprinkler system utilizing directional nozzles, water spray, water mist (Total Flooding, Local Application), compressed air foam systems . Automatic actuation is more reliable than manual action. Fire protection systems for turbine-generator bearings should be designed for a density of 0.25 gpm/ft^2 (10.2 mm/min) over the protected area of all bearings.

Statement of Problem and Substantiation for Public Input

Introduction of new fire suppression system for the Steam Turbine Area based on the Equivalency Assumption (Chapter 1.4), in order to reduce the impact on Steam Turbine Foundation, Oil Pipe Trenches, Concrete Curbs.
Water Mist (Total Flooding and Local Application), and Compressed Air Foam System are already recommended fire suppression system for Combustion Turbines and Internal Combustion Engines (Chapter 8).

Submitter Information Verification

Submitter Full Name: Alberto Cusimano
Organization: General Electric Switzerland
Street Address:
City:
State:
Zip:

Submittal Date: Tue Jun 06 05:04:41 EDT 2017

Public Input No. 44-NFPA 850-2018 [Sections 7.8.1, 7.8.2]

Sections 7.8.1, 7.8.2

7.8.1 Control, Computer, and Communication Rooms.

7.8.1.1

Control, computer, or telecommunications rooms should meet the applicable requirements of NFPA 75.

7.8.1.2

A smoke detection system should be installed throughout these rooms, including walk-in-type consoles, above suspended ceilings where combustibles are installed, and below raised floors. Where the only combustibles above the false ceiling are cables in conduit and the space is not used as a return air plenum, smoke detectors are permitted to be omitted from this area.

7.8.1.3

Automatic sprinkler protection, hybrid fire-extinguishing or automatic water mist fire protection systems for computer or telecommunications rooms should be considered in the Fire Protection Design Basis Document. A preaction system can be used. In addition, total flooding gaseous fire extinguishing systems should be considered for areas above and below raised floors that contain cables or for areas or enclosures containing equipment that is of high value or is critical to power generation. Individual equipment and cabinet protection could be considered in lieu of total flooding systems.

7.8.1.4

Cable raceways not terminating in the control room should not be routed through the control room.

7.8.1.5*

Fire detection systems should alarm in a constantly attended area.

7.8.2 Cable Spreading Room and Cable Tunnels.

7.8.2.1

Cable spreading rooms and cable tunnels should be protected with automatic sprinkler, water spray, water mist, hybrid fire-extinguishing or automatic gaseous extinguishing systems. Automatic sprinkler systems should be designed for a density of 0.30 gpm/ft^2 (12.2 mm/min) over 2500 ft^2 (232 m^2) or the most remote 100 linear ft (30 m) of cable tunnels up to 2500 ft^2 (232 m^2).

7.8.2.2

Cable spreading rooms and cable tunnels should be provided with an early warning fire detection system.

Statement of Problem and Substantiation for Public Input

Hybrid Fire Extinguishing Systems are viable fire protection for applications including control, computer, and telecommunication rooms as well as cable spreading rooms and cable tunnels.

Submitter Information Verification

Submitter Full Name: Lawrence Carmen
Organization: Victaulic Company of America

Street Address:
City:
State:
Zip:
Submittal Date: Wed Jan 03 16:35:48 EST 2018

Public Input No. 45-NFPA 850-2018 [New Section after 8.5.4]

8.5.4.9 Hybrid Fire Extinguishing Systems

8.5.4.9.1 Where hybrid fire-extinguishing systems are used, the system shall be installed in accordance with NFPA 770 and the manufacturer's design and installation procedures

8.5.4.9.2 The turbine or engine enclosure shall be arranged for reduced leakage by automatic closing of the doors, ventilation dampers, and automatic shutdown of fans and other openings. Fuel valves shall be arranged to close automatically on system actuation.

8.5.4.9.3 Discharge rate and duration of discharge should be such that the hybrid media concentration is maintained for sufficient time to allow cooling of hot surfaces below the fuel's auto-ignition temperature.

Statement of Problem and Substantiation for Public Input

Hybrid Fire-Extinguishing Systems have been recognized as viable fire protection and listed for the protection of combustion turbines and internal combustion engines.

