Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1

Section 4
General

Safety Requirements, UL 62368-1

- **Background**
  - Is intended to ultimately **replace** IEC 60065 and IEC 60950-1;
  - IEC Standard initially published in 2010 with a minimum five (**5**) year effective date that is being recommended by IEC TC108;
  - Its Test Report Form (**TRF**) has been published;
  - Publication of national standards based on IEC 62368-1 expected to follow after the publication of IEC 62368-1.
    - It is hoped that National/Regional Committees will adopt effective dates that will coincide with the effective date timing recommended by IEC TC108, but this cannot be guaranteed.
    - Since the five-year transition period is the **best case scenario**, there's no guarantee that one or more **regulators** will not adopt the standard sooner.
    - **Retailers** and other major **customers** may demand a product to be certified to IEC 62368-1 sooner than the transition period.

Safety Requirements, UL 62368-1

- **Background**
  - **IEC 62368-1/UL 62368-1**
    - New Safety Standard for
      - **Consumer Electronic** (Audio/Video) Apparatus,
      - **Information Technology Equipment**, and
      - **Communication Technology Equipment**
    - **NOT** a simple **merger** of IEC 60065 and IEC 60950-1
    - **IEC 62368-1 published 2010-01-21**
      - **(www.ansi.org – cost $370)**
    - **UL 62368-1 published 2012-2-17**
      - (**www.comm-2000.com – cost $579)**
    - **CSA 62368-1-12 published 2012-2-17**
      - **(www.shop.csa.ca – cost $330 US)**

Safety Requirements, UL 62368-1

- **Background**
  - **IEC 62368-1**
    - Its **scope** is broad and inclusive of the current IEC 60065 and IEC 60950-1.
    - Follows a different approach to safety using **HBSE** principles – but it is not a full HBSE or Risk Based standard – it relies on performance tests to demonstrate safety.
    - It's Hazard Based approach is different than that of the more prescriptive approach taken by the existing standards, i.e., IEC 60065 and IEC 60950-1.

Safety Requirements, UL 62368-1

- **Workshop Format**
  - **Series of presentations**
  - **Each presentation will go thru the standard, Section by Section**
    - **Section 0, Principles of Product Safety,**
    - **Section 1, Scope (skip)**
    - **Section 2, Normative References (skip)**
    - **Section 3, Terms and Definitions**
    - **Section 4, General Requirements**
    - **Section 5, Electrically Caused Injuries**
    - **Section 6,**
  - **Open discussion**

Safety requirements, UL 62368-1

- **4.1 General**
  - **4.1.12 Hierarchy of safeguards**
    - **Safeguards that are required for ordinary persons are acceptable, but may not be required, for instructed persons and skilled persons. Likewise, safeguards that are required for instructed persons are acceptable, but may not be required, for skilled persons.**
    - A **reinforced safeguard may be used in place of a basic safeguard or a supplementary safeguard or** a **double safeguard. A double safeguard may be used in place of a reinforced safeguard.**
    - **Safeguards other than equipment safeguards may be specified in specific clauses**

Safety requirements, UL 62368-1

- **4.1 General**
  - **4.1.16DV.1 Mains connections**
    - **4.1.16DV.1.1 DE See Annex G.9 for Mains Supply Cords for Pluggable (Cord Connected) Equipment.**
    - **4.1.16DV.1.2 DR See Annex G.9ADV for Mains Supply Cords for Pluggable (Cord Connected) Equipment (Canadian and U.S. regulatory-based requirements).**
    - **4.1.16DV.1.3 D2 See Annex DVH for requirements for Permanently Connected Equipment.**
    - **4.1.16DV.1.4 DR See Annex DVH for requirements for Permanently Connected Equipment (Canadian and U.S. regulatory-based requirements).**

Safety requirements, UL 62368-1

- **4.1 General**
  - **4.1.17DV.1 External interconnecting cable and wiring**
  - **4.1.17DV.1.1 General**
    - **External interconnecting cable and wiring are investigated to the requirements of 6.5 and either 4.1.17DV.1.2 or 4.1.17DV.1.3, as appropriate.**

Safety requirements, UL 62368-1

- **4.1 General**
  - **4.1.17DV.1.3 External interconnecting cable and wiring considered part of the building installation**
    - **External interconnecting cables and wiring longer than 3,05 m are regulated by the Canadian Electrical Code, C22.1, and the National Electrical Code, NFPA 70. See Annex DVA(Annex Q entry).**

