National Fire Protection Association

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Technical Committee on Electrical Equipment Maintenance (EEM-AAA)

AGENDA

First Draft Meeting for the 2016 Edition of NFPA 70B

March 12-14, 2014
San Antonio, TX

14-3-01	Call to Order and Introduction of Members and Guests
14-3-02	Approval of Pre-First Draft Meeting Minutes [attachment]
14-3-03	Review of Meeting Procedures and Revision Process
14-3-05	Task Group Reports
14-3-06	Review of Public Inputs and Development of First Revisions [attachment]
14-3-07	New Business
14-3-08	Adjournment

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NFPA 70B Pre - First Draft Meeting Minutes

February 14, 2014

Item 1 Welcome and Introductions. Chair Ken Rempe called the meeting to order at 2:00 pm. The following committee members were present:

Name	**Representing**
Kenneth Rempe, Chair	Siemens Industry, Inc. Rep. NEMA, Branch Circuit Wiring Devices
Richard Bingham	Dranetz-BMI
Thomas Bishop	Electrical Apparatus Service Association
Timothy Crnko	Cooper Bussmann
Ryan Grimes	Toyota Motor Engineering & Manufacturing
Palmer Hickman	National Joint Apprentice & Training Committee Rep. IBEW
Alan Manche	Schneider Electric Rep. NEMA, Circuit Protection
Ahmad Moshiri	Liebert Corporation
Robert Neary	SEA Limited
Gregory Todd Orr	Eastman Chemical Company Rep. American Chemical Council
James White	Shermco Industries, Inc.
John Staires	City of Tulsa Oklahoma
Leonard Fiume	National Grid Rep. Electric Light & Power Group/EEI
Ron Widup	Shermco Industries, Inc.

The following guests and NFPA staff were present:

Adria Corbett	Chubb Group of Insurance Companies
Chuck Kaufman	Miller Electric Manufacturing Company
Richard King	Eaton
Bill Harris	General Motors Corporation
Brian Brecheisen	Nucor Steel/ IEEE
Dennis Green	Tony Demaria Electric, Inc.

Bill Cantor	IEEE
Steve McClu	APC by Schneider Electric
John Polenz	Emerson Network Power
Kim Shea	NFPA
Michael Fontaine	NFPA

Item 2. Overview of the New NFPA Process. Michael Fontaine reviewed the new revision process and answered questions from the members. [Attachment]

Item 3. Overview of Public Inputs. It was noted that there are 38 Public Inputs for the committee to review and resolve at the First Draft meeting.

Item 4. Task Group Assignments. Ken Rempe reviewed the proposed task groups and requested volunteers. [Attachment]

Item 5. Review of New Chapters added last cycle. Ken assigned a task group to propose additional material/requirements for the new chapters.

Item 6. Next meeting. Michael offered to schedule another Pre-FD teleconference/web meeting to show the terra platform and demonstrate how the TC will work at the FD meeting. A doodle poll will be sent to the TC to determine interest and availability.

Item 7. Adjournment. The meeting adjourned at 3:50 pm

NFPA 70B Pre-First Draft Meeting

Welcome TC on

Electrical Equipment Maintenance

NFPA 70B F2015 Timline

- Public Input Stage (First Draft):
  - First Draft Meeting: March 12-14, 2014, San Antonio
  - Posting of First Draft for Public Comment: September 5, 2014
- Comment Stage (Second Draft):
  - Public Comment Closing Date: October 10, 2014
  - Second Draft Meeting: NLT January 23, 2015
  - Posting of Second Draft for NITMAM: July 17, 2015
- Tech Session Preparation:
  - NITMAM Closing Date: August 21, 2015
  - NITMAM /CAM Posting Date: October 16, 2015
  - NFPA Annual Meeting: June 13-16, 2015
- Standards Council Issuance:
  - Issuance of Consent Documents: November 10, 2015
  - Issuance of Documents with CAM: August 4, 2016

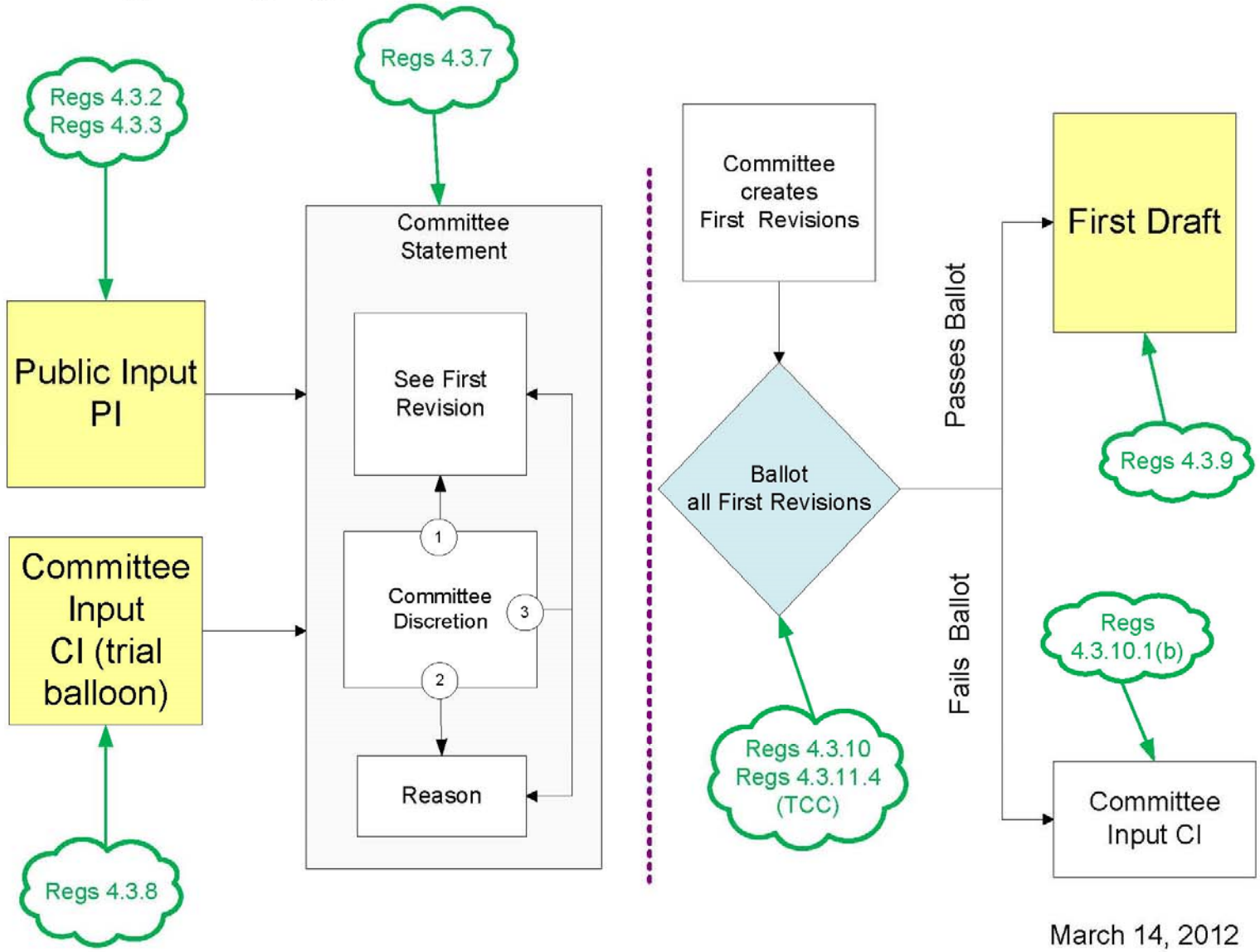
NFPA First Draft Meeting
New Process – New Terminology

New Term	Old Term
Input Stage	ROP Stage
Public Input	Proposal
First Draft Meeting	ROP Meeting
Committee Input	"Trial Balloon" (or later, FR that fails ballot)
Committee Statement (CS)	Committee Statement
First Revision (FR)	Committee Proposal or Accepted Public Proposal
First Draft Report	ROP
First Draft	ROP Draft

NFPA First Draft Meeting
New Process – New Terminology

New Term	Old Term
Comment Stage	ROC Stage
Public Comment	Public Comment
Second Draft Meeting	ROC Meeting
Committee Comment	Comment that Failed Ballot (Second Revision that failed ballot)
Second Revision	Committee Comment or Accepted Public Comment
Second Draft Report	ROC
Second Draft	ROC Draft

The New NFPA Standards Development Process – Input Stage Regs §4.3



March 14, 2012

NFPA First Draft Meeting

- **NEW Committee Actions and Motions:**
  - Resolve Public Input
  - Create a First Revision

NFPA First Draft Meeting

- **Resolve a Public Input (PI)**
  - Committee develops a Committee Statement (CS) to respond (resolve) a Public Input.
  - Committee must clearly indicate reasons for not accepting the recommendation in CS and/or point to a relevant First Revision
  - PIs do not get balloted

NFPA First Draft Meeting

- **Create a First Revision (FR)**
  - Committee makes a change to a current section or adds new text.
  - Committee develops a Committee Statement (CS) substantiating the change. (do not refer to PI as the reason)
  - Each FR gets balloted

NFPA First Draft Meeting

- **Committee Statements & Responses (Substantiation):**
  - All Public Inputs must have a Committee Response
  - Responses must include a valid technical reason for rejecting
  - No vague references to “intent”
  - Explain how the submitter’s substantiation is inadequate

NFPA First Draft Meeting New Process

- Preliminary Report of First Revisions
- Ballot
- Circulation of negatives and comments
- First Revision that fail ballot become Committee Inputs (CIs). CIs are published in the First Draft Report for Public Comment.