Submitter Information Verification

Submitter Full Name: Lawrence Carmen
Organization: Victaulic Company of America
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jan 03 16:41:28 EST 2018

Public Input No. 46-NFPA 850-2018 [Section No. 9.1.5.3]

9.1.5.3

Hydraulic equipment, reservoirs, coolers, and associated oil-filled equipment should be provided with automatic sprinkler, water spray protection, hybrid fire-extinguishing or compressed air foam systems. Protection should be over oil-containing equipment and for 20 ft (6.1 m) beyond in all directions. A density of 0.25 gpm/ft^2 (10.2 mm/min) should be provided. Compressed air foam systems should be designed and installed in accordance with NFPA 11 and their listing for the specific hazards and protection objectives specified in the listing.

Exception: Where a listed fire-resistant fluid is used, protection is not needed.

Statement of Problem and Substantiation for Public Input

Hybrid fire-extinguishing systems have been recognized as viable fire protection and listed for the protection of spaces containing oil pumps, oil tanks, hydraulic fluids.

Submitter Information Verification

Submitter Full Name: Lawrence Carmen
Organization: Victaulic Company of America
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jan 03 16:51:14 EST 2018

Public Input No. 47-NFPA 850-2018 [New Section after 10.5.3.2]

10.5.3.3 Hybrid Fire-Extinguishing Systems

10.5.3.3.1 Where hybrid fire-extinguishing systems are used, the system should be installed in accordance with NFPA 770 and the manufacturer's design and installation procedures.

10.5.3.3.2 The turbine or engine enclosure shall be arranged for reduced leakage by automatic closing of the doors, ventilation dampers and automatic shutdown of fans and other openings.

Statement of Problem and Substantiation for Public Input

Hybrid Fire Extinguishing Systems are viable fire protection for applications found in wind generating facilities. Hybrid Fire-Extinguishing systems use less water and may suitable for applications that lack an abundant water supply.

Submitter Information Verification

Submitter Full Name: Lawrence Carmen
Organization: Victaulic Company of America
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jan 03 16:56:02 EST 2018

Public Input No. 48-NFPA 850-2018 [Section No. 14.5.2.4]

14.5.2.4*

Fixed fire protection for this equipment, where provided, should be as follows:

(1) Automatic wet pipe sprinkler protection systems utilizing a design density of 0.25 gpm/ft^2 (10.2 mm/min) for the entire hazard area

(2) Automatic foam-water sprinkler systems providing a density of 0.16 gpm/ft^2 (6.5 mm/min)

(3) Gaseous extinguishing systems of either the local application or total flooding types. Safety considerations associated with these systems should be evaluated prior to the selection of gas-type protection systems.

(4) Compressed air-foam systems designed and installed in accordance with NFPA 11 and their listing for the specific hazards and protection objectives specified in the listing.

(5) Hybrid fire-extinguishing systems designed and installed in accordance with NFPA 770 and the manufacturer's design and installation procedures.

Statement of Problem and Substantiation for Public Input

Hybrid fire-extinguishing systems are viable fire protection for applications involving hydraulic pumps, piping and control systems

Submitter Information Verification

Submitter Full Name: Lawrence Carmen
Organization: Victaulic Company of America
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jan 03 17:05:57 EST 2018

Public Input No. 49-NFPA 850-2018 [Sections 14.5.3.1, 14.5.3.2, 14.5.3.3]

Sections 14.5.3.1, 14.5.3.2, 14.5.3.3

14.5.3.1*

Protection of generator windings consisting of materials that will not extinguish when de-energized should be provided by automatically actuated gaseous extinguishing systems, hybrid fire-extinguishing systems, water spray rings, or ~~both~~ a combination of these .

14.5.3.2

Fire detection in generator winding should be provided.

14.5.3.3

Protection of generator pits containing auxiliary circuits such as protection current transformers (CTs), neutral transformers, and grounding resistors that are associated with generator protection should be provided by an automatically actuated gaseous extinguishing system, hybrid fire-extinguishing system or water spray system.