Safety Requirements, UL 62368-1

Table 1 – Response to energy class

Energy source	Effect on the body	Effect on combustible materials
Class 1	Not painful, but may be detectable	Ignition not likely
Class 2	Painful, but not an injury	Ignition possible, but limited growth and spread of fire
Class 3	Injury	Ignition likely, rapid growth and spread of fire

Safety requirements, UL 62368-1

- **4.2 Energy source classifications**
  - **4.2.1 Class 1 energy source**
    - Unless otherwise specified, a class 1 source is an energy source with levels not exceeding class 1 limits under
      - – **normal operating conditions and**
      - – **abnormal operating conditions that do not lead to a single fault condition,**
      - - and not exceeding class 2 limits under **single fault conditions.**
  - Under **normal operating conditions and abnormal operating conditions, the energy in a class 1** source, in contact with a body part, may be detectable, but is not painful nor is it likely to cause an injury. For fire, the energy in a class 1 source is not likely to cause ignition.
  - Under **single fault conditions, a class 1 energy source, under contact with a body part, may be painful,** but is not likely to cause injury.

Safety requirements, UL 62368-1

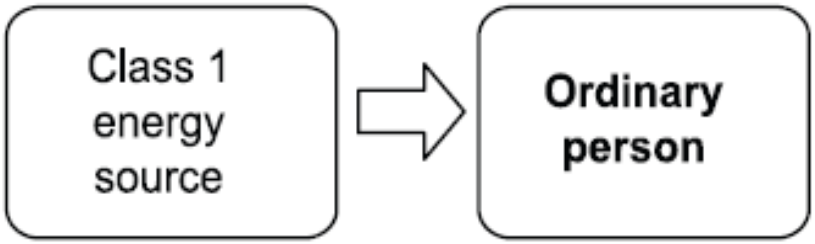
- **4.2 Energy source classifications**
  - **4.2.2 Class 2 energy source**
    - Unless otherwise specified, a class 2 source is an energy source
      - with levels exceeding class 1 limits
      - and not exceeding class 2 limits under **normal operating conditions, abnormal operating conditions, or single fault conditions.**
    - **The energy in a class 2 source, under contact with a body part, may be painful,** but is not likely to cause an injury.
    - For fire, the energy in a class 2 source can cause ignition under some conditions.

Safety requirements, UL 62368-1

- **4.2 Energy source classifications**
  - **4.2.3 Class 3 energy source**
    - A class 3 source is an energy source
      - with levels exceeding class 2 limits under **normal operating conditions, abnormal operating conditions, or single fault conditions, or any energy source declared** to be a class 3 source.
    - The energy in a class 3 source, under contact with a body part, is capable of causing injury.
    - For fire, the energy in a class 3 source may cause ignition and the spread of flame where fuel is available.

Safety requirements, UL 62368-1

- **4.3 Protection against energy sources**
  - **4.3.2 Safeguards for protection of an ordinary person**
    - 4.3.2.1 Safeguards between a class 1 energy source and an ordinary person
      - No **safeguards need be interposed between a class 1 energy source and an ordinary person (see** Figure 9). Consequently, a class 1 energy source may be **accessible to an ordinary person.**



Safety requirements, UL 62368-1

- **4.3 Protection against energy sources**
  - 4.3.2.2 Safeguards between a class 2 energy source and an ordinary person
    - During **normal operating conditions at least one basic safeguard shall be interposed between a class** 2 energy source and an **ordinary person (see Figure 10).**