NFPA First Draft Meeting

- **Formal voting**
  - Voting during meeting is used to establish a sense of agreement (simple majority)
  - Secured by letter ballot (2/3 agreement required)
  - Only the results of the formal ballot determine the official position of the committee on the First Revisions

NFPA First Draft Meeting New Process

- **Ballots will be an online format**
- **Ballots are on the First Revisions (FR) ONLY**
  - Public Inputs and Committee Inputs not balloted
  - Reference materials are available:
    - First Draft, PI, CI, CS, etc
- **Ballot allows you to vote:**
  - Affirmative on all FR
  - Affirmative on all FR with Exceptions specifically noted (Affirmative with Comment, Negative or abstain on one or more FR).
- **Reject and Abstain requires a reason**

NFPA 70B Task Group Assignments for the F2105 First Draft Meeting

Task Group 1 – Assignment Review and update the description, title and date for the items in the following portions of the document and will be responsible for integrating new items identified from the PI and Committee actions for: Chapter 2 – Referenced Publications Annex C – Bibliography Annex D – Informational References	TG Chair – Robert Urdinola Members – Jeff Hall Dennis Green Brian Brecheisen Richard King
Task Group 2 – Assignment Review Related PI created by Robert Baker and recommend action that appears to be addressing: Safety & Health Information Bulletin (SHIB) 02-16-2010*,"Certification of Work place Products by Nationally Recognized Testing Laboratories".* Includes the following PI: 14, 17, 16, 19, 18, 20, 28, 21, 22, 23, 24, 25, 26, 27 Consider Reference to NFPA 790 and 791. Review and recommend action on PI 52 (Page 58), 51	TG Chair – Rich Bingham Members – Ron Widup John Staires Tim Crnko

Task Group 3 – Assignment Review and recommend action on PI 11, 13, 29, 49, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 46, 4, 47, 45, 48,	TG Chair – Stephen McCluer Members – Bill Cantor Ahmed Moshiri John Polenz
Task Group 4 – Assignment Chapter 30 - Reliability-Centered Maintenance (RCM)	TG Chair – Jim White Members – Dennis Green Palmer Hickman Robert Neary Adria Corbett Michael Fontaine Bill Harris
Task Group 5 – Assignment 32 – Electrical Disaster Recovery 33 – Photovoltaic Systems 34 – Electric Vehicle Charging Systems 35 – Wind Power Electric Systems and Associated Equipment	TG Chair – Alan Manche Members – Ken Rempe Leonard Fiume Mark Horne
Task Group 6 – Assignment Torque clarification Expand Case History	TG Chair – Tim Crnko Members – Ron Widup Adria Corbett Robert Neary Brian Brecheisen Aaron Butcher
Task Group 7 – Assignment Identify changes in NFPA 70E that impact or need to be reviewed in 70B	TG Chair – Ron Widup Members – Jim White Palmer Hickman Volunteers Needed

Public Input No. 14-NFPA 70B-2013 [Section No. 2.3.8]

2.3.8 U.S. Government Publications.

U.S. Government Printing Office, Washington, DC 20402-9328.

Federal Emergency Management Agency (FEMA), FEMA P-348, *Protecting Building Utilities from Flood Damage*, 1999 updated 2012.

Title 29, *Code of Federal Regulations,* Part 1910.

Title 29, *Code of Federal Regulations,* Part 1926.

Title 29, *Code of Federal Regulations,* Part 1910.94(a), “Occupational Health and Environmental Control — Ventilation.”

Title 29, *Code of Federal Regulations,* Part 1910.146, “Permit-Required Confined Spaces.”

Title 29, *Code of Federal Regulations,* Part 1910.242(b), “Hand and Portable Powered Tools and Other Hand Held Equipment.”

Title 29, *Code of Federal Regulations,* Part 1910.269, “Electric Power Generation, Transmission, and Distribution,” Paragraph (e), Enclosed Spaces.

Title 29, *Code of Federal Regulations,* Part 1910.331 through Part 1910.335, “Safety Related Work Practices.”

Title 40, *Code of Federal Regulations*, Part 761, “Protection of Environment — Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions.”

TM 5-694, *Commissioning of Electrical Systems for Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) Facilities,* 2006.

TM 5-698-1, *Reliability/Availability of Electrical and Mechanical Systems for Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) Facilities*, 2003.

TM 5-698-2, *Reliability-Centered Maintenance (RCM) for Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) Facilities,* 2003.

TM 5-698-3, *Reliability Primer for Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) Facilities,* 2003.

Toxic Substances Control Act, Environmental Protection Agency, www.epa.gov/agriculture/lsca.html.

U.S. General Services Administration and U.S. Department of Energy, *Building Commissioning Guide,* 1998.

U.S. Department of Labor, Occupational Safety & Health Administration, Directorate of Technical Support and Emergency Management, Office of Technical Programs and Coordination Activities: Safety & Health Information Bulletin (SHIB) 02-16-2010, *"Certification of Workplace Products by Nationally Recognized Testing Laboratories".*

Statement of Problem and Substantiation for Public Input

Currently repaired, overhauled, reconditioned, refurbished or remanufactured equipment that was originally listed / labeled / approved for use in hazardous locations when new, is not currently required to be inspected and recertified (to original manfacturer's design specifications that meet appropriate standards as approved when new), before being installed into a hazardous location. The equipment may be misrepresented since the original OEM (Original Equipment Manufacturer) nameplate containing approved labeling as authorized by an NRTL (Nationally Recognized Testing Laboratory) when new, is typically left on the equipment following such repair, overhaul, reconditioning, refurbishing, or remanufacturing. Potential safety and OSHA compliance issues may exist if the equipment has incurred any "changes" since originally manufactured.
NOTE: Supporting material is available for review from NFPA Headquarters.

Page 5 (including footnote 5) of OSHA SHIB 02-16-2010 (Safety Health & Information Bulletin), http://www.osha.gov/dts/shib/shib021610.html advises industry that any "changes" incurred by an NRTL labeled product, even if inadvertent, voids the NRTL's approval for that product and an employer's use of such product in the workplace violates the OSHA standard(s) requiring that the product be NRTL-approved. The term "void" is consistent with NFPA 70B 27.2.9 terminology.

Incorporating the above issues, terminology and requirements into NFPA 70B should increase industry users' awareness and focus on ensuring listed / labeled / approved products that are repaired, overhauled, reconditioned, refurbished or remanufactured, continue to meet regulatory standard(s) and provide for a safe workplace.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 18-NFPA 70B-2013 [New Section after 3.3.61]	
Public Input No. 19-NFPA 70B-2013 [New Section after 3.3.54]	
Public Input No. 20-NFPA 70B-2013 [New Section after 3.3.61]	
Public Input No. 21-NFPA 70B-2013 [New Section after 4.2.2]	
Public Input No. 22-NFPA 70B-2013 [Section No. 27.2.1]	
Public Input No. 23-NFPA 70B-2013 [Section No. 27.2.9]	
Public Input No. 24-NFPA 70B-2013 [Section No. 32.2.7.7.2]	
Public Input No. 25-NFPA 70B-2013 [Section No. D.2]	
Public Input No. 26-NFPA 70B-2013 [Section No. E.1.18]	
Public Input No. 27-NFPA 70B-2013 [New Section after 3.3.61]	
Public Input No. 28-NFPA 70B-2013 [New Section after 3.3.61]	

Submitter Information Verification

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Copyright Assignment

Copyright Assignment

I, Robert Baker, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (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 Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am Robert Baker, 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

Public Input No. 17-NFPA 70B-2013 [New Section after 3.2.3]

Labeled*

Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production, repair, overhaul, recondition, refurbish or remanufacture of labeled equipment or materials, and by whose labeling the manufacturer, repairer, overhauler, reconditioner, refurbisher or remanufacturer indicates compliance with appropriate standards of performance in a specified manner.

Statement of Problem and Substantiation for Public Input

BRING INTO NFPA 70B FROM NFPA 70E WITH PROPOSED MODIFICATION (no underline format was available online to underline the suggested changes to the 70E definition).
Currently repaired, overhauled, reconditioned, refurbished or remanufactured equipment that was originally listed / labeled / approved for use in hazardous locations when new, is not currently required to be inspected and recertified (to original manfacturer's design specifications that meet appropriate standards as approved when new), before being installed into a hazardous location. The equipment may be misrepresented since the original OEM (Original Equipment Manufacturer) nameplate containing approved labeling as authorized by an NRTL (Nationally Recognized Testing Laboratory) when new, is typically left on the equipment following such repair, overhaul, reconditioning, refurbishing, or remanufacturing. Potential safety and OSHA compliance issues may exist if the equipment has incurred any "changes" since originally manufactured.

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Inclusion (from NFPA 70E) and expansion of this proposed definition is necessary since the term “production”, also used within OSHA standards such as 1910 Subpart S and NRTL program standard 1910.7, has been interpreted as addressing newly manufactured equipment. In light of the current marketplace extensively utilizing repaired, overhauled, reconditioned, refurbished or

remanufactured equipment, broadening definitions is necessary.

It is recognized that a definition change is the authority of the NFPA Standards Council section 3.3.6.1. If the Committee is uncomfortable with this definition change to that listed in NFPA 70E, we respectfully ask that it be taken to the Standards Council for review.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 14-NFPA 70B-2013 [Section No. 2.3.8]	
Public Input No. 18-NFPA 70B-2013 [New Section after 3.3.61]	
Public Input No. 19-NFPA 70B-2013 [New Section after 3.3.54]	
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Public Input No. 27-NFPA 70B-2013 [New Section after 3.3.61]	
Public Input No. 28-NFPA 70B-2013 [New Section after 3.3.61]	

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Public Input No. 16-NFPA 70B-2013 [Section No. 3.2.3]

3.2.3 * Listed.

Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of new, repaired, overhauled, reconditioned, refurbished or remanufactured products or services, that maintains periodic inspection of production ~~of~~ , repair, overhaul, refurbish, recondition or remanufacture of listed equipment or materials or periodic evaluation of services and service facilities , and whose listing states that either the equipment, material, or service ~~meets~~ continue to meet appropriate designated standards or has been tested and found suitable for a specified purpose.

Statement of Problem and Substantiation for Public Input

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NOTE: Supporting material is available for review from NFPA Headquarters.

Page 5 (including footnote 5) of OSHA SHIB 02-16-2010 (Safety Health & Information Bulletin), http://www.osha.gov/dts/shib/shib021610.html advises industry that any "changes" incurred by an NRTL labeled product, even if inadvertent, voids the NRTL's approval for that product and an employer's use of such product in the workplace violates the OSHA standard(s) requiring that the product be NRTL-approved. The term "void" is consistent with NFPA 70B 27.2.9 terminology.

