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MEMORANDUM

TO: Technical Committee on Emergency Power Supplies

FROM: Sarah Caldwell *Project Administrator*

DATE: August 17, 2018

SUBJECT: NFPA 110 Proposed Tentative Interim Amendment (TIA) No. 1388

The attached proposed Tentative Interim Amendment (TIA) is being submitted to you for letter ballot. This proposed TIA was submitted by Michelle Hilger of Arizona GEN TECH and the endorsers are:

Steve Sappington, Caterpillar Inc. (TC member)
Dan Chisholm, Sr. Motor and Generator Institute (TC member)
Timothy Windey, Cummins Power Systems (TC member)
Dean Weigand, Briggs & Stratton Corporation
Dennis Roundtree, Onsite Power Inc.
Paul Feld, Penn Power Systems
Kurt Summers, Austin Generator Service
Bob Piske, Arizona Generator Technology
Charlie Habic, Gillette Generators
Michael Marrero, Cummins, Inc.
Michael Sparks, Cummins, Inc.
Dan Bordui, Bell performance
Thodore Olszewski, R.W. Beckett Corporation
Harry A. James, Semler Industries, Inc.
Richard Johansen, Fuel Management Services
Loren W. Semler, Semler Industries, Inc.
Jeff Poirier, AXI International
Lyndon B. Risser, DynaTech Generators
Jerry Dawson, Keystone Materials Testing
Sean Butterfield, Senergy Petroleum
Lee Newton, Bay Diesel & Generator
Al Powers, Powers Generator
Brad Holmes, Clay & Bailey
Steve Belcher, FM Generator
Jim Landis, The Power Connection

This proposed TIA will be published for public comment in the September 2018 issue of *NFPA News* with a Public Comment Closing Date of September 20, 2018. Any public



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comments received will be circulated to the committee. Finally, the Standards Council will review and consider the issuance of this TIA.

In accordance with Section 5 of the *Regulations Governing the Development of NFPA Standards*, you are being balloted on the technical merits of the proposed TIA and whether this matter is of an emergency nature.

Please complete and return your ballot as soon as possible but no later than **August 27, 2018**. As noted on the ballot form, please return the ballot to Sarah Caldwell either via e-mail to scaldwell@nfpa.org or via fax to 617-984-7110. You may also mail your ballot to the attention of Sarah Caldwell at NFPA, 1 Batterymarch Park, Quincy, MA 02169.

Note: Please remember that the return of ballots and attendance at committee meetings are required in accordance with the Regulations Governing the Development of NFPA Standards.

NFPA 110-Proposed 2019 Edition

Standard for Emergency and Standby Power Systems

TIA Log No.: 1388

Reference: 2.3.2(new), 8.3.7, C.1.2.2, and C.1.2.3(new)

Comment Closing Date: September 20, 2018

Submitters: Michelle Hilger, Arizona GEN TECH

www.nfpa.org/110

1. Add new section in Chapter 2 to read as follows:

2.3.2 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM D2709, Standard Test Method for Water and Sediment in Middle Distillate Fuels by Centrifuge, 2016.

ASTM D6469, Standard Guide for Microbial Contamination in Fuels and Fuel Systems, 2017.

ASTM D7371, Standard Test Method for Determination of Biodiesel (Fatty Acid Methyl Esters) Content in Diesel Fuel Oil Using Mid Infrared Spectroscopy (FTIR-ATF-PLS Method), 2014.

2. Revise 8.3.7 and associated Annex material to read as follows:

~~8.3.7 A fuel quality test shall be performed at least annually using appropriate ASTM standards or the manufacturer's recommendations.~~ **Diesel Fuel.**

8.3.7.1 Diesel fuel maintenance and testing shall begin the day of installation and first fill in order to establish a benchmark for future comparison.

8.3.7.1.1 Diesel fuel shall be tested for degradation no less than twice annually with a maximum of 6 months between testing.