Safety requirements, UL 62368-1

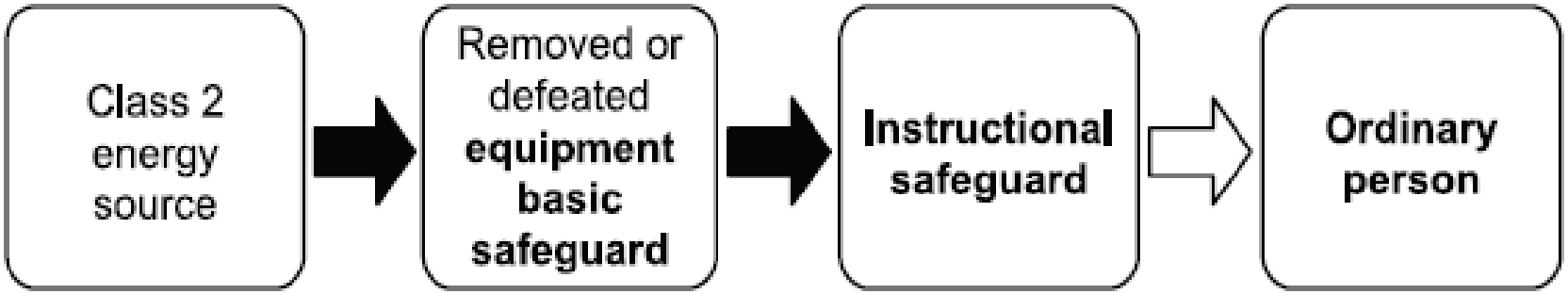
- **4.3 Protection against energy sources**
  - 4.3.2.3 Safeguards between a class 2 energy source and an ordinary person during ordinary person servicing conditions
    - If **ordinary person servicing conditions require a basic safeguard to be removed or defeated, an instructional safeguard as described in Clause F.5 shall be provided and located in such a way that an ordinary person will see the instruction prior to removing or defeating the equipment basic safeguard**
    - The **instructional safeguard shall include all of the following:**
      - – identify parts and locations of the class 2 energy source;
      - – specify actions that will protect persons from that energy source; and
      - – specify actions to reinstate or restore the **basic safeguard.**

Safety requirements, UL 62368-1

- **4.3 Protection against energy sources**
  - 4.3.2.3 Safeguards between a class 2 energy source and an ordinary person during ordinary person servicing conditions
    - If **ordinary person servicing conditions require a basic safeguard to be removed or defeated, and where** the equipment is intended for use in the home, an **instructional safeguard directed** towards adults, shall warn against removing or defeating the **basic safeguard by children.**

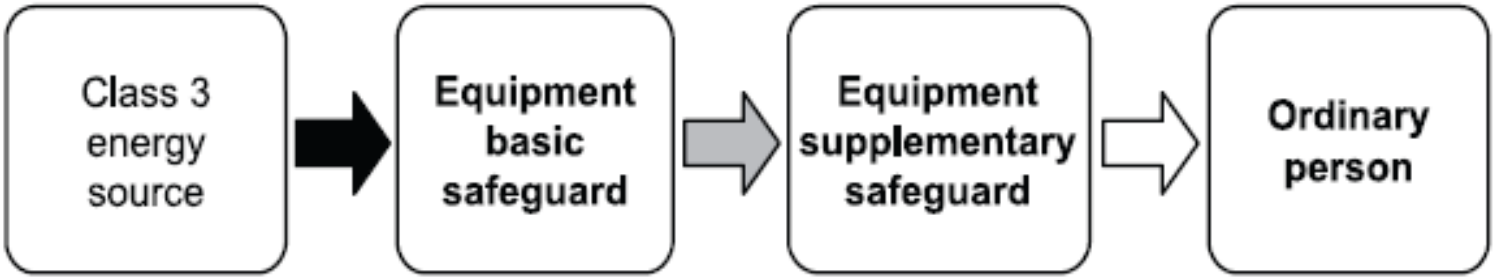
Safety requirements, UL 62368-1

- **4.3 Protection against energy sources**



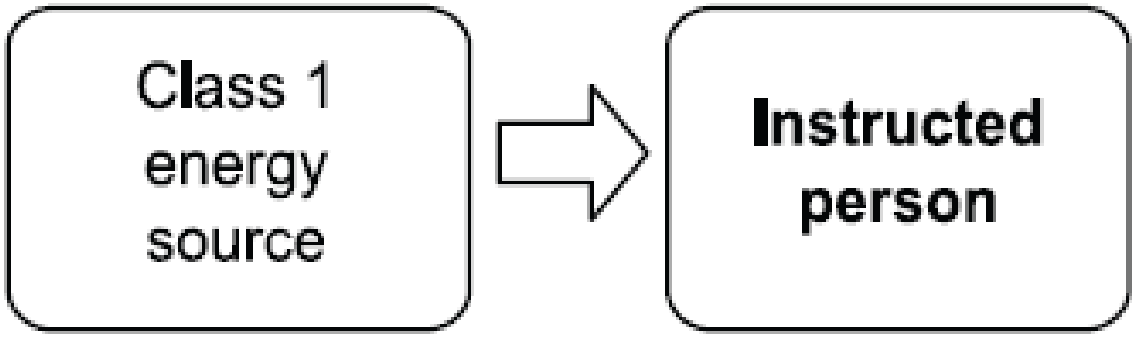
Safety requirements, UL 62368-1

- **4.3 Protection against energy sources**
  - 4.3.2.4 Safeguards between a class 3 energy source and an ordinary person
    - An **equipment basic safeguard and an equipment supplementary safeguard (double safeguard) or**
    - an **equipment reinforced safeguard shall be interposed between a class 3 energy source and an ordinary person.**