Expansion of this definition is necessary since the term "production", also used within OSHA standrds such as 1910 Subpart S and NRTL program standard 1910.7, has been interpreted as addressing newly manufactured equipment. In light of the current marketplace extensively utilizing repaired, overhauled, reconditioned, refurbished or remanufactured equipment, broadening the definition is necessary.

It is recognized that a definition change is the authority of the NFPA Standards Council section 3.3.6.1. If the Committee is uncomfortable with this proposed definition change, we respectfully ask that it be taken to the Standards Council for review.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 14-NFPA 70B-2013 [Section No. 2.3.8]	
Public Input No. 17-NFPA 70B-2013 [New Section after 3.2.3]	
Public Input No. 18-NFPA 70B-2013 [New Section after 3.3.61]	
Public Input No. 19-NFPA 70B-2013 [New Section after 3.3.54]	

Public Input No. 20-NFPA 70B-2013 [New Section after 3.3.61]
Public Input No. 21-NFPA 70B-2013 [New Section after 4.2.2]

Public Input No. 22-NFPA 70B-2013 [Section No. 27.2.1]
Public Input No. 23-NFPA 70B-2013 [Section No. 27.2.9]
Public Input No. 24-NFPA 70B-2013 [Section No. 32.2.7.7.2]
Public Input No. 25-NFPA 70B-2013 [Section No. D.2]
Public Input No. 26-NFPA 70B-2013 [Section No. E.1.18]
Public Input No. 27-NFPA 70B-2013 [New Section after 3.3.61]
Public Input No. 28-NFPA 70B-2013 [New Section after 3.3.61]

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Public Input No. 19-NFPA 70B-2013 [New Section after 3.3.54]

Overhaul.

Terminology variation of repair

Statement of Problem and Substantiation for Public Input

Currently repaired, overhauled, reconditioned, refurbished or remanufactured equipment that was

originally listed / labeled / approved for use in hazardous locations when new, is not currently required to be inspected and recertified (to original manfacturer's design specifications that meet appropriate standards as approved when new), before being installed into a hazardous location. The equipment may be misrepresented since the original OEM (Original Equipment Manufacturer) nameplate containing approved labeling as authorized by an NRTL (Nationally Recognized Testing Laboratory) when new, is typically left on the equipment following such repair, overhaul, reconditioning, refurbishing, or remanufacturing. Potential safety and OSHA compliance issues may exist if the equipment has incurred any "changes" since originally manufactured.

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Since each product device is unique unto itself including exposure to different installation, handling, repair, chemical exposure, etc. throughout its lifetime of use, inspecting to original OEM design specifications would be the logical method of ensuring no changes have been made to areas critical to meet original listing / labeling / approval requirements.

Inclusion of this new definition into NFPA 70B supports the other public input proposed changes, to increase industry users' awareness and focus on ensuring that after overhaul of listed / labeled / approved products, they continue to meet regulatory standard(s) and provide for a safe workplace.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 18-NFPA 70B-2013 [New Section after 3.3.61]	
Public Input No. 20-NFPA 70B-2013 [New Section after 3.3.61]	
Public Input No. 21-NFPA 70B-2013 [New Section after 4.2.2]	
Public Input No. 22-NFPA 70B-2013 [Section No. 27.2.1]	
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Public Input No. 27-NFPA 70B-2013 [New Section after 3.3.61]	
Public Input No. 28-NFPA 70B-2013 [New Section after 3.3.61]	

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Copyright Assignment

I, Robert Baker, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (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 Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

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Public Input No. 18-NFPA 70B-2013 [New Section after 3.3.61]

Repair.

Work performed to electrical equipment that would bring it back to its original design specifications as approved when new, including functional capability and applicable safety listing, labeling or approval by an NRTL (Nationally Recognized Testing Laboratory). Could be considered the over-arching terminology covering various regulatory / industry descriptions such as overhaul, recondition, refurbish or remanufacture.

Statement of Problem and Substantiation for Public Input

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Since each product device is unique unto itself including exposure to different installation, handling, repair, chemical exposure, etc. throughout its lifetime of use, inspecting to original OEM design specifications would be the logical method of ensuring no changes have been made to areas critical to meet original listing / labeling / approval requirements.

Inclusion of this new definition into NFPA 70B supports the other public input proposed changes, to increase industry users' awareness and focus on ensuring that after repair of listed / labeled /

approved products, they continue to meet regulatory standard(s) and provide for a safe workplace.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 20-NFPA 70B-2013 [New Section after 3.3.61]	
Public Input No. 21-NFPA 70B-2013 [New Section after 4.2.2]	
Public Input No. 22-NFPA 70B-2013 [Section No. 27.2.1]	
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Public Input No. 24-NFPA 70B-2013 [Section No. 32.2.7.7.2]	
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Public Input No. 27-NFPA 70B-2013 [New Section after 3.3.61]	
Public Input No. 28-NFPA 70B-2013 [New Section after 3.3.61]	

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Submittal Date: Thu Dec 12 00:07:29 EST 2013

Public Input No. 20-NFPA 70B-2013 [New Section after 3.3.61]

Remanufacture.

Terminology variation of repair, except that the equipment has changed ownership since

original purchase, i.e. equipment has been repaired, overhauled, reconditioned or refurbished and then resold to an employer other than the previous equipment owner.

Statement of Problem and Substantiation for Public Input

Currently repaired, overhauled, reconditioned, refurbished or remanufactured equipment that was originally listed / labeled / approved for use in hazardous locations when new, is not currently required to be inspected and recertified (to original manfacturer's design specifications that meet appropriate standards as approved when new), before being installed into a hazardous location. The equipment may be misrepresented since the original OEM (Original Equipment Manufacturer) nameplate containing approved labeling as authorized by an NRTL (Nationally Recognized Testing Laboratory) when new, is typically left on the equipment following such repair, overhaul, reconditioning, refurbishing, or remanufacturing. Potential safety and OSHA compliance issues may exist if the equipment has incurred any "changes" since originally manufactured.

Page 5 (including footnote 5) of OSHA SHIB 02-16-2010 (Safety Health & Information Bulletin), http://www.osha.gov/dts/shib/shib021610.html advises industry that any "changes" incurred by an NRTL labeled product, even if inadvertent, voids the NRTL's approval for that product and an employer's use of such product in the workplace violates the OSHA standard(s) requiring that the product be NRTL-approved. The term "void" is consistent with NFPA 70B 27.2.9 terminology.

Since each product device is unique unto itself including exposure to different installation, handling, repair, chemical exposure, etc. throughout its lifetime of use, inspecting to original OEM design specifications would be the logical method of ensuring no changes have been made to areas critical to meet original listing / labeling / approval requirements. Particularly with remanufacture, where used/salvaged labeled product is obtained and then resold after repair, overhaul, recondition or refurbish, and where there may be several owners over the product's lifetime.

Remanufacture is common terminology within the marketplace and CHANGE IN OWNERSHIP CAN BE ASCERTAINED BY, AND SHOULD BE THE RESPONSIBILITY OF, either the reseller and/or the end user purchasing such pre-owned product.

Inclusion of this new definition into NFPA 70B supports the other public input proposed changes, to increase industry users' awareness and focus on ensuring that after remanufacture of listed / labeled / approved products, they continue to meet regulatory standard(s) and provide for a safe workplace.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 21-NFPA 70B-2013 [New Section after 4.2.2]	
Public Input No. 22-NFPA 70B-2013 [Section No. 27.2.1]	
Public Input No. 23-NFPA 70B-2013 [Section No. 27.2.9]	
Public Input No. 24-NFPA 70B-2013 [Section No. 32.2.7.7.2]	
Public Input No. 25-NFPA 70B-2013 [Section No. D.2]	
Public Input No. 26-NFPA 70B-2013 [Section No. E.1.18]	
Public Input No. 27-NFPA 70B-2013 [New Section after 3.3.61]	
Public Input No. 28-NFPA 70B-2013 [New Section after 3.3.61]	

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Public Input No. 27-NFPA 70B-2013 [New Section after 3.3.61]

Recondition
Terminology variation of repair.

Statement of Problem and Substantiation for Public Input

Currently repaired, overhauled, reconditioned, refurbished or remanufactured equipment that was originally listed / labeled / approved for use in hazardous locations when new, is not currently required to be inspected and recertified (to original manfacturer's design specifications that meet appropriate standards as approved when new), before being installed into a hazardous location. The equipment may be misrepresented since the original OEM (Original Equipment Manufacturer) nameplate containing approved labeling as authorized by an NRTL (Nationally Recognized Testing Laboratory) when new, is typically left on the equipment following such repair, overhaul, reconditioning, refurbishing, or remanufacturing. Potential safety and OSHA compliance issues may exist if the equipment has incurred any "changes" since originally manufactured.

Page 5 (including footnote 5) of OSHA SHIB 02-16-2010 (Safety Health & Information Bulletin), http://www.osha.gov/dts/shib/shib021610.html advises industry that any "changes" incurred by an NRTL labeled product, even if inadvertent, voids the NRTL's approval for that product and an employer's use of such product in the workplace violates the OSHA standard(s) requiring that the product be NRTL-approved. The term "void" is consistent with NFPA 70B 27.2.9 terminology.

Since each product device is unique unto itself including exposure to different installation,

handling, repair, chemical exposure, etc. throughout its lifetime of use, inspecting to original OEM design specifications would be the logical method of ensuring no changes have been made to areas critical to meet original listing / labeling / approval requirements.

Inclusion of this new definition into NFPA 70B supports the other public input proposed changes, to increase industry users' awareness and focus on ensuring that after the recondition of listed / labeled / approved products, they continue to meet regulatory standard(s) and provide for a safe workplace.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 21-NFPA 70B-2013 [New Section after 4.2.2]	
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Public Input No. 25-NFPA 70B-2013 [Section No. D.2]	
Public Input No. 26-NFPA 70B-2013 [Section No. E.1.18]	
Public Input No. 28-NFPA 70B-2013 [New Section after 3.3.61]	

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Public Input No. 28-NFPA 70B-2013 [New Section after 3.3.61]

Refurbish
Terminology variation of repair.