8.3.7.1.2 All testing shall be performed using ASTM-approved test methods and meet engine manufacturer's requirements.

8.3.7.1.3 Fuel testing shall be performed on all diesel fuel sources of EPSS.

8.3.7.2* Tests.

8.3.7.2.1 Tests shall include at a minimum Microbial Contamination per guidelines referenced under ASTM D6469, Standard Guide for Microbial Contamination in Fuels and Fuel Systems, Free Water and Sediment under ASTM D2709, Standard Test Method for Water and Sediment in Middle Distillate Fuels by Centrifuge, and Biodiesel Concentration under ASTM D7371, Standard Test Method for Determination of Biodiesel (Fatty Acid Methyl Esters) Content in Diesel Fuel Oil Using Mid Infrared Spectroscopy (FTIR-ATR-PLS Method).

8.3.7.2.2 Similar, modified, and proven methods recognized under ASTM shall be accepted.

A.8.3.7.2 For acceptable values, consult with the engine manufacturer and the most current ASTM test documents, including Appendix X3.1.3 of ASTM D975, Standard Specification for Diesel Fuel Oils.

8.3.7.3* For diesel fuel stored consecutively for 12 months or longer, a diesel fuel stability test shall be performed annually.

A.8.3.7.3 PetroOxy under ASTM D7545, Standard Test Method for Oxidation Stability of Middle Distillate Fuels — Rapid Small Scale Oxidation Test (RSSOT), is the accepted ASTM

test method for S15 diesel fuels and biodiesel blends containing up to a biodiesel blend of 5 percent. Additional methods might be acceptable. Refer to the most current ASTM test documents, including Appendix X3.1.3 of ASTM D975, *Standard Specification for Diesel Fuel Oils*.

8.3.7.4* Any additional testing requirements shall be determined by equipment manufacturer, government regulations, recent test results, and geographical region.

A.8.3.7.4 Refer to the most current, ASTM D975, *Standard Specification for Diesel Fuel Oils*, Appendix, and the CRC Report No. 667, *Diesel Fuel Storage and Handling Guide*, for detailed testing and descriptions.

8.3.7.5* If diesel fuel is found to be outside of the acceptable range in the testing listed in 8.3.7.2, the fuel shall be remediated to bring back to the required fuel quality for long-term storage specified under ASTM.

A.8.3.7.5 Remediation could be in the form of fuel additives, polishing, tank cleaning, or diesel fuel replacement and will be dependent on the test results received.

3. *Update document references in existing section as follows:*

C.1.2.2 ASTM Publications.

ASTM D975, *Standard Specification for Diesel Fuel Oils*, 2015e 2018.

ASTM D7545, *Standard Test method for Oxidation Stability of Middle Distillate Fuels – Rapid Small Scale Oxidation Test (RSSOT)*, 2014.

4. *Add new section to read as follows:*

C.1.2.3 CRC Publications. Coordinating Research Council, Inc., 5755 North Point Parkway, Suite 265, Alpharetta, GA 30022.

CRC Report No. 667, *Diesel Fuel Storage and Handling Guide*, 2014.

Substantiation: Diesel fuel is the power source of a generator. It is often the factor between life and death in a state of emergency. If the diesel fuel fails due to poor quality and maintenance, it doesn't matter how well the generator has been maintained as it will not get the power from the fuel source to run.

For several years, there has been uncertainty between end users, service companies, laboratories, manufacturers, and dealers when it comes to the proper fuel testing to provide to those adhering to NFPA 110 Chapter 8.3.7. The language has been too broad in only referencing an annual test, but not what to test for. In many cases, AHJ's and others refer back to the test standards of ASTM D975 which is the Diesel Fuel Oil Specification for **NEW** Fuel Oils at time of production.

The problem with this reference is emergency standby power, is just that, standby. The diesel fuel can sit in these tanks for 6 months, 1 year, and often several years. There needs to be testing done for the degradation of diesel fuel and a remediation process in place to be followed to ensure the diesel fuel does not fail in the event of any emergency.