Safety requirements, UL 62368-1

- **4.3 Protection against energy sources**
  - **4.3.3 Protection of an instructed person**
    - 4.3.3.1 Safeguards between a class 1 energy source and an instructed person
      - No **safeguards need be interposed between a class 1 energy source and an instructed person.**
      - Consequently, a class 1 energy source may be **accessible to an instructed person**

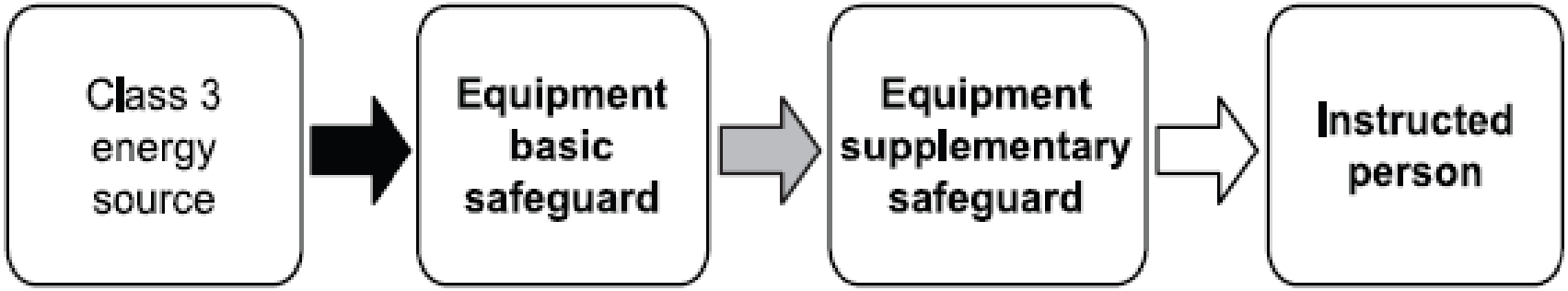


Safety requirements, UL 62368-1

- **4.3 Protection against energy sources**
  - 4.3.3.2 Safeguards between a class 2 energy source and an instructed person
    - During **instructed person servicing, the equipment safeguards against a class 2 energy source may be** removed or defeated. In this case, an **instructed person is presumed to use precaution as a safeguard** against a class 2 energy source

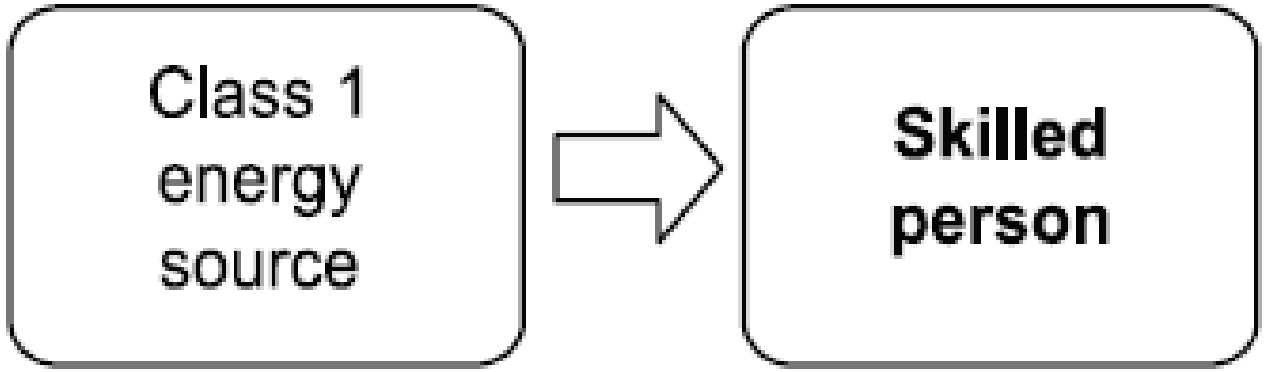
Safety requirements, UL 62368-1

- **4.3 Protection against energy sources**
  - 4.3.3.3 Safeguards between a class 3 energy source and an instructed person
    - An **equipment basic safeguard and an equipment supplementary safeguard (double safeguard) or**
    - a **reinforced safeguard shall be interposed between a class 3 energy source and an instructed person**