Statement of Problem and Substantiation for Public Input

Currently repaired, overhauled, reconditioned, refurbished or remanufactured equipment that was originally listed / labeled / approved for use in hazardous locations when new, is not currently required to be inspected and recertified (to original manfacturer's design specifications that meet appropriate standards as approved when new), before being installed into a hazardous location. The equipment may be misrepresented since the original OEM (Original Equipment Manufacturer) nameplate containing approved labeling as authorized by an NRTL (Nationally Recognized Testing Laboratory) when new, is typically left on the equipment following such repair, overhaul, reconditioning, refurbishing, or remanufacturing. Potential safety and OSHA compliance issues may exist if the equipment has incurred any "changes" since originally manufactured.

Page 5 (including footnote 5) of OSHA SHIB 02-16-2010 (Safety Health & Information Bulletin), http://www.osha.gov/dts/shib/shib021610.html advises industry that any "changes" incurred by an NRTL labeled product, even if inadvertent, voids the NRTL's approval for that product and an employer's use of such product in the workplace violates the OSHA standard(s) requiring that the product be NRTL-approved. The term "void" is consistent with NFPA 70B 27.2.9 terminology.

Since each product device is unique unto itself including exposure to different installation, handling, repair, chemical exposure, etc. throughout its lifetime of use, inspecting to original OEM design specifications would be the logical method of ensuring no changes have been made to areas critical to meet original listing / labeling / approval requirements.

Inclusion of this new definition into NFPA 70B supports the other public input proposed changes, to increase industry users' awareness and focus on ensuring that after the refurbishing of listed / labeled / approved products, they continue to meet regulatory standard(s) and provide for a safe workplace.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 21-NFPA 70B-2013 [New Section after 4.2.2]	
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Public Input No. 23-NFPA 70B-2013 [Section No. 27.2.9]	
Public Input No. 24-NFPA 70B-2013 [Section No. 32.2.7.7.2]	
Public Input No. 25-NFPA 70B-2013 [Section No. D.2]	
Public Input No. 26-NFPA 70B-2013 [Section No. E.1.18]	

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Public Input No. 21-NFPA 70B-2013 [New Section after 4.2.2]

4.2.2.1

Enhanced worker and plant safety results from use of authorized facilities capable of inspecting and recertifying, following repair, overhaul, recondition, refurbish or remanufacture of listed / labeled / approved electrical equipment, that no “changes” have been incurred by the equipment, whether introduced intentionally or inadvertently, that would void the equipment’s listing / labeling / approval.

If “changes” to a listed / labeled / approved device are identified, the device should either be restored to comply with original manufacturer’s design specifications that meet appropriate standards as approved when new, or the listing / labeling / approval markings should be removed from the device or device’s nameplate.

Statement of Problem and Substantiation for Public Input

Currently repaired, overhauled, reconditioned, refurbished or remanufactured equipment that was originally listed / labeled / approved for use in hazardous locations when new, is not currently required to be inspected and recertified (to original manfacturer's design specifications that meet appropriate standards as approved when new), before being installed into a hazardous location. The equipment may be misrepresented since the original OEM (Original Equipment Manufacturer) nameplate containing approved labeling as authorized by an NRTL (Nationally Recognized Testing Laboratory) when new, is typically left on the equipment following such repair, overhaul, reconditioning, refurbishing, or remanufacturing. Potential safety and OSHA compliance issues may exist if the equipment has incurred any "changes" since originally manufactured.

Page 5 (including footnote 5) of OSHA SHIB 02-16-2010 (Safety Health & Information Bulletin), http://www.osha.gov/dts/shib/shib021610.html advises industry that any "changes" incurred by an NRTL labeled product, even if inadvertent, voids the NRTL's approval for that product and an employer's use of such product in the workplace violates the OSHA standard(s) requiring that the product be NRTL-approved.
Since each product device is unique unto itself including exposure to different installation,

handling, repair, chemical exposure, etc. throughout its lifetime of use, inspecting to original OEM design specifications would be the logical method of ensuring no changes have been made to areas critical to meet original listing / labeling / approval requirements. Removing listing / labeling / approval marks from suspect equipment will better ensure that the equipment will not be installed in a hazardous location before being certified that no changes have been incurred.

Incorporating the above issues, terminology and requirements into NFPA 70B should increase industry users' awareness and focus on ensuring listed / labeled / approved products that are repaired, overhauled, reconditioned, refurbished or remanufactured, continue to meet regulatory standard(s) and provide for a safe workplace.

The term “void” is used in the proposed change to remain consistent with NFPA 70B 27.2.9 and OSHA SHIB 02-16-2010 terminology

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 22-NFPA 70B-2013 [Section No. 27.2.1]	
Public Input No. 23-NFPA 70B-2013 [Section No. 27.2.9]	
Public Input No. 24-NFPA 70B-2013 [Section No. 32.2.7.7.2]	
Public Input No. 25-NFPA 70B-2013 [Section No. D.2]	
Public Input No. 26-NFPA 70B-2013 [Section No. E.1.18]	

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Public Input No. 52 - New 11.19.2.9

11.19.2.8 Power Factor or Dissipation Factor.

11.19.2.9 **Direct Measurement of utility impedance for real flash hazard calculations.**

Power factor or dissipation factor is a measurement of the dielectric losses in an insulating fluid. It is a means of evaluating the quality of the insulating fluid. Power factor or dissipation factor tests are performed by *ASTM method D-924*.

11.19.3 Analysis.

11.19.3.1 Service-Aged Insulating Fluid Limits.

11.20 Rotating Machine Testing.

On ac rotating machines with an external neutral connection, the stator neutral should be disconnected and a test of each winding with respect to the other two windings and to ground should be obtained.

11.20.1 Insulation Resistance Testing.

11.20.1.1

This testing procedure applies to armature and rotating or stationary field windings. A hand crank, rectifier, or battery-operated instrument is suitable for testing equipment rated to 600 volts. For equipment rated over 600 volts, a 1000-volt or 2500-volt motor-driven or rectifier-operated instrument is recommended for optimum test results. Operating machines should be tested immediately following shutdown when the windings are hot and dry. On large machines, the temperature should be recorded and converted to a base temperature in accordance with ANSI/IEEE 43 *Recommended Practice for Testing Insulation Resistance of Rotating Machinery*, paragraph 6.3, to provide continuity for comparative purposes. Voltage sources, lightning arresters, and capacitors or other potential low-insulation sources should always be disconnected before insulation measurements are made. Lead-in cables or buses and line side of circuit breakers or starters can be tested as a part of the circuit provided a satisfactory reading is obtained. If the insulation resistance is below the established minimum, the circuit components should be tested separately until the low insulation reading is located. Insulation resistance history based on tests conducted on new motors, after rewind and cleaning or from recorded data made under uniform conditions forms a useful basis for interpretation of a machine winding condition. When records of periodic tests are compared, *any persistent downward trend is an indication of insulation trouble,* even though the values might be higher than the recommended minimum safe values listed in Table 11.20.1.2.

11.20.1.2

Insulation resistance readings taken for purposes of correlation should be made at the end of a definite interval following the application of a definite test voltage. For purposes of standardization, 60-second applications are recommended where short-time single readings are to be made on windings and where comparisons with earlier and later data are to be made. Recommended minimum acceptable insulation values without further investigation are as shown in Table 11.20.1.2.

Table 11.20.1.2 Rotating Machine Insulation Testing

Rotating Machinery Voltage	Insulation Resistance (at 40°C)
1000 volts and below	2 megohms
Above 1000 volts	1 megohm per 1000 volts plus 1 megohm

11.27.3.3 Red Decal: Nonserviceable.

If the device under test has a problem that is detrimental to the proper electrical or mechanical operation of that device, then a red “Nonserviceable” decal should be attached to the device. The nonserviceable decal would be attached to the device after attempts at field repair were made. Examples of nonserviceable classifications include no trip on one or more phases, low insulation resistance readings, mechanical trip problems, and high contact resistance readings. In addition, management or the owner should be advised of this condition.

Statement of Problem and Substantiation for Public Input

There is an instrument that measures utility impedance in real time. See IEEE Paper -

“Using a Microporcessor-Based Instrument to Predict the Incident Energy From Arc-Flash Hazards”, Thomas L. Baldwin, Michael J. Hittel, Lynn F. Saunders, Frank Renovich, IEEE Industrial Applications Society

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Public Input No. 11-NFPA 70B-2013 [Section No. 11.14.2.1]

11.14.2.1 **Trending**

Tests should be performed and results recorded to establish trends that can be used in predicting battery life. ~~For lead-acid batteries, a pilot cell may be selected to obtain a representative temperature while the recommended voltage and specific gravity measurements are made.~~ The type of data to be collected can include measurements of float voltage, cell temperature, internal ohmic readings, and specific gravity (where applicable). For trending state of health, a baseline should be established approximately six months after the battery has been put into service, or two weeks after the most recent discharge, whichever is later.

Statement of Problem and Substantiation for Public Input

This public input proposes to re-order Section 11.14.2 and to add some recommended practices. Several associated paragraphs follow in separate PIs. This PI adds a title "Trending" because, aside from actual discharge testing, monitoring trends is one of the most widely accepteded methods within the battery industry for estimating state-of-health and predicting life expectancty of a battery system. This PI expands the scope of the section to include more than just lead-acid batteries, and identifies the type of data that can be trended. Finally, this PI describes the establishment of a "baseline" against which all future data will be compared. Because the chemical action of a newly charged battery is unstable, data from a newly installed battery is inconsistent. Tthis PI sets the establishment of the baseline approximately six months after installation. It also recommends collection of data no sooner than two weeks after a discharge for the same reason.

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Public Input No. 13-NFPA 70B-2013 [Section No. 11.14.2.2]

11.14.2.2 **Voltage, Temperature, and specific gravity**

If used, pilot cell/block voltage, specific gravity, and electrolyte temperature should be measured and ~~recorded monthly in accordance with the established maintenance program~~ recorded at every maintenance interval *(see 15.9.4.2).* Refer to the manufacturer's recommended practices for the use of pilot cells or blocks and for the range of float voltage applicable to a specific battery.

