

NFPA 75-2024: Fire Protection of ITE
Analysis of Impact Considerations on Design and Installation of IT Equipment

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This analysis identifies and analyzes changes in the 2024 Edition of NFPA 75, Standard for the Fire Protection of Information Technology Equipment, that have potential impact on safety and installation of IT equipment (ITE), including the National Differences (ND) and requirements in UL 62368-1, Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements.

Other observations are included that may be of interest to the audio/video, information and communication technology (AV/ICT) Industry.

NFPA 75, Standard for the Fire Protection of Information Technology Equipment, was prepared by the **National Fire Protection Association (NFPA)** Technical Committee on Electronic Computer Systems. The Standard was first published in 1962 and has had numerous editions since then, typically reissued as a new edition about every four years.

The **Scope (1.1)** of the standard covers the requirements for the protection of ITE and ITE areas. The **Purpose (1.2)** of the standard is to set forth the minimum requirements for the protection of ITE and ITE areas from damage by fire or its associated effects — namely, smoke, corrosion, heat, and water.

The standard also contains an informative **Annex A**, Explanatory Material, which is not a part of the requirements, but is included for informational purposes only, providing explanatory material numbered to correspond with the applicable text paragraphs.

The Standard is both adopted by local jurisdictions and used by the insurance industry for approving ITE Rooms & Areas, otherwise known as Computer Rooms, Data Centers and similar spaces.

UL 62368-1, Audio/Video, Information and Communication Technology Equipment - Part 1: Safety Requirements, is prominently referenced in NFPA 75 for IT equipment product safety requirements. It contains National Differences (NDs) from the IEC 62368-1 standard of the same name that are driven by NFPA 75.

Per the Highlights area of the NFPA website, the 2024 edition includes:

- Added requirements for ITE immersion cooling equipment.
- Removal of all lithium-ion battery requirements in favor of coverage in NFPA 855, Standard for the Installation of Stationary Energy Storage Systems.
- Added requirements for off-gas detection systems.
- New Annex F based on optional tests included in NFPA 76, Standard for the Fire Protection of Telecommunications Facilities.

The 2024 Edition of NFPA 75 is available from the NFPA: <https://www.nfpa.org/product/nfpa-75-standard/p0075code>

Explanation of Impact Statements:

Statement	Impact
None	Anticipate no impact on design and/or installation of IT equipment due to the change.
Minor	Anticipate limited impact on the design and/or installation of some IT equipment due to the change.
Significant	Anticipate potentially sizable impact on the design and/or installation of some IT equipment due to the change.

NFPA 75 Section	Title	Summary	Impact	New or revised ND to be proposed in UL 62368-1?
3	Definitions			
3.3.10	Energy Storage System (new)	<p>To support more refined requirements being added to Section 11.5, Uninterruptible Power Supplies (UPSs), to consider modern battery chemistries, a new term/definition has been added for Energy Storage Systems (ESS).</p> <p>3.3.10* Energy Storage System (ESS).</p> <p>One or more devices installed as a system capable of storing energy and providing electrical energy into the premises wiring system or an electric power production and Included in informative Annex A, Explanatory Material, is the explanation on new Section 8.3 distribution network. [70, 2023]</p>	<p>None</p> <p>Definition</p> <p>Proposed UL 62368-1 Edition 4, with a targeted publication date in 4Q 2024, will make reference to Energy Storage Systems and redirects to other standards outside of UL 62368-1, such as UL 9540, Energy Storage Systems and Equipment.</p>	No
A.3.3.10		<p>Included in informative Annex A, Explanatory Material, is further explanation of new Section 8.3 that Energy storage systems (ESSs) differ from other storage systems (e.g., uninterruptible power supply (UPS)), mainly to emphasize that ESS and UPS are not the same.</p> <p>For further information, please download the UL Solutions White Paper, “UPS Versus ESS,” which reviews the North American codes and standards for uninterruptible power supply (UPS) products and evolving energy storage systems (ESS) - https://www.ul.com/insights/ups-versus-ess .</p>	<p>None</p> <p>Informative</p>	No