NFPA 25 for the maintenance of Fire Pumps already has the language in place for remediation of the fuel in case of degradation, why does not the NFPA 110. However, just like NFPA 110, the NFPA 25 does lack the specific testing to be performed on the unit.

In July 2017, our first request to revise Chapter 8.3.7 was denied as it was not written in code language. Between the voting members there was no consensus within the marketplace to add specific testing to the code so instead “or the manufacturer’s recommendation” was added to the 2019 revision. The problem is, manufacturers refer back to ASTM D975 which once again, is the specification for NEW diesel fuel oils, not long-term storage fuels.

Over the last year, within EGSA (Electrical Generating Systems Association) we compiled a collaborative working group between the Dealer & Distributor Committee and the Codes & Standards Committee to create a consensus for the minimum testing requirements and maintenance of diesel fuel for the safety and reliability of EPSS. The above TIA wording has been sponsored by (2) NFPA 110 TC Members, the EGSA Executive Board, and several collaborators across the industry. I have attached statements from those involved in a separate document.

Emergency Nature. The standard contains an error or an omission that was overlooked during the regular revision process. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public.

With the changes to the production of diesel fuel over the last several years, the importance of proper maintenance to diesel fuel has become a matter of a life and death. Diesel fuel has changed drastically with the reduction of sulfur to 15ppm and the addition of biodiesel blends. It is no longer a maintenance free product. Without the code dictating what testing needs to be done, and requiring maintenance and remediation, it is only a matter of time before “bad” fuel fails to start a generator. The fuel may have been tested per the annual requirement, but for the wrong tests. We need to equip the industry with the proper testing and remediation for diesel fuel before the consequence is a catastrophic lost of innocent human lives within a medical facility.

**Supporting Statements from Collaborators 6/14/2018
TIA Submission for NFPA 110 – Chapter 8.3.7**

Endorser No. 1

Sponsor of this TIA as a NFPA 110 TC Member

Steve Sappington – Caterpillar Inc. – Product Safety & Compliance Specialist – 770-233-5858 – sappisr@cat.com

Reason to Sponsor TIA:

“This TIA is urgently needed to require proper periodic diesel fuel testing so as to better ensure a diesel fueled prime mover that is part of a legally required standby and emergency power source will start and satisfy its rated load requirements during normal electric power loss. Today’s diesel fuel recipes frequently change, thus facilitating bacterial growth and waste that adversely affect diesel fuel quality and its performance. The corrosive byproducts adversely affect fuel tanks and fuel delivery systems thereby increasing the likelihood of poor and undesirable EPSS performance. Without a requirement, EPSS owner behaviors are less motivated to ensure proper fuel quality and fuel delivery system readiness. Lack of proper attention and action has been evident in recent natural disasters spanning several years that resulted in EPSS failure and extended electric power outages.”

Endorser No. 2

Sponsor of this TIA as a NFPA 110 TC Member

Dan Chisholm, Sr. – Motor and Generator Institute – Emergency Power Consultant – dan.chisholm@mgi-epss.com

Reason to Sponsor TIA:

The following statement is for Dan Chisholm, Chairman of the NFPA’s Technical Committees responsible for NFPA 110, Emergency and Standby Power Systems, NFPA 111, Stored Electrical Energy Emergency and Standby Power Systems, and a technical committee member of the Electrical Section of NFPA 99, Health Care Facilities Code.

“It is of paramount importance that the industry (backup power) standardizes and consolidates its long-term fuel storage recommendations and requirements. Previous standards fail to address recent changes in fuel consistency and storage practices. By providing more explicit requirements through NFPA 110 8.3.7, we are filling a knowledge gap within the industry on how to properly maintain and address long-term fuel storage, and also setting the standard for ensuring optimal critical facility uptime throughout any natural disaster or power disruption.”