11.14.2.2.1 Temperature testing Pilot cells may be selected to obtain a representative temperature and to detect temperature gradients within a string. Temperatures should be collected for no less than 10% of the units in a string. For VRLA batteries, cell temperature should be obtained by measuring at the negative post of the unit. For vented batteries in which electrolyte samples are being collected, electrolyte temperature can be determined at the same time.

11.14.2.2.2 Electrolyte sampling Where electrolyte sampling is used, refer to the manufacturer's recommended practices for the use of pilot cells and for the range for float voltage applicable to a specific battery. It is advisable to periodically change pilot cells because a slight amount of electrolyte can be lost each time a specific gravity reading is taken.

11.14.2.3.3 Ohmic testing For lead-acid batteries, if ohmic measurement is used, it is recommended that ohmic measurements (resistance, impedance, or conductance) be collected. recorded and reviewed at regular intervals but in no case less than quarterly. Use of ohmic measurements should be in accordance with manufacturer's instructions and with an established maintenance program to set baselines,to identify trends, and to identify anomalies. When anomalies are detected, additional steps such a capacity test or unit replacement may be warranted.

Statement of Problem and Substantiation for Public Input

Measurement of specific gravity is rarely used anymore on vented lead-acid batteries. For multi-cell (monobloc) battery units,, individual cell temperatures and voltages for VRLAs are impossible to obtain, so the block temperature at the negative post, and the overall battery voltage are the next best thing. Depending on the criticality of the application, not all batteries are maintained monthly, so the text is changed to take these specific measurements at every maintenance interval. A new sub-paragraph is proposed to give guidance on the number of cells to be measured (at least 10%), how to take readings on VRLA cells. It also adds that, if/when electrolyte samples are being taken, it is possible to collect temperature data at the same time. A new paragraph on ohmic measurements is added (this paragraph might be promoted one level). Ohmic measurements are only useful on certain types of batteries and applications. When used, ohmic metering should carefully follow the manufacturer's instructions on how to determine when deviations from baseline exceed the range of probability of randomness.

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Public Input No. 29-NFPA 70B-2013 [Section No. 11.14.2.4]

11.14.2.4 **Connection testing**

~~Measure connection~~ Connection resistances of cell-to-cell (or block-to-block) and terminal connections should be tested in accordance with manufacturer's instructions and with an established maintenance program. Where test sets to read intercell connection resistance do not exist for economic reasons [due to the lower criticality of the application], the infrared scan of 11.14.2.5 can be used to indicate which connections need to be re-torqued to the battery manufacturer's specified values.

Statement of Problem and Substantiation for Public Input

For VRLA monoblocs, cell-to-cell connection resistance readings are not possible to obtain, thus block-to-block connection readings are the next best alternative. Not all batteries are equal in importance, based on the criticality of the application. For lower criticality applications, it may not be economically desirable to invest in a micro-ohmmeter. Thus an alternative is provided for finding poor connections by using ifrared thermography.

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Public Input No. 49-NFPA 70B-2013 [Section No. 11.14.2.6]

11.14.2.6

Measurements should be recorded for future reference along with log notations of the visual inspection and corrective action. ~~An example of a battery record is included as~~ ~~Figure H.21~~ ~~. The record~~ Measurements and inspections with vary from one type of battery to another. Two examples of battery records for one type of battery, VRLA, are included as Figures H.21(a) and (b) . The records should be modified to correspond to the user's maintenance program per 15.9.4.2.

Statement of Problem and Substantiation for Public Input

The existing example in H.21 is inappropriate, even for lead-acid battery. Weekly readings of pilot cells are excessive for most applications, and even the existing text of 11.14.2.2 , requires pilot cell readings no more often than monthly. Specific gravity is rarely used anymore on vented lead-acid batteries and is never required on VRLA batteries.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 48-NFPA 70B-2013 [Section No. H.21]	Annex H.21 is referenced in 11.14.2.6

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Public Input No. 32-NFPA 70B-2013 [Section No. 15.9.4.1 [Excluding any Sub-Sections]]

Stationary batteries are a power source for critical systems, ac power generation equipment, switchgear, and control circuits. Stationary batteries are most often used as the reserve power source for critical equipment during power outages.~~- These batteries are typically vented lead–acid (VLA) batteries consisting of either lead-calcium or lead antimony grids. Other technologies can be utilized in these applications but are not specifically addressed in the following paragraphs.~~ _ Due to the reliability requirements for these applications, specific safety guidelines as well as well-defined maintenance practices should be utilized to ensure a reliable system. The following sections of 15.9.4 offer guidance on the safety and maintenance requirements. In addition, the manufacturers' recommendations should be followed and the applicable IEEE standards should be referred to for additional information.

Statement of Problem and Substantiation for Public Input

We should not limit the section to vented batteries, especially when 1188 (VRLA) is referenced iin 15.9.4.1.2. The trend is toward greater use of VRLA, but many other technologies are being used as well. NFPA 70B should be broad enough to cover all types.

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Public Input No. 33-NFPA 70B-2013 [Section No. 15.9.4.1.1]

15.9.4.1.1

~~Battery chargers play a critical role in battery maintenance because they supply normal dc requirements and maintain batteries at appropriate levels of charge. Chargers should be set and maintained according to manufacturers' instructions~~ . Charger output voltage should be set and periodically verified (at least once per year) to be in accordance with the battery manufacturers' instructions. Battery chargers should be maintained in accordance with the charger manufacturer's instructions.
Note: chargers can be stand-alone or they can be integrated into other equipment such as UPS systems.

The most important action in maintaining a charger is to set proper voltage levels.

Other routine maintenance activities can include such things as:

- Inspect for dirt and corrosion, blow out with low pressure air hose if required.
- Visual inspection of internal components
- Tighten connections as required
- Check front-panel meters and alarms for accuracy

Caution: adjustments may require opening the battery disconnect in order to properly set the voltage levels .

Statement of Problem and Substantiation for Public Input

The battery charger is necessary to the performance of a battery, but it is not generally considered to be a maintenance device. Added text clarifies that the charger should maintain the required voltage. The charger should be set to meet the requirements of the battery system. Both battery and charger should be maintained in accordance with the respective manufacturer's instructions.

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Public Input No. 34-NFPA 70B-2013 [Section No. 15.9.4.1.2]

15.9.4.1.2 References.

The following references should be considered for specific maintenance, repair considerations, and procedures:

(1) IEEE 450 — *IEEE Recommended Practice for Maintenance, Testing and Replacement of Vented Lead-Acid Batteries for Stationary Applications*

(2) IEEE 1188 — *IEEE Recommended Practice for Maintenance, Testing and Replacement of Valve-Regulated Lead-Acid (VRLA) Batteries for Stationary Applications*

(3) IEEE 1106 — *IEEE Recommended Practice for Installation, Maintenance, Testing and Replacement of Vented Nickel-Cadmium Batteries for Stationary Applications*

(4) IEEE ~~1145 — *IEEE Recommended Practice for Installation and Maintenance of Nickel-Cadmium Batteries for Photovoltaic (PV) Systems*~~

(5) ~~IEEE~~ Std 1657 — *IEEE Recommended Practice for Personnel Qualifications for Installation and Maintenance of Stationary Batteries*

Statement of Problem and Substantiation for Public Input

IEEE 1145 is a withdrawn standard, and thus should not be referenced

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Public Input No. 35-NFPA 70B-2013 [Section No. 15.9.4.3 [Excluding any Sub-Sections]]

Personnel should be aware of the hazards associated with stationary batteries. ~~A vented battery emits~~ Lead-acid and nickel-cadmium batteries emit a mixture of hydrogen and oxygen gas. Under abnormal conditions, such as overcharging or extreme overtemperatures combined with a lack of space ventilation, it is possible for the mixture to reach a flammable level. Voltages present can cause injury and death. Exposing skin and eyes to electrolyte can cause severe burns and blindness. ~~Vented lead-acid batteries can emit a mixture of hydrogen and oxygen gas. Under abnormal conditions, such as a lack of space ventilation, it is possible for the mixture to reach a flammable level~~ Not all stationary batteries vent flammable gas or expose a worker to electrolyte, so the service person must understand the potential hazards prior to doing any work . As a minimum, the safety precautions in 15.9.4.3.1 through 15.9.4.3.6 should be observed.

Statement of Problem and Substantiation for Public Input

Not only vented batteries emit hydrogen and oxygen, but VRLAs do too, and failing to note that can be catastrophic. Many people have put VRLA batteries in “sealed” chambers in the belief that a valve-regulated battery is “sealed”, leading to explosions. A statement is added to clarify that not all stationary batteries have the same hazards. Repeated sentences are deleted in this PI.

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Submittal Date: Wed Dec 18 14:51:43 EST 2013

Public Input No. 36-NFPA 70B-2013 [Section No. 15.9.4.3.1]

15.9.4.3.1

Maintenance personnel should be trained to perform the tasks properly for the specific type of battery being worked on . Training should include using personal protective equipment, handling the electrolyte safely (where applicable) , using the proper tools, and following the battery manufacturer's service and maintenance instructions. IEEE 1657 provides recommended curriculum for various skill levels (See 15.9.4.1.2).

Statement of Problem and Substantiation for Public Input

Batteries come in many different chemistries and form factors. A person skilled in maintenance on one type may not be qualified on a different type. This PI adds a requirement for training on the specific battery to be worked on. Handling electrolyte is not necessary, or even possible on some battery types, so the words “where applicable” are added. A sentence is added to reference IEEE 1657 which outlines the curriculum necessary for a person to be qualified and sets levels of certification.

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Public Input No. 37-NFPA 70B-2013 [Section No. 15.9.4.3.2]

15.9.4.3.2

The technician should verify that, when a ventilation systems is installed or required, the ventilation system in the room or compartment in which ~~operating lead-acid~~ batteries are located is operating as required.

Statement of Problem and Substantiation for Public Input

This proposal expands the standard to encompass all types of batteries. Ventilation is not always required by code.