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3.3.13	Information Technology Equipment (ITE) (revised)	<p>The maximum rating of Information Technology Equipment covered by NFPA 75 has been increased to 1000 volts to be consistent with NFPA 70, National Electrical Code (NEC). Therefore, NFPA 75 can accommodate ITE connected to branch circuits (mains) up to 1000 volts.</p> <p>Note, although the NEC, and now NFPA 75, have increased the maximum mains (branch circuit) voltage covered under their scopes, IEC 62368-1 and UL 62368-1 continue to have a 600 V limit associated with their scope. However, this has not demonstrated to be problematic since almost all ITE does not approach a 600 V electrical rating (and UL 62368-1 already can cover Working Voltages above 600V). If ITE rated above 600V was investigated to UL 62368-1, the provisions of sub-clause 4.1.5, Constructions and components not specifically covered, could be utilized, which would continue to allow use UL 62368-1, but with additional considerations introduced for connection of the IT equipment to higher mains voltages.</p>	None Definition	No
3.3.16	ITE Immersion Cooling Liquid (new)	<p>To support new requirements being added as Section 8.2.2, ITE Immersion Cooling System, to address modern ITE Immersion Cooling, a new term/ definition has been added for ITE Immersion Cooling Liquid.</p> <p>3.3.16 ITE Immersion Cooling Liquid.</p> <p>An insulating liquid (dielectric) used for the purpose of cooling ITE through direct contact that is contained within the ITE system.</p>	None Definition	Yes, to bring attention to the new term/ definition.

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		<p>It is noted that IEC 62368-1:2023 does not include the same term/definition, but contains the following parallel term/definition.</p> <p style="padding-left: 40px;">3.3.5.4 insulating liquid</p> <p style="padding-left: 40px;">insulating material consisting entirely of a liquid</p>		
3.3.22	Off-Gas (new)	<p>To support additional refined requirements being added to Section 11.5, Uninterruptible Power Supplies (UPSs), to consider modern battery chemistries, a new term/definition has been added for Off-Gas.</p> <p style="padding-left: 40px;">3.3.22 Off-Gas.</p> <p style="padding-left: 40px;">The event in which the [battery] cell case vents due to a rise in internal pressure of the cell. [855, 2023]</p>	None Definition	No
3.3.31	Thermal Runaway (new)	<p>To support additional refined requirements being added to Section 11.5, Uninterruptible Power Supplies (UPSs), to consider modern battery chemistries, a new term/definition has been added for Thermal Runaway.</p> <p style="padding-left: 40px;">3.3.31 Thermal Runaway.</p> <p style="padding-left: 40px;">Self-heating of an electrochemical system in an uncontrollable fashion. [855, 2023]</p>	None Definition	No

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8	Construction of Information Technology Equipment			
8.2.2.	ITE Immersion Cooling System (new)	<p>ITE Immersion Cooling is a modern cooling solution intended for installation in Data Centers that typically consist of a cabinet/enclosure, a power distribution unit, an internal cooling distribution unit (with interconnection to an external cooling infrastructure associated with the data center/building), internal tank, and an insulating (immersion cooling) liquid, to which IT hardware, including servers, power supplies and related devices, are added (on-site) to make a complete system.</p> <p>Up until the 2024 edition of NFPA 75 there were no specific requirements in it that covered this type of construction. In NFPA 75:2024 the technical committee added Section 8.2.2, ITE Immersion Cooling System, with several basic requirements for initial exposure of single-phase systems. These requirements are expected to be expanded in future editions as the industry evolves, including coverage of two-phase systems.</p> <p>The key provisions of these new requirements include, (8.2.2.1) Manufacturers' instructions are required to be followed for installation, maintenance, and operation for all immersion cooling units.; (8.2.2.2) Insulating liquids are required to be noncombustible or have a closed-cup flash point of 135°C (275°F) or higher.; and (8.2.2.3) a system designed for the purpose of single-phase immersion cooling of ITE using</p>	<p>Minor</p> <p>As this industry is relatively young, the basic requirements added to NFPA 75:2024 should not be problematic.</p> <p>However, the addition of requirements for ITE Immersion Cooling, including a Listing provision, in NFPA 75:2024 should drive more NRTL certification.</p>	Yes

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		<p>insulating liquids are required to comply with the following: (1) have a lid or access point, (2) use closed piping, and (3) be listed or approved.</p> <p>These requirements are consistent with the system and insulating liquid requirements for immersion cooling in UL 62368-1.</p> <p>The complete structure of Section 8.2.2 follows:</p> <ul style="list-style-type: none"> 8.2.2 ITE Immersion Cooling System. 8.2.2.1 Immersion Cooling Unit Installation. 8.2.2.2 ITE Immersion Cooling Liquid. 8.2.2.3 ITE Immersion Cooling Unit — Single-Phase. 8.2.2.4 ITE Immersion Cooling Unit — Two-Phase. (Reserved) 		
8.3	ITE with Integral Battery Backup (new)	<p>Since integral battery backup is being incorporated into more varieties of ITE installed in Data Centers, the technical committee added a new Section 8.3 for ITE with integral battery backup.</p> <p>The key requirements include, (a) where ITE includes integral battery backup, the integral battery backup is required to be included in the product listing; and (b) where ITE includes integral battery backup, the ITE is required to be installed and operated in accordance with its listing and the manufacturer's instructions.</p>	Minor	Yes