Statement of Problem and Substantiation for Public Input

Hybrid fire extinguishing systems are viable fire protection for generator windings and ancillary equipment.

Submitter Information Verification

Submitter Full Name: Lawrence Carmen
Organization: Victaulic Company of America
Street Address:
City:
State:
Zip:

Submittal Date: Wed Jan 03 17:14:35 EST 2018

Public Input No. 50-NFPA 850-2018 [Section No. 17.4.1.2]

17.4.1.2*

All fire protection systems and equipment should be periodically inspected, tested, and maintained in accordance with applicable *National Fire Codes*. *(See Table 17.4.1.2 for guidance.)*

Table 17.4.1.2 Reference Guide for Fire Equipment Inspection, Testing, and Maintenance

Item	NFPA Document No.
Supervisory and fire alarm circuits	72
Fire detectors	72
Manual fire alarms	72
Sprinkler water flow alarms	25/72
Sprinkler and water spray systems	25/72
Foam systems	11/16/25
Halogenated agent, chemical and CO_2 systems	12/12A/17/2001
Fire pumps and booster pumps	25/72
Water tanks and alarms	25/72
P.I.V.s and O.S. & Y. valves	25/72
Fire hydrants and associated valves	13/24
Fire hose and standpipes and hose nozzles	1962/25
Portable fire extinguishers	10
Fire brigade equipment	1971
Fire doors and dampers	80/90A
Smoke vents	204
Emergency lighting	110
Radio communication equipment	1221
Audible and visual signals	72
Hybrid fire-extinguishing systems	770
Water mist fire protection systems	750

Statement of Problem and Substantiation for Public Input

Hybrid fire-extinguishing systems are viable fire protection for the applications covered by this section.

Submitter Information Verification

Submitter Full Name: Lawrence Carmen
Organization: Victaulic Company of America
Street Address:
City:
State:
Zip:

Submittal Date: Wed Jan 03 17:17:38 EST 2018

Public Input No. 36-NFPA 850-2018 [Section No. A.5.1.4.2(9)]

A.5.1.4.2(9)

Oil-filled transformer explosions and fires can be prevented in some cases by the installation of a passive mechanical system designed to depressurize the transformer a few milliseconds after the occurrence of an electrical fault, as shown in D .2.14. This fast depressurization can be achieved by a quick oil evacuation triggered by the dynamic pressure peak generated by the short circuit. The protection technology activates within milliseconds before static pressure increases, therefore preventing transformer explosion and subsequent fire. However, since these devices do not eliminate a fire potential resulting from all forms of transformer failure (e.g., transformer bushing failure), they should be considered as a possible supplement to passive protection features such as physical barriers or spatial separation, not as an alternative to these features. Fast Depressurization systems may be more effective when specifically including depressurization outflow devices located directly on the high-risk areas of the bushing turrets and oil bushing cable boxes. The fast depressurization system should have no obstructions to flow, to allow the rapid evacuation of high pressure fluids from the transformer. Type-testing of the fast depressurization system on sealed, oil-filled transformers with high energy arcs of 1 megajoule can confirm the effectiveness of the system for its intended use.

Statement of Problem and Substantiation for Public Input

We propose adding an illustrative example case where this technology successfully has been employed into Annex D (see linked public input submission.)

The CIGRE A2.37 Transformer Reliability Survey of 2015 includes a study of 675 major transformers failures with voltage classes of at least 100 kV, which found that bushings were the source of failure for 48.5% of cases resulting in explosion or fire, for which the failure origin is known. Because bushings have a high risk of failure and because both bushing turrets and oil bushing cable boxes include high voltage elements in constrained geometric regions, our company has found it necessary to equip high voltage bushing turrets and oil bushing cable boxes with depressurization sets for transformers with power ratings higher than 160 MVA.