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Public Input No. 38-NFPA 70B-2013 [Section No. 15.9.4.4.2]

15.9.4.4.2

Plates and internal parts within clear containers should be checked for damage such as ~~buckling,~~ excessive positive plate growth, sulfate crystal formation on positive plates, buckling, warping, scaling, swelling, cracking, hydration rings, excessive sedimentation, mossing, copper contamination, internal post seal cracks, and changes in color. Cells exhibiting any of these characteristics should be evaluated for repair or replacement.

Statement of Problem and Substantiation for Public Input

Two of the most common things to check in a vented lead-acid battery (positive plate growth and crystal growth) were missing from the list. This PI adds them at the beginning of the list of things to check.

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Public Input No. 39-NFPA 70B-2013 [Section No. 15.9.4.4.4]

15.9.4.4.4

A check should be made for spilled electrolyte or electrolyte leaks . A solution of water and bicarbonate of soda (baking soda) should be used to neutralize lead–acid battery spills, and a solution of boric acid and water should be used for Ni-Cad spills. The battery manufacturer's instructions should be consulted for proper proportions. Information on prevention and response to electrolyte spills can be found in IEEE 1578, *Recommended Practice for Stationary Battery Electrolyte Spill Containment and Management*

Statement of Problem and Substantiation for Public Input

Electrolyte leaks are more common than spills, so this PI adds leaks to the requirement. A reference is added to IEEE 1578 which gives information about how to design battery systems to prevent spills or leaks, and how to respond when leaks and spills do occur.

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Public Input No. 40-NFPA 70B-2013 [Section No. 15.9.4.4.5]

15.9.4.4.5

The electrolyte level before water addition should be checked, and corrective measures should be noted in accordance with the owner's maintenance program and the manufacturer's recommendations. Excessive water consumption can be a sign of overcharging or cell damage. For lead–antimony batteries, (including low-antimony designs, such as lead-selenium), water consumption increases gradually with age. Distilled or deionized water should be used unless otherwise recommended by the battery manufacturer.

CAUTION: Never add anything but water to a battery unless recommended to do so by the manufacturer.

Statement of Problem and Substantiation for Public Input

Some users may not realize that lead-selenium batteries are also lead-antimony, and thus not be aware that in a lead-selenium battery water consumption will also increase with age.

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Public Input No. 41-NFPA 70B-2013 [Section No. 15.9.4.4.6]

15.9.4.4.6

Ventilation and the suitability and condition of electrical equipment in the area should be checked for its possible effect on the battery. ~~Local~~ Local sources of heating and cooling can create cell temperature differentials that cause battery damage. ~~Battery~~ . Where abnormal temperatures, temperature differentials , or restricted air movement are noted, sources of the condition should be identified and possible corrective measures should be considered. Battery room ventilation openings should be checked to be sure they are clear of obstructions.

Statement of Problem and Substantiation for Public Input

Location of equipment in a room is a design issue that might be outside the jurisdiction of the maintenance worker. This PI adds a recommended action when abnormal heating and/or ventilation is detected.

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Public Input No. 42-NFPA 70B-2013 [Section No. 15.9.4.4.7]

15.9.4.4.7

Ambient temperature should be checked to be within the manufacturer's recommended range. High ambient temperatures reduce cell life. Lower ambient cell temperatures reduce cell capacity. In a well ventilated room with proper circulation of air between battery units, temperature differential of more than a few degrees between battery cells and the ambient room temperature may indicate impending thermal runaway, in which case corrective action should be taken immediately. As a general consideration, a deviation greater than 3°C-5°C should be cause for concern.

Statement of Problem and Substantiation for Public Input

Existing text does not give guidance for what to do if temperature deviations are noted. A sentence is added to warn that high temperature differentials between battery cells and ambient could imply potential thermal runaway and directs corrective action should be taken. A range is suggested for reasonable temperature deviation.

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Public Input No. 43-NFPA 70B-2013 [Section No. 15.9.4.4.8]

15.9.4.4.8

Area heating, air conditioning, seismic protection, dc circuit overcurrent protection, distilled or deionized water supply, grounding connections, cable clamps, and all other installed protective systems and devices should be checked. If deionized water is used, it is important to check for proper operation of the deionizer (or if deionizing filters need replacement) .

Statement of Problem and Substantiation for Public Input

Either distilled water or deionized water are commonly used to replenish electrolyte. Distilled water is usually purchased, whereas deionized water can be created locally. It is much more important to check for proper operation of the deionizer (or if deionizing filters need replacement) if that source of water is used for battery water.

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Public Input No. 44-NFPA 70B-2013 [Section No. 15.9.4.4.12]

15.9.4.4.12 * _

All battery connections should be checked on a routine basis for high connection resistance with a micro-ohmmeter . When a connection resistance is high, then the connection should be cleaned and torqued in accordance with the manufacturer's procedures. (Where test sets to read intercell connection resistance do not exist for economic reasons [due to the lower criticality of the application], the infrared scan of 11.14.2.5 can be used to indicate which connections need to be re-torqued to the battery manufacturer's specified values.)

Statement of Problem and Substantiation for Public Input

Not all batteries are equal in importance, based on the criticality of the application. For lower criticality applications, it may not be economically wise to invest in a micro-ohmmeter, thus an alternative is provided for finding poor connections. This PI adds the requirement of a micro-ohmmeter because many users may not be aware that a conventional digital ohmmeter cannot resolve the small resistances typically present in intercell connections.

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Public Input No. 46-NFPA 70B-2013 [Section No. 15.9.4.4.13]

15.9.4.4.13

Alarm relays, lights, and horns ~~should~~ , and emergency lighting should be checked for proper operation. ~~The battery room emergency lighting should be checked.~~

Statement of Problem and Substantiation for Public Input

This PI makes an editorial change to combine the two sentences into one. The existing text does not say what to check for on emergency lighting.

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Public Input No. 4-NFPA 70B-2013 [New Section after 15.9.4.5.2]

15.9.4.5.2 Batteries should be visually inspected for excess sedimentation and other signs of plate damage. Causes can include:

(a) Vibration, Caused by an External Source. If vibration is observed, then steps to reduce the vibration source are to isolate the batteries from the vibration and/or plan for an earlier than normal scheduled replacement of the batteries.

(b) Incorrect Charging Regimes. The charger settings should be examined to verify that they are within the battery manufacturer's recommended voltage range. If not, they should be adjsuted as appropriate.

(c) Excessive Cycling. The charger records should be examined to determine the history of discharge/recharge cycles. If excessive, the cause of the cycling should be determined and corrected if possible. Otherwise, it may be necessary to plan for an earlier than normal replacement of the batteries.

(d) Aging. The date codes of the batteries should be noted and it should be determined if the observed condition is within the predicted condition for a battery of that age.

(e) Manufacturing Defect. If the battery is relatively new, or if the condition is only observed in one or a few cells within the same manufacturing "batch number", the manufacturer should be contacted for possible warranty replacement.

(f) AC Ripple Current from Charger or Connected Load. Reading should be taken to determine if the amount of ripple current exceeds the manufacturer's Recommended limit.

Additional Proposed Changes

File Name	Description	Approved
70B_PI_Held_Comment_70B-14_McCluer_.pdf	Cover Sheet	

Statement of Problem and Substantiation for Public Input

NOTE: This proposal appeared as Comment 70B-14 (Log #8) which was held from the F12 ROC on Proposal 70B-32, 70B-68, 70B-68a.

Proposal 70B-32 was a carryover from the previous code cycle. In that cycle the battery requirements were moved from Chapter 9 to Chapter 15. Because Section 9.9.4.5.2 no longer exists, 70B-32 should be deleted; the requirement is addressed in 70B-68 and 70B-68a.

In transparent containers, visual inspection is a highly reliable maintenance practice that can identify many failure modes. Vibration is only one of many possible causes for sedimentation, so it should not be singled out. The proposed wording directs service personnel to inspect for sedimentation and identifies possible causes for excess sedimentation, one of which is vibration.

The Committee's comments on Proposal 70B-68a identifies the problem, but gives no guidance on the solution. This comment adds some guidance for what the maintenance personnel should do if the condition is observed.

This comment was jointly authored by the following members of the IEEE Stationary Battery Committee: Phyllis Archer/C&D; Curtis Ashton/Century Link; Allen Byrne/Interstate Battery; Bill Cantor/TPI Engineering; Dan Lambert/APC; Ron Marts/Telcordia; Steve McCluer/Schneider Electric; Dan McMenamin/DMA; and John Polenz/Emerson Electric.

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Public Input No. 47-NFPA 70B-2013 [Section No. 15.9.4.5.2]

15.9.4.5.2

Some lead-acid batteries support as few as 50 full discharges while others can tolerate over 1000 discharges, depending upon the battery construction and the depth of discharges. Excessive discharges can shorten the life of a battery. Fully ~~discharging a~~ discharge testing a stationary battery more than twice in one year is not recommended.

Statement of Problem and Substantiation for Public Input

Unplanned discharges are beyond anyones control, so the text was slightly modified to meet the actual intent of the last sentence, which is to limit full discharge tests (as opposed to emergency discharges). Full discharges beyond the control of the operator are beyond the scope of this recommendation

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Public Input No. 22-NFPA 70B-2013 [Section No. 27.2.1]

27.2.1

Electrical equipment designed for use in hazardous (classified) locations should be maintained through periodic inspections, tests, and servicing as recommended by the manufacturer. Electrical preventive maintenance (EPM) documentation should define the classified area (the class, group, and division specification and the extent of the classified area) and the equipment maintenance required. EPM documentation should identify who is authorized to work on this equipment, where the maintenance is to be performed, and what precautions are necessary ~~. Although repairs to certain equipment should be done by the manufacturer or authorized representatives, inspection and~~ to ensure that listed / labeled /approved equipment do not incur any "changes", either intentionally or inadvertently, that could void the equipment's listing / labeling / approval. Repairs to listed / labeled / approved equipment should be done at manufacturer or authorized representative facilities that are inspected and approved by the entity listing / labeling / approving the equipment such that no intentional modifications or inadvertent changes are made that would void the listing / labeling / approval. Inspection and servicing that can be performed in-house should be clearly identified.