Endorser No. 3

Sponsor of this TIA as a NFPA 110 TC Member

Timothy Windey - Corporate Electrical Safety Council Chair Technical Advisor - Product Safety and Compliance Cummins Power Systems – 763-574-5198 – tim.windey@cummins.com

Reason to Sponsor TIA:

“This TIA adds needed details regarding diesel fuel testing requirements for emergency and standby power systems. The current language in NFPA 110 8.3.7 is too vague for modern diesel engines with the diesel fuels that are available today. This is a big deal, because in the last several years the production of diesel fuel has changed (reduction of sulfur content and addition of biodiesel blends). Without proper quality testing, diesel fuels will degrade to a point where the system gensets won’t be able to service the loads when needed.”

Endorser No. 4

Sponsor of this TIA as a NFPA Member & EGSA Member

Dean Weigand – Briggs & Stratton Corp. - Electrical Project Engineer – 414-256-1108 – weigand.dean@basco.com

Reason to Sponsor TIA:

“The testing of Diesel Fuel is necessary in situations where significant volumes of fuel are stored on site to provide operation for an established time. It has become critical with the government and fuel standards allowing significant amount of BIO mix in standard diesel fuel deliveries. This is requiring testing, pretreatment and possible remediation of stored fuel.”

Electrical Generating Systems Association (EGSA) Executive Board Stamp of Approval

EGSA President – Dennis Roundtree with Onsite Power Inc
EGSA President Elect – Paul Feld with Penn Power Systems
EGSA Vice President – Kurt Summers with Austin Generator Service
EGSA Secretary-Treasurer – Bob Piske with Arizona Generator Technology
EGSA Immediate Past President – Charlie Habic with Gillette Generators

**Endorsers No.
5 through 9**

Supporting Statements from Collaborators 6/14/2018
TIA Submission for NFPA 110 – Chapter 8.3.7

Endorser No. 10

Contributor & EGSA Member

Michael Marrero – Cummins Inc – PG Planned Maint. Sales – 812-314-5415 – michael.marrero@cummins.com

TIA Supporting Statement:

“Lack of standards and effective guidelines on sampling requirements are preventing effective mitigation of fuel contamination in critical mission generators thus potentially creating a catastrophic situation at these sites.”

Endorser No. 11

Contributor & EGSA Member

Michael Sparks – Cummins Inc – Project Manager – 602-390-0208 – michael.sparks@cummins.com

TIA Supporting Statement:

“Due to the concerns of Generator failure that we are facing in the just the Phoenix market could prove to be very disastrous for all of our customers. Hospitals, surgery centers, retirement homes, chemical storage facility’s that require refrigeration, Data centers. Any of these sites lose back up power due to generator failure puts us all at risk.”

Endorser No. 12

Contributor & EGSA Member

Dan Bordui – Bell Performance – Dir. of Nat’l Partnerships – 407-417-0415 – dbordui@bellperformance.net

TIA Supporting Statement:

“Given the recent & rapid changes that have occurred in the diesel fuel market, current NFPA 110 8.3.7 is ambiguous and has become essentially insufficient & obsolete. Especially within many standby power markets where NFPA 110 8.3.7 is commonly referenced by AHJ’s as the go to standard related to proper maintenance of standby power fuel quality. Reference of the standard has and will continue to lead to at best significant loss of revenue for the industry and at worst loss of life for those that rely on them.”

Endorser No. 13

Contributor & Member of ASTM

Theodore Olszewski – R.W. Beckett Corp – Compliance Engineer – 440-353-6320 – tolszewski@beckettcorp.com

TIA Supporting Statement:

“Until the introduction of renewable fuels (specifically biodiesel blends), petroleum diesel was used in applications that required long term storage of the fuel. Codes and standards over the years have addressed the issues that came with storing petroleum diesel and verifying whether the fuel remained usable during storage. New biodiesel blends are now also in use. These biodiesel blends have different chemical properties. As such, the behavior and degradation of biodiesel blends can be different than petroleum diesel during storage. The changes being proposed in this TIA address some of the known differences in the way biodiesel blends degrade as opposed to how petroleum diesel may degrade. In short, since fuels are evolving, the monitoring of fuels in storage needs to evolve accordingly.”