Safety requirements, UL 62368-1

- **4.3 Protection against energy sources**
  - **4.3.4 Protection of a skilled person**
    - 4.3.4.1 Safeguards between a class 1 energy source and a skilled person
    - No **safeguard need be interposed between a class 1 energy source and a skilled person**



Safety requirements, UL 62368-1

- **4.3 Protection against energy sources**
  - 4.3.4.2 Safeguards between a class 2 energy source and a skilled person
    - During **skilled person servicing, the equipment safeguards against a class 2 energy source may be** removed or defeated. In this case, a **skilled person is presumed to use skill as a safeguard against a** class 2 energy source

Safety requirements, UL 62368-1

- **4.3 Protection against energy sources**
  - 4.3.4.3 Safeguards between a class 3 energy source and a skilled person
    - During **skilled person servicing, the equipment safeguards against a class 3 energy source may be** removed or defeated. In this case, a **skilled person is presumed to use skill as a safeguard against a** class 3 energy source

Safety requirements, UL 62368-1

- **4.3 Protection against energy sources**
  - 4.3.4.4 Safeguards between class 3 energy sources and a skilled person during equipment servicing conditions
    - During equipment servicing conditions on a class 3 energy source, an **equipment safeguard intended to** reduce the likelihood of injury due to an involuntary reaction shall be interposed between:
      - – another class 3 energy source, not undergoing service and in the same vicinity as the class 3 energy source being serviced; and
      - – a **skilled person**

Safety requirements, UL 62368-1

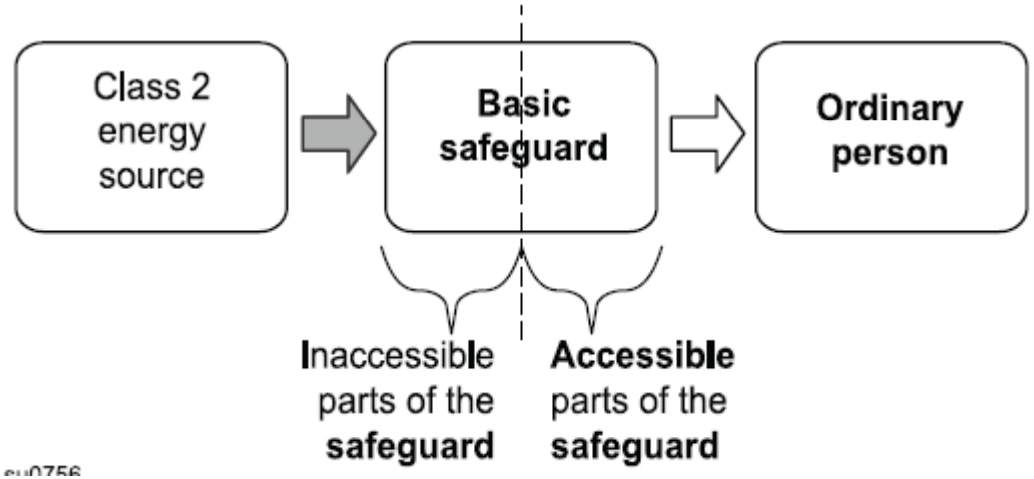
- **4.3 Protection against energy sources**

Safety requirements, UL 62368-1

- **4.3 Protection against energy sources**
  - **4.3.5 Safeguards in a restricted access area**
    - Certain equipment is intended for installation exclusively in **restricted access areas. Such equipment** shall have **safeguards as required in 4.3.3 for instructed persons and 4.3.4 for skilled persons.**