Statement of Problem and Substantiation for Public Input

Currently repaired, overhauled, reconditioned, refurbished or remanufactured equipment that was originally listed / labeled / approved for use in hazardous locations when new, is not currently required to be inspected and recertified (to original manfacturer's design specifications that meet appropriate standards as approved when new), before being installed into a hazardous location. The equipment may be misrepresented since the original OEM (Original Equipment Manufacturer) nameplate containing approved labeling as authorized by an NRTL (Nationally Recognized Testing Laboratory) when new, is typically left on the equipment following such repair, overhaul, reconditioning, refurbishing, or remanufacturing. Potential safety and OSHA compliance issues may exist if the equipment has incurred any "changes" since originally manufactured.

Page 5 (including footnote 5) of OSHA SHIB 02-16-2010 (Safety Health & Information Bulletin), http://www.osha.gov/dts/shib/shib021610.html advises industry that any "changes" incurred by an NRTL labeled product, even if inadvertent, voids the NRTL's approval for that product and an employer's use of such product in the workplace violates the OSHA standard(s) requiring that the product be NRTL-approved. Since each product device is unique unto itself including exposure to different installation, handling, repair, chemical exposure, etc. throughout its lifetime of use, inspecting to original OEM design specifications would be the logical method of ensuring no changes have been made to areas critical to meet original listing / labeling / approval requirements.

Incorporating the above issues, terminology and requirements into NFPA 70B should increase industry users' awareness and focus on ensuring listed / labeled / approved products that are repaired, overhauled, reconditioned, refurbished or remanufactured, continue to meet regulatory standard(s) and provide for a safe workplace.

The term “void” is used in the proposed change to remain consistent with NFPA 70B 27.2.9 and OSHA SHIB 02-16-2010 terminology.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 23-NFPA 70B-2013 [Section No. 27.2.9]	
Public Input No. 24-NFPA 70B-2013 [Section No. 32.2.7.7.2]	

Public Input No. 25-NFPA 70B-2013 [Section No. D.2]
Public Input No. 26-NFPA 70B-2013 [Section No. E.1.18]

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Public Input No. 23-NFPA 70B-2013 [Section No. 27.2.9]

27.2.9
Field modifications of equipment and parts replacement should be limited to those changes acceptable to the manufacturer and approved by the authority having jurisdiction. Normally, intentional modifications ~~to equipment~~ or inadvertent changes made to areas critical to an OEM's (Original Equipment Manufacturer) listing / labeling / approval of equipment void any listing by nationally recognized testing laboratories.

Statement of Problem and Substantiation for Public Input

Currently repaired, overhauled, reconditioned, refurbished or remanufactured equipment that was originally listed / labeled / approved for use in hazardous locations when new, is not currently required to be inspected and recertified (to original manfacturer's design specifications that meet appropriate standards as approved when new), before being installed into a hazardous location. The equipment may be misrepresented since the original OEM (Original Equipment Manufacturer) nameplate containing approved labeling as authorized by an NRTL (Nationally Recognized Testing Laboratory) when new, is typically left on the equipment following such repair, overhaul,

reconditioning, refurbishing, or remanufacturing. Potential safety and OSHA compliance issues may exist if the equipment has incurred any "changes" since originally manufactured.

Page 5 (including footnote 5) of OSHA SHIB 02-16-2010 (Safety Health & Information Bulletin), http://www.osha.gov/dts/shib/shib021610.html advises industry that any "changes" incurred by an NRTL labeled product, even if inadvertent, voids the NRTL's approval for that product and an employer's use of such product in the workplace violates the OSHA standard(s) requiring that the product be NRTL-approved. The term "void" is consistent with this NFPA 70B 27.2.9 terminology.

Incorporating the above issues, terminology and requirements into NFPA 70B should increase industry users' awareness and focus on ensuring listed / labeled / approved products that are repaired, overhauled, reconditioned, refurbished or remanufactured, continue to meet regulatory standard(s) and provide for a safer workplace.

Specifically, the issue of inadvertent change has been proposed in this public input to align with the OSHA SHIB content and the other related proposed public inputs.

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Public Input No. 24-NFPA 70B-2013 [Section No. 32.2.7.7.2]

32.2.7.7.2 Repair or Replace Factors.

Some of the factors that can affect the repair or replace decision are as follows:

(1) Is the equipment currently manufactured?

(2) Are there long lead times to replace with new?

(3) Will equipment performance or continued listing / labeling / approval compliance (to original equipment manufacturer's design specifications that meet appropriate standards as approved when new) be compromised if repaired?

(4) What is the age of the equipment?

(5) What is the reliability requirement?

(6) Can it be effectively repaired and remain safety compliant per (3) above ?

(7) Is the manufacturer still in business?

(8) Is the repair contractor qualified for the task?

(9) Will the authority having jurisdiction allow repair or replacement?

(10) What is the financial impact?

(11) What is the total outage time required?

Statement of Problem and Substantiation for Public Input

Currently repaired, overhauled, reconditioned, refurbished or remanufactured equipment that was originally listed / labeled / approved for use in hazardous locations when new, is not currently required to be inspected and recertified (to original manfacturer's design specifications that meet appropriate standards as approved when new), before being installed into a hazardous location. The equipment may be misrepresented since the original OEM (Original Equipment Manufacturer) nameplate containing approved labeling as authorized by an NRTL (Nationally Recognized Testing Laboratory) when new, is typically left on the equipment following such repair, overhaul, reconditioning, refurbishing, or remanufacturing. Potential safety and OSHA compliance issues may exist if the equipment has incurred any "changes" since originally manufactured.

Page 5 (including footnote 5) of OSHA SHIB 02-16-2010 (Safety Health & Information Bulletin), http://www.osha.gov/dts/shib/shib021610.html advises industry that any "changes" incurred by an NRTL labeled product, even if inadvertent, voids the NRTL's approval for that product and an employer's use of such product in the workplace violates the OSHA standard(s) requiring that the product be NRTL-approved. The term "void" is consistent with NFPA 70B 27.2.9 terminology.

Since each product device is unique unto itself including exposure to different installation, handling, repair, chemical exposure, etc. throughout its lifetime of use, inspecting to original OEM design specifications would be the logical method of ensuring no changes have been made to areas critical to meet original listing / labeling / approval requirements.

Incorporating the above issues, terminology and requirements into NFPA 70B should increase industry users' awareness and focus on ensuring that after repair of listed / labeled / approved products, they continue to meet regulatory standard(s) and provide for a safer workplace.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 23-NFPA 70B-2013 [Section No. 27.2.9]	

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Public Input No. 51-NFPA 70B-2014 [New Section after A.15.9.4.4.12]

14.1.6.42+ Resistance Grounding

Resistance grounding Systems have many advantages over solidly grounded systems including arc-flash hazard reduction, limiting mechanical and thermal damage associated with faults, and controlling transient overvoltages. High resistance grounding systems may also be employed to maintain service continuity and assist with locating the source of a fault

Low resistance systems are designed to limit the fault current when one phase of the system shorts or arcs to ground. In the event that a ground fault condition exists, a neutral grounding resistor typically limits the current to 200-400A

High resistances systems are designed to limit the fault current when one phase of the system shorts or arcs to ground, but at lower levels than low resistance systems. In the event that a ground fault condition exists, the resistor typically limits the current to 5-10A, though most resistor manufacturers label any resistor that limits the current to 25A or less as high resistance.

When designing a system with resistors, the design/consulting engineer must consider the specific requirements for conductor insulation ratings, surge arrestor ratings, breaker single-pole duty ratings, and method of serving phase-to-neutral loads.

Statement of Problem and Substantiation for Public Input

This proposal for a simple definition is intended to start an enlightened discussion about how campus-style power distribution systems can be migrated from solidly grounded systems to resistance systems for greater safety, reliability and economy with particular emphasis on health care facility campuses.

The vast majority of health care facilities in North America have low voltage (LV) power systems within the buildings themselves. The most common are 480/277V in the USA and 600/357V in Canada. The selection process goes back many years to criterion based primarily on economics. This design concept was the least costly then, especially when Line-to-Neutral (VLN) lighting loads were selected. It eliminated lighting transformers and did not conflict with utility practices of almost always providing solidly grounded transformers when the power company supplied these transformers.

A large percentage of the health care facilities associated with universities and other institutional type settings are located on large campuses with multiple buildings. The size of the complex dictates that that the bulk of the power system to be fed from medium voltage underground distribution systems. In past years, a utility/power company design has been employed where the source is solidly grounded. While this typically is the least expensive method, it does not lend itself to the most reliable involving service continuity and/or time to repair failures. M.V. cable faults will result in increased damage with extended outages and repair time. Solidly grounded power systems are not the best choice for MV emergency generators and put the generators at higher risk as well.

While resistance requires more engineering, it is a proven solution to many electrician safety problems associated with maintenance

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Public Input No. 45-NFPA 70B-2013 [Section No. A.15.9.4.4.12]

A.15.9.4.4.12

The battery connection resistance value can vary depending upon the type of battery and the application.

(1) For valve-regulated lead-acid (VRLA) batteries, See IEEE 1188, *Recommended Practice for Maintenance, Testing, and Replacement of Valve-Regulated Lead-Acid (VRLA) Batteries for Stationary Applications*

~~, for valve-regulated lead–acid (VRLA) batteries and IEEE~~

(1)

(2) For vented lead-acid (VLA) batteries, IEEE 450, *Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications* , for vented lead–acid batteries

(3) For stationary nickel-cadmium (NiCd) batteries, see IEEE 1106, *IEEE Recommended Practice for Installation, Maintenance, Testing and Replacement of Vented Nickel-Cadmium Batteries for Stationary Applications*

(4) For photovoltaic nickel-cadmium batteries, see IEEE 1145, *IEEE Recommend Practice for the Installation and Maintenance,of Nickel-Cadmium Batteries for Photovoltaic (PV) Application* .

Statement of Problem and Substantiation for Public Input

This PI makes an editorial change adding bulletes to make the section easier to read.

Two new bullets are added to reference IEEE Maintenance Standards 1106 & 1145 for Ni-Cd batteries in stationary and PV applications.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 44-NFPA 70B-2013 [Section No. 15.9.4.4.12]	annex material modified to synch with text

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Public Input No. 25-NFPA 70B-2013 [Section No. D.2]

D.2 Informational References.