This sentence about outflow provides additional information to help users differentiate the design characteristics of fast depressurization systems from existing resealable pressure devices, also known as pressure relief valves, designed for slower pressure rises from low energy faults or overheating. Resealable pressure relief devices (pressure relief valves) often have significant obstructions to flow, which make them ineffective solutions to relieve pressures due to internal arcs in transformers. The ineffectiveness of resealable pressure relief devices (pressure relief valves) can be demonstrated by the persistence of transformer explosions and fires despite the near universal application of these devices in transformers. The CIGRE A2.37 Transformer Reliability Survey of 2015 analyzing 964 major failures showed that 13.07% of transformer failures result in explosion or fire. Fast depressurization systems are best able to relieve sharp pressure rises caused by low impedance faults when the outflow is unimpeded.

There are no industry organizations that currently provide guidelines for the sizing of fast depressurization systems, so a live test of the system installed on a sealed, oil-filled transformer is important to verify its ability to safely depressurize transformers given realistic internal arcing events. A 2012 Department of Energy Study, “Infrastructure and Energy Restoration Office of Electricity Delivery and Energy Reliability” has characterized power transformers as having power ratings of 60 MVA or above. If the entire power of the transformer goes through the arc, arc powers can be as high as 60 MW for smaller power transformers. Given that circuit breaker operation is defined in units of cycles, for example in IEEE C37.04-1999(R2006), we can bound the minimum circuit breaker operation time scale at one cycle. Therefore, assuming a 60 Hz power frequency common in North

America, a minimum energy threshold which should be proven by experimental tests is 1 megajoule (MJ).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 37-NFPA 850-2018 [New Section after D.2]	example of loss prevention referenced in this input
Public Input No. 34-NFPA 850-2018 [Section No. 3.3.6]	
Public Input No. 35-NFPA 850-2018 [Section No. 5.1.5.2]	

Submitter Information Verification

Submitter Full Name: Anne Goj
Organization: Transformer Protector Corp
Affilliation: Transformer Protector Corp
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jan 02 12:19:18 EST 2018

Public Input No. 33-NFPA 850-2018 [New Section after A.7.6.5]

7.6.8 - Stack Fire Loss Experience

Three cases have been reported, where a large power station fire originating in the FGD system affected a borosilicate glass block lined steel chimney or steel chimney flue. The three fires have the following factors in common: (1) the fires occurred during a maintenance outage or during initial construction, (b) the fires resulted in very high temperatures within the steel chimney (flue) and (c) the borosilicate glass block lining, while itself heavily damaged, was successful in protecting the steel chimney (flue) against overheating and collapse.

Fire No. 1. This fire occurred in the FGD system of a coal fired power plant. As the fire erupted, very hot combustion gases entered into the stack, which was a 250 ft high, free standing steel stack internally lined with a lining of 1.5” thick borosilicate glass blocks. It was reported by power plant personnel that during the fire, flames erupted 10 to 15 feet above the top of the stack. Following the fire, it was established that the lining had been seriously damaged and needed partial replacement. The stack itself did not sustain structural damage.

Fire No. 2. This fire occurred in the FGD system of an oil fired power plant. The plant operates a 410 ft high concrete stack with three flues. The steel flue connected to the burning FGD system was internally protected by a lining of 1.5” thick borosilicate glass blocks. The heat entering this steel flue during the FGD fire was exacerbated by the fire in the fiberglass-reinforced plastic outlet duct connecting the FGD system to the stack. Following the fire, it was established that the lining had been irreparably damaged and needed complete replacement. The steel flue and the stack itself did not sustain structural damage.

Fire No. 3. This fire occurred in the FGD system of a coal fired power plant that was under (nearly complete) construction. The plant has a 689 ft high concrete stack with two flues. The steel flue connected to the burning FGD system was internally protected by a lining of 1.5” thick borosilicate glass blocks. During the fire, the steel flue was exposed to very hot combustion gases, with flames shooting out of the top of the stack. Following the fire, it was established that the lining had been irreparably damaged and needed complete replacement. The steel flue and the stack itself did not sustain structural damage.