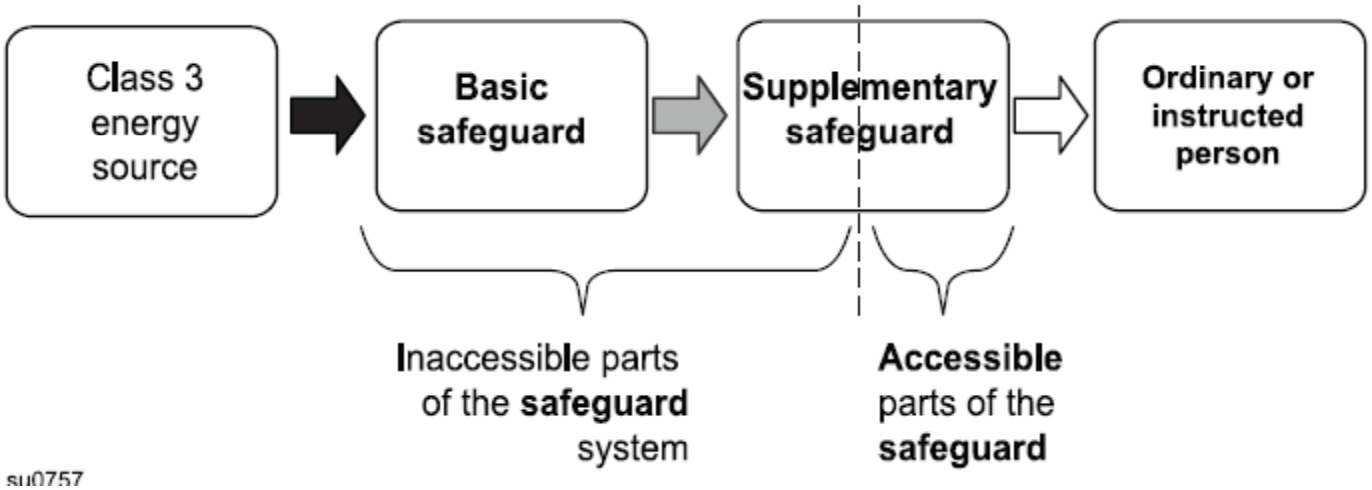
Safety requirements, UL 62368-1

- **4.4 Safeguards**



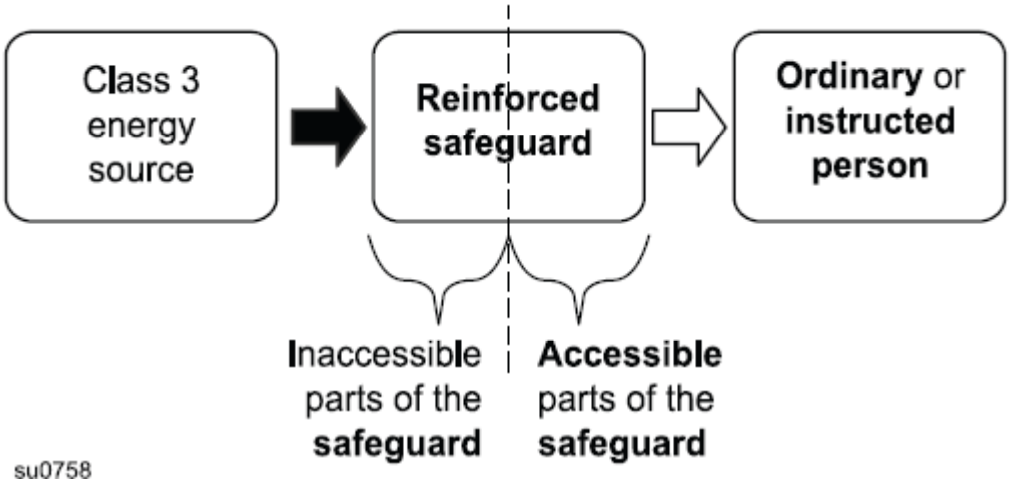
Safety requirements, UL 62368-1

- **4.4 Safeguards**



Safety requirements, UL 62368-1

- **4.4 Safeguards**



Safety requirements, UL 62368-1

- **4.5 Explosion**
  - **Explosion can be caused by**
    - – chemical reaction,
    - – mechanical deformation of a sealed container,
    - – rapid combustion or decomposition, producing a large volume of hot gas,
    - – high pressure,
    - – high temperature.
      - NOTE 1 Depending on the energy rate, **explosion can be categorized as a deflagration, a detonation, or pressure rupture.**
      - NOTE 2 An ultracapacitor (for example, a double layer capacitor) is a high energy source and can explode following overcharging and high temperature.
      - For requirements regarding **explosion of batteries, see Annex M.**

Safety requirements, UL 62368-1

- **4.5 Explosion**
  - During **normal operating conditions and abnormal operating conditions, an explosion shall not** occur.
  - During **single fault conditions, the equipment shall comply with the relevant parts of Clause 6 and** Clause 8.

Safety requirements, UL 62368-1

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