ANSI/IEEE 1100, *Recommended Practice for Powering and Grounding Electronic Equipment (IEEE Emerald Book),* 2005.

Power Quality for the Utility Engineer, Electric Power Research Institute, p. VIII-12, 1988.

Van Wagner et al., *Industrial Power Quality Case Study: General Motors Corporation Buick-Oldsmobile-Cadillac Group Powertrain Group — Livonia Engine,* Detroit Edison, March 1990, p. 43.

U.S. Department of Labor, Occupational Safety & Health Administration, Safety & Health Information Bulletin (SHIB), *Certification of Workplace Products by Nationally Recognized Testing Laboratories* , SHIB 02-16-2010

Statement of Problem and Substantiation for Public Input

Currently repaired, overhauled, reconditioned, refurbished or remanufactured equipment that was originally listed / labeled / approved for use in hazardous locations when new, is not currently required to be inspected and recertified (to original manfacturer's design specifications that meet appropriate standards as approved when new), before being installed into a hazardous location. The equipment may be misrepresented since the original OEM (Original Equipment Manufacturer) nameplate containing approved labeling as authorized by an NRTL (Nationally Recognized Testing Laboratory) when new, is typically left on the equipment following such repair, overhaul, reconditioning, refurbishing, or remanufacturing. Potential safety and OSHA compliance issues may exist if the equipment has incurred any "changes" since originally manufactured.

From above proposed document listing:
Page 5 (including footnote 5) of OSHA SHIB 02-16-2010 (Safety Health & Information Bulletin), http://www.osha.gov/dts/shib/shib021610.html advises industry that any "changes" incurred by an NRTL labeled product, even if inadvertent, voids the NRTL's approval for that product and an employer's use of such product in the workplace violates the OSHA standard(s) requiring that the product be NRTL-approved. The term "void" is consistent with NFPA 70B 27.2.9 terminology.

The OSHA SHIB provides guidance to industry, so listing it within NFPA 70B can increase industry users' awareness and focus on ensuring listed / labeled / approved products that are repaired, overhauled, reconditioned, refurbished or remanufactured, continue to meet regulatory standard(s) and provide for a safe workplace.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 23-NFPA 70B-2013 [Section No. 27.2.9]	
Public Input No. 24-NFPA 70B-2013 [Section No. 32.2.7.7.2]	

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Public Input No. 26-NFPA 70B-2013 [Section No. E.1.18]

E.1.18 Hazardous (Classified) Location Equipment.

All cover bolts should be in place and tight. Permanent markings should not be obstructed by paint. Joints between cover and case should be examined for signs of having been pried open in the removal of the cover. This might have damaged the mating surfaces of the joints. Excessive accumulations of dust and dirt should be noted for removal from all enclosures, including motors, which also should be examined for obstructed ventilation. The use of nonexplosionproof electric equipment, including lighting that might have been installed in the hazardous (classified) location area, should be noted and reported.

If listed / labeled / approved equipment is identified as having been intentionally modified or is suspected of non-compliance (to original manufacturer's design specifications that meet appropriate standards as approved when new) after having been repaired, overhauled, refurbished, reconditioned or remanufactured, then inspection and recertification should be performed by the original manufacturer, its authorized representative, or a third party, any of which must have facilities and procedures approved and audited by the appropriate NRTL (Nationally Recognized Testing Laboratory) for the product brand and model, or be field evaluated by a Field Evaluation Body (FEB).

Statement of Problem and Substantiation for Public Input

Currently repaired, overhauled, reconditioned, refurbished or remanufactured equipment that was originally listed / labeled / approved for use in hazardous locations when new, is not currently required to be inspected and recertified (to original manfacturer's design specifications that meet appropriate standards as approved when new), before being installed into a hazardous location. The equipment may be misrepresented since the original OEM (Original Equipment Manufacturer) nameplate containing approved labeling as authorized by an NRTL (Nationally Recognized Testing Laboratory) when new, is typically left on the equipment following such repair, overhaul, reconditioning, refurbishing, or remanufacturing. Potential safety and OSHA compliance issues may exist if the equipment has incurred any "changes" since originally manufactured.

Page 5 (including footnote 5) of OSHA SHIB 02-16-2010 (Safety Health & Information Bulletin), http://www.osha.gov/dts/shib/shib021610.html advises industry that any "changes" incurred by an NRTL labeled product, even if inadvertent, voids the NRTL's approval for that product and an employer's use of such product in the workplace violates the OSHA standard(s) requiring that the product be NRTL-approved.

Since each product device is unique unto itself including exposure to different installation, handling, repair, chemical exposure, etc. throughout its lifetime of use, inspecting to original OEM design specifications would be the logical method of ensuring no changes have been made to areas critical to meet original listing / labeling / approval requirements.

Incorporating the above issues, terminology and requirements into NFPA 70B should increase industry users' awareness and focus on ensuring listed / labeled / approved products that are repaired, overhauled, reconditioned, refurbished or remanufactured, continue to meet regulatory standard(s) and provide for a safe workplace.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 23-NFPA 70B-2013 [Section No. 27.2.9]	
Public Input No. 24-NFPA 70B-2013 [Section No. 32.2.7.7.2]	
Public Input No. 25-NFPA 70B-2013 [Section No. D.2]	

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Public Input No. 48-NFPA 70B-2013 [Section No. H.21]

H.21

Figure H.21 (a) shows an example of a

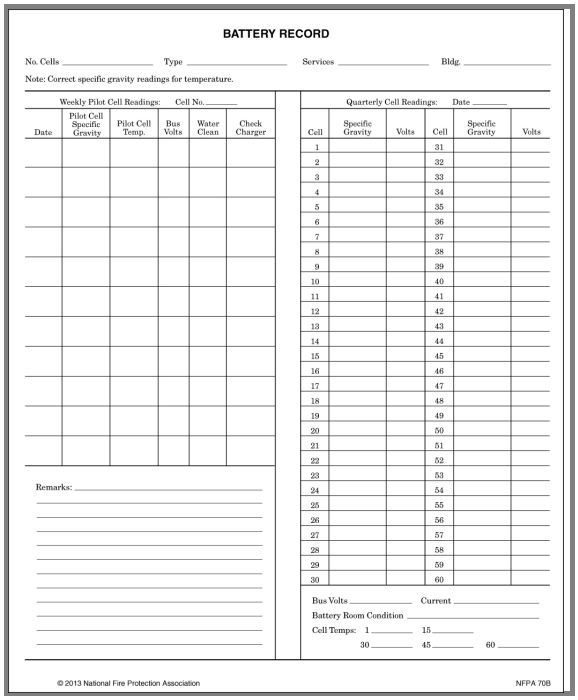
~~typical~~

VRLA battery

~~record~~

inspection report .

~~**Figure H.21 Typical Battery Record.**~~



BATTERY RECORD

No. Cells _____ Type _____ Services _____ Bldg. _____

Note: Correct specific gravity readings for temperature.

Weekly Pilot Cell Readings: Cell No. _____

Date	Pilot Cell Specific Gravity	Pilot Cell Temp.	Bus Volts	Water Clean	Check Charger

Remarks: _____

Quarterly Cell Readings: Date _____

Cell	Specific Gravity	Volts	Cell	Specific Gravity	Volts
1			31		
2			32		
3			33		
4			34		
5			35		
6			36		
7			37		
8			38		
9			39		
10			40		
11			41		
12			42		
13			43		
14			44		
15			45		
16			46		
17			47		
18			48		
19			49		
20			50		
21			51		
22			52		
23			53		
24			54		
25			55		
26			56		
27			57		
28			58		
29			59		
30			60		

Bus Volts _____ Current _____

Battery Room Condition _____

Cell Temps: 1 _____ 15 _____

30 _____ 45 _____ 60 _____

 NFPA 70B

Fibure H.21(b) shows an example of a VRLA maintenance work sheet

Additional Proposed Changes

File Name	Description	Approved

VALVE-REGULATED (VRLA) LEAD-ACID STATIONARY BATTERIES AND CHARGERS INSPECTION REPORT

Inspected by: _____

Inspection date: _____

User's Name:	Authorized Site Contact:
Installation Location:	Phone No.:
	Other:
System OEM:	Installation by:

BATTERY & CHARGER SYSTEM INFORMATION

VENDOR INSPECTION **USER INSPECTION**

Order Number **Ship Date**	Appearance of Following Battery Items
	Positive Posts
Date Installed	Negative Posts
Battery Model	Cell Covers
Cells x Strings	Presence of Lubricant on Cells ☐ Yes ☐ No
Application	
Bus Voltage, Portable Meter	
Bus Voltage, Equipment, Final	
Charger Size, Type, Serial No. & Mfg.	
Ambient Room Temperature	
Last Discharge	
Peak Load Current Amp. or KW	
Typical Load Current/KW	
Cell Arrangement	

COMMENTS AND RECOMMENDATIONS

Figure H.2(a) - Example of a VRLA battery inspection work sheet

BATTERY CHARGE STATUS ☐ OPEN CIRCUIT ☐ FLOAT ☐ EQUALIZE
BATTERY BUS VOLTAGE _____Vdc _____Vdc _____Vdc

Location: Model: Date:

Cell No.	Volts +2.000	Serial No.	Connection Resistance	Internal Cell Conductance /Impedance/ Resistance	Cell No.	Volts +2.000	Serial No.	Connection Resistance	Internal Cell Conductance /Impedance/ Resistance

Figure H.2(b) - Example of a VRLA maintenance work sheet

VRLA_Inspection_Maint_WrkShts_70B_Annex_H.docx	Annex H.21(a)&(b) VRLA Battery inspection & worksheets

Statement of Problem and Substantiation for Public Input

Table H.21 is not representative of today's best practices and cannot be used across many types of battery systems. Pilot cell readings are not necessary more often than monthly. Specific gravity measurements are rarely used anymore on vented lead-acid batteries, and are never taken on VRLA batteries. Service personnel should refer to referenced IEEE maintenance and testing standards for the type of battery being being tested. These standards are listed in 15.9.4.1.2

Because there are too many battery technologies to show them all, and because no single worksheet can satisfactorily address them all, this PI provides two examples of activity check lists for VRLA batteries only; one is an inspection report, the other is a maintenance report.

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