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		These requirements are consistent with the current requirements in UL 62368-1.		
A.8.3		Included in informative Annex A, Explanatory Material, is the explanation on new Section 8.3 that some types of ITE use integral batteries to reduce the effects of instantaneous power shutdowns and to provide power for orderly shutdown of the server.	None Informative	No
9	Fire Detection and Protection Equipment			
9.6	In-Building Emergency Responder Communications Enhancement Systems (new)	<p>New Section 9.6 requires that, where in-building emergency responder communications enhancement systems are required for the building, such systems are required to be installed to minimize interference with ITE in accordance with NFPA 1225.</p> <p>NFPA 1255 is the Standard for Emergency Services Communications, which is a combination of the legacy NFPA 1061, Standard for Public Safety Telecommunications Personnel Professional Qualifications, and NFPA 1221, Standard for Emergency Services Communications.</p> <p>The addition of this section to the standard is being included in this analysis because some in-building emergency responder communication enhancement systems use AV/ICT hardware and because of the reference to ITE interference.</p>	Minor	No

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A.9.6		<p>Included in informative Annex A, Explanatory Material, is the explanation about Section 9.6 that “some ITE facilities are essential elements of the public safety network, providing communities with connectivity to 911 and E911 as well as processing alarms and other signals. ITE might not have been designed or tested for immunity at the power levels and frequencies commonly used in responder radios. ITE rooms are not publicly accessible and the number of incidents requiring responder access is low compared to many other occupancies. Because these facilities are unique occupancies with such an important function, close cooperation between the facility operator and the emergency response organization(s) should be encouraged to assure responder activities are not unduly impaired and the ITE remains functioning. In-building emergency responder communications enhancement systems deployed in common areas, stairwells, lobbies, and other nonequipment room locations within ITE buildings are less of a concern.”</p>	<p>None Informative</p>	No
11	Utilities			
11.5.2.7	Batteries (new)	<p>The requirements in 11.5, Uninterruptible Power Supplies (UPSs), of NFPA 75:2024, have been updated to better address modern battery chemistries and align with the latest NFPA Codes and Standards for these sorts of batteries after the first significant expansion of the UPS/battery requirements was added to the 2020 Edition of NFPA 75.</p> <p>Acknowledging that such batteries used in UPS applications sometimes are changed in the field, new Section 11.5.2.7 has been added to existing Section 11.5.2 requiring that a failure modes and effects analysis</p>	<p>Minor</p> <p>Although most constructions with lead-acid or nickel-cadmium batteries will continue to be covered primarily by NFPA 75, the redirection of lithium and other modern battery technologies to NFPA 1 and</p>	<p>No</p> <p>Installation consideration</p>

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		shall be performed in accordance with NFPA 855 if the chemistry (i.e., type) of the batteries constituting a battery system is changed.	NFPA 855 may be new to some manufacturers/installers.	
11.5.4	Other Battery Types (new)	Existing Section 11.5.3 covers lead-acid and nickel-cadmium Batteries. Since NFPA Codes and Standards have been updated to address more modern technologies, such as lithium, a new requirement as Section 11.5.4, Other Battery Types, has been added that Battery types other than those addressed in 11.5.3 shall comply with Chapter 52 of NFPA 1. NFPA 1 is the Fire Code. Its Chapter 52, Energy Storage Systems, relies heavily on NFPA 855, Standard for the Installation of Energy Storage Systems, for most of its requirements.	Minor Although most constructions with lead-acid or nickel-cadmium batteries will continue to be covered primarily by NFPA 75, the redirection of lithium and other modern battery technologies to NFPA 1 and NFPA 855 may be new to some manufacturers/installers.	Yes
		Additionally, in new Section 11.5.4.1, if an off-gas detection system is installed for lithium-Ion batteries to monitor for electrolyte vapor released prior to thermal runaway, such systems are required to be listed or approved, and installed in accordance with the manufacturer’s published instructions.	Minor Likely reflects present practice.	No Installation consideration.
		Additionally, in new Section 11.5.4.2, if lithium-ion batteries in a UPS are replaced with new batteries, replacement batteries are required to be in accordance with the listing of the UPS.	Minor Reflects present practice since UL 1778, Uninterruptible Power Systems, can accommodate replacement batteries if	Yes

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			specified and anticipated at the time of Listing.	