Additional Proposed Changes

File Name	Description	Approved
Exponent_-_Chimney_fire_study.pdf	Exponent study on large power plant fires	
I.R._01_131_-_Vasilikos_Power_Station_14.06.43.pdf	Vasilikos Power Station fire study	
I.R._01_132_-_Vinh_Tan_4_Power_Station_14.06.45.pdf	Vinh Tan 4 Power Station fire study	

Statement of Problem and Substantiation for Public Input

Within the current NFPA-850 document it is our stance that further detail is required to educate the end user with regards to fire risks and protective measures which should be taken in order to protect the structural integrity of ducts/chimneys from fire. As an effect of our proposed change our additions would further clarify necessary steps to fire protection concerning downstream applications in the ductwork and chimneys of generating facilities. We would provide studies which detail the success of the Pennguard Block Lining System (Borosilicate Glass Block Lining System) and its ability to protect the structural integrity of said ducts/chimneys for the technical committees review.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 28-NFPA 850-2017 [Section No. 7.6.8.1]	Elaboration of "Stack Fire Loss Experience" events

Submitter Information Verification

Submitter Full Name: Gary Gerba
Organization: Hadek Protective Systems
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jan 02 09:52:10 EST 2018

Public Input No. 29-NFPA 850-2017 [Section No. C.5.1]

C.5.1 General.

Tests were conducted on four fire-retardant fiberglass-reinforced plastic liners by Factory Mutual Research Corporation. [6] The liners were 3 ft (0.91 m) in diameter and 30 ft (9.15 m) long. They were suspended vertically above a 10 ft^2 (0.93 m^2) pan containing 3 in. (7.62 cm) of heptane. The liners were exposed to this ignition source for 2½ minutes, at which time the pan was removed.

Tests were also conducted by FM Approvals on steel panels protected by a borosilicate glass block lining in accordance with its standard entitled Approval Standard for Chimney and Flue Liner Materials dated November 2007. As required by this standard, two parallel test specimens of 16 ft high and 3 ft wide were exposed to flames and combustion gas from a propane burner firing at 360 kW capacity for a period of 30 minutes.

Additional Proposed Changes

File Name	Description	Approved
FM_Approval_Pennguard.pdf	FM Approvals procedure	
Approvals_Letter.pdf	Manufacturer study approval letter via FM Approvals	

Statement of Problem and Substantiation for Public Input

Within the current NFPA-850 document it is our stance that further detail is required to educate the end user with regards to fire risks and protective measures which should be taken in order to protect the structural integrity of ducts/chimneys from fire. As an effect of our proposed change our additions would further clarify necessary steps to fire protection concerning downstream applications in the ductwork and chimneys of generating facilities. We would provide studies which detail the success of the Pennguard Block Lining System (Borosilicate Glass Block Lining System) and its ability to protect the structural integrity of said ducts/chimneys for the technical committees review.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 28-NFPA 850-2017 [Section No. 7.6.8.1]	
Public Input No. 30-NFPA 850-2017 [Section No. C.5.2]	

Submitter Information Verification

Submitter Full Name: Gary Gerba
Organization: Hadek Protective Systems
Street Address:
City:
State:
Zip:

Submittal Date: Thu Nov 16 09:14:42 EST 2017

Public Input No. 30-NFPA 850-2017 [Section No. C.5.2]

C.5.2 Tests.

Results were similar with all four materials tested. There was an initial moderate temperature rise due to the heat input from the heptane fire, a leveling off of temperature prior to involvement of the plastic, then a very rapid temperature increase caused by heat contribution from the burning liner, another leveling off during a period of active liner burning, then a decrease in temperature coincident with removal of the exposure fire. From a review of the test data, it appeared that once burning of the liner started, fire spread over the surface was almost instantaneous. Temperatures at different elevations in the liner interior reached 1000°F (537.8°C) almost simultaneously in each test.

The FM Approvals test of the borosilicate glass block lined steel was concluded successfully, with both the visual flame height and the maximum heat release remaining well within the limits set by FM Approval's standard.