Endorser No. 14

Contributor

Harry A. James – Semler Industries – Product Specialist – 224-501-4609 – hjames@semlerindustries.com

TIA Supporting Statement:

“Today’s diesel fuel is not the same as it was 5 years ago. ULSD is more subject to water absorption and the development of microbial growth in storage tanks. The additional use of bio-blend diesel in standby generator storage tanks is taking place without consumer knowledge of bio content %. Higher bio content has proven to cause issues when stored for over 6 months. It is my belief that the proposed changes in the code will serve to help keep fuel ready by raising awareness of fuel condition, content and that preventative measures will be developed by stored fuel owners.”

Endorser No. 15

Contributor

Richard Johansen – Fuel Management Services – VP of Sales – 732-779-1331 – RJ.Johansen@yahoo.com

TIA Supporting Statement:

“I work with companies on a daily basis that are experiencing multiple issues with fuel contamination. People are just learning about the issues of ULSD and Biofuels and are not aware of the parameters to test for these issues. Places like hospitals and retirement communities are asking for our laboratory to test for D-975 testing parameters and they are very expensive. They do not need to be spending that much on a test that is irrelevant for the fuel that is in their storage tanks. The industry is at a disservice because the code is not clear as to what they need to do to keep their fuel reliable.”

Supporting Statements from Collaborators 6/14/2018
TIA Submission for NFPA 110 – Chapter 8.3.7

Endorser No. 16

Contributor

Loren W. Semler - Semler Industries, Inc. – President - 847-671-5650 Ext. 305 - lsemler@semlerindustries.com

TIA Supporting Statement:

"As stated in the TIA request form, the changes in diesel fuel (low sulfur, biodiesel blends, etc.), combined with the technology in newer diesel engines requires that much more attention be paid to monitoring and maintaining fuels used in long-term, stand-by applications. Without this monitoring and maintenance, fuel quality will degrade to the point where even a well-maintained emergency generator cannot supply power when needed.

Semler Industries has provided equipment (bulk transfer pumps, filters, meters, load-out equipment, etc.) into the fueling industry for over 60 years, and has been a part of the Petroleum Equipment Institute since its inception. I personally have been involved in the industry for over 20 years. Our experience in different markets allows us a unique perspective on how fuel is handled and used differently, and specifically how the changes in fuel composition has been managed and addressed by those at the point-of-sale and point-of-use in various markets.

As part of the PEI, we have had a lot of interaction with equipment providers and service contractors that provide equipment and maintenance to fuel sites for over-the road and off-road vehicles. Shortly after the newer fuel blends became widely used, it became evident that some detrimental affects on traditional tanks, piping systems, and equipment would occur if not addressed. This was evident relatively quickly, because of how frequently the fuel and equipment was used, and because of the high visibility of storage and transfer system failures. As a result, the industry has evolved rather quickly to address these effects through education, better fuel management, equipment maintenance, changes to materials used in fuel systems, etc.. The industry addressed and evolved as quickly as they have because the effects of the new fuel were visible rather quickly, and the cost and impact was immediate.

As newer members of EGSA, it became evident rather quickly that there is not as much awareness of the existing and growing challenges inherent with the new fuel blends in the stand-by power industry. Through conversations with many stake holders in the industry, our participation in the fuel group subcommittee, as members of the Dealer and Distributor group, and as a supplier of fuel filtration systems, I believe the stand-by power industry has not adapted their approach to fuel management and handling as quickly as those in the vehicle-use fuel markets, because they have not fully experienced the "pain" caused through system and equipment failures. This is largely due (in my opinion) to the fact that the fuel is not used as frequently (which not only compounds the problem, but also hides it until it is needed), and because the standby power equipment is rarely called on to operate for long periods of time. As a result, symptoms of fuel degradation are not always evident, but the problem is quietly growing. Unless regular fuel monitoring, testing, and maintenance is performed, it is not until a generator is called on to perform for a long period of time, in an emergency situation, that the true extent of fuel degradation or fuel system damage might be known. At that point, the consequences can be potentially devastating in terms of property damage and / or loss of life. This TIA change is necessary to help those tasked with assuring back-up power is available to do so in an a manner that addresses this newer concern that many firms and technicians are not yet fully aware of, and do not yet fully understand.