Additional Proposed Changes

File Name	Description	Approved
Approvals_Letter.pdf	Approval letter - FM Approvals	
FM_Approval_Pennguard.pdf	FM Approvals Document	

Statement of Problem and Substantiation for Public Input

Within the current NFPA-850 document it is our stance that further detail is required to educate the end user with regards to fire risks and protective measures which should be taken in order to protect the structural integrity of ducts/chimneys from fire. As an effect of our proposed change our additions would further clarify necessary steps to fire protection concerning downstream applications in the ductwork and chimneys of generating facilities. We would provide studies which detail the success of the Pennguard Block Lining System (Borosilicate Glass Block Lining System) and its ability to protect the structural integrity of said ducts/chimneys for the technical committees review.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 29-NFPA 850-2017 [Section No. C.5.1]	FM Global testing results on the Pennguard Block Lining System in fire study

Submitter Information Verification

Submitter Full Name: Gary Gerba
Organization: Hadek Protective Systems
Street Address:
City:
State:
Zip:
Submittal Date: Thu Nov 16 09:16:54 EST 2017

Public Input No. 37-NFPA 850-2018 [New Section after D.2]

D.2.14 Prevention of Transformer Fire by Fast Depressurization System

In 2013, a 400 MVA indoor oil-filled transformer manufactured in 2008 and located within the Rushydro hydroelectric plant in Krasnoyarsk Krai had a 65 ms fault with a current of 4.5 kA. Subsequent dissolved gas analysis and internal scorch marks confirmed that a high energy internal fault had occurred and the energy of the arc was estimated to be over 6 megajoules. This transformer was equipped with a fast depressurization system that operated at the inception of the arc and was logged as one of the first safety devices to have functioned. Despite the energy of the arc, there was no deformation or leaking of the tank and therefore no fire. The transformer was repaired and placed back into service. Plant engineers credited the timely operation of the fast depressurization system with prevention of a transformer fire and plant damage.

Statement of Problem and Substantiation for Public Input

This section provides a publicly documented example of a loss prevention by fast depressurization systems. This technology is less deployed within the US than it has been in Europe and other countries, including installations where it has been EU ATEX certified for operation in an explosive atmosphere. However, its availability and usefulness may not be as familiar to US utilities. A study of the incident was published by the utility in: L'vova et al. "Reducing the Risk of Damage to Power Transformer of 110kV and above Accompanying Internal Short Circuits" Power Technology and Engineering, vol 48. No 6. p 484 March 2015. Our company has received numerous reports from clients following the activation of our fast depressurization system where no explosion or fire has occurred, and in one case where the client has estimated the financial impact of the fault they found that the total costs of repairs was only 2% of the original 125MVA transformer cost because of the successful operation of the depressurization system.

Submitter Information Verification

Submitter Full Name: Anne Goj
Organization: Transformer Protector Corp
Affilliation: Transformer Protector Corp
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jan 02 12:25:46 EST 2018

Public Input No. 3-NFPA 853-2018 [Section No. 1.3]

1.3 Application.

This standard shall not apply to- ~~portable~~ :

1. Portable fuel cells or to fuel cell power systems that are used on any movable structure ~~or vehicle~~ unless the structure ~~or vehicle is made stationary~~ is made stationary.

2. Fuel cell power systems that are used to power any vehicle unless the vehicle is made stationary, other than the temporary use of a one- or two-family dwelling unit owner or occupant's private fuel cell powered vehicle to power the dwelling while parked .

Statement of Problem and Substantiation for Public Input

With the establishment of the new NFPA 855 Energy Storage Systems Standard, and work that has been ongoing to modify the NFPA 1 Fire Code and the International Fire Code relevant to Energy Storage Systems, it has been identified that various electric vehicle (EV) and fuel cell powered electric vehicle (EV) manufacturers have designed and/or manufactured vehicles that would allow the vehicle owner to temporarily power their home from the vehicles electric source. Both the 1st Draft NFPA 855 document will contain an exception for the temporary use of the private vehicle belonging to an owner or occupant of one- or two-family dwelling to be used for such purpose. Those documents would require compliance with the vehicle manufacturer’s instructions and NFPA 70 for the temporary use.

This proposal would correlate the applicability of this standard with the actions moving forward within the other documents.

Submitter Information Verification

Submitter Full Name: Robert Davidson
Organization: Davidson Code Concepts, LLC
Affilliation: Toyota USA
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jan 04 15:28:42 EST 2018