Most people would not get on an aircraft without assurance that the fuel had been tested and filtered suitably to make the engines perform as designed. In the event of a power failure at a hospital, the fuel supply in the generator could have consequences just as deadly as the failure of an aircraft engine, yet very little testing and maintenance is performed on this fuel... In my opinion, this TIA is a much needed step that should be taken to prevent potential significant loss of property and life in emergency situations.

This TIA represents a significant step forward in offering not only the necessary education and awareness to those who are tasked with maintaining back-up power systems, but also guidance as to the standards and procedures that should be incorporated into their maintenance programs. "

Contributor

Jeff Poirier – AXI International – Chief Operations Officer – 239-600-6942 – jpoirier@axi-international.com

Endorser No. 17

TIA Supporting Statement:

"This TIA should be approved in order to protect both customers and users of mission critical facilities across the United States. With the changes to fuel over the past 10-15 years, long-term stability has suffered greatly. This coupled with tighter injection system tolerances, has led to greatly increased facility liability regarding back up power. The tools and solutions exist within the industry, but a guide/standard is missing for customer education and implementation."

**Supporting Statements from Collaborators 6/14/2018
TIA Submission for NFPA 110 – Chapter 8.3.7**

Contributor

Endorser No. 18

Lyndon B Risser – DynaTech Generators – CEO – 717-274-8899 – lyndon.risser@dynatechgenerators.com

TIA Supporting Statement:

“As a service company responsible for the maintenance of Standby Generators providing emergency power for Healthcare, Municipalities, Education, Fire and Rescue and other infrastructure critical for our for the communities survival, we are discovering an alarming amount of diesel fuel issues from water contamination destroying fuel injection systems, sludge in tanks and filters restricting fuel, and premature tank deterioration that has rendered our customer’s generators useless. A fuel monitoring and testing program is no longer optional, it is your only assurance your generator will perform with today’s fuels.”

Contributor

Endorser No. 19

Jerry Dawson – Keystone Materials Testing – Lab Manager – 641-792-8505 – jdawson@kmtlabs.com

TIA Supporting Statement:

“This TIA need to be approved to provide a reliable fuel source for emergency power backup. Today’s diesel fuels are less stable and are more prone to bacterial growth than the fuels produced before the introduction of ULSD. Due to the many issues facing fuel storage practices a planned monitoring program is imperative to provide a real time status of the fuel. Monitoring will prevent fuel related failures in times when we rely on our backup power the most. This TIA will provide a clear directive for the monitoring of the most common fuel related problems we see in the stored fuel supply.”

Other Contributors Include:

- subm** Michelle Hilger – Arizona Generator Technology – Marketing Coordinator – 602-510-0639 – mihilger@gentechus.com
– EGSA – Secretary of Dealer & Distributor Committee & Chair of Diesel Fuel Working Group
- Sean Butterfield – Senergy Petroleum – Account Executive – 623-738-9279 – sbutterfield@gosenergy.com
- Lee Newton – Bay Diesel & Generator – VP of Sales – 804-230-3495 – lee.newton@baydiesel.com
- Al Powers – Powers Generator – Owner – 800-853-7202 ext 11 – apowers@powersgenerator.com
- Brad Holmes – Clay & Bailey – Account Executive – 800-821-6583 – bholmes@claybailey.com
- Steve Belcher – FM Generator – Special Accounts Projects Manager – 781-828-0026 – sbelcher@fmgenerator.com
- dup** Bob Piske – Arizona Generator Technology – President – 623-937-1719 – bpiske@gentechus.com
- Jim Landis – The Power Connection – Service Team Leader – 540-578-4979 – jiml@tpcgenerators.com

**Endorsers No.
20 through 25**