

# E21 Requirements for uninterruptible power system (UPS) units as alternative and/or transitional power

(Sep 2005)  
(Rev.1  
Feb 2021)

## Scope:

These requirements to UPS units, as defined in IEC 62040-3:2011, apply when providing an alternative power supply or transitional power supply to services as defined in SOLAS Chapter II-1, Regulations 42 and 43 of SOLAS Chapter II-1 as amended by IMO resolutions up to MSC.436(99).

A UPS unit complying with these requirements may provide an alternative power supply as an accumulator battery in terms of being an independent power supply for services defined in SOLAS Chapter II-1, Regulation 42, 42.2.3 or 43, 43.2.4 of SOLAS Chapter II-1 as amended by IMO resolutions up to MSC.436(99).

## Definitions:

**Uninterruptible Power System (UPS)** - combination of converters, switches and energy storage means, for example batteries, constituting a power system for maintaining continuity of load power in case of input power failure [IEC 62040-3:1999/2011]

**Off-line UPS unit** - a UPS unit where under normal operation the output load is powered from the bypass line (raw mains) and only transferred to the inverter if the bypass supply fails or goes outside preset limits. This transition will invariably result in a brief (typically 2 to 10 ms) break in the load supply.

**Line interactive UPS unit** - an off-line UPS unit where the bypass line switch to stored energy power when the input power goes outside the preset voltage and frequency limits.

**On-line UPS unit** - a UPS unit where under normal operation the output load is powered from the inverter, and will therefore continue to operate without break in the event of the supply input failing or going outside preset limits.

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## Notes:

1. Rev.1 of this UR is to be uniformly implemented by IACS Societies for cables:
  - i) when an application for certification of UPS is dated on or after 1 July 2022; or
  - ii) which are installed in new ships contracted for construction on or after 1 July 2022.
2. The “contracted for construction” date means the date on which the contract to build the vessel is signed between the prospective owner and shipbuilder. For further details regarding the date of “contract for construction”, refer to IACS Procedural Requirement (PR) No. 29.
3. The “date of application for certification of cables” is the date of whatever document the Classification Society requires/accepts as an application or request for certification of cables.

**E21**  
(cont)**1. Design and construction**

1.1 UPS units are to be constructed in accordance with ~~IEC 62040~~ IEC 62040-1:2017, IEC 62040-2:2016, IEC 62040-3:2011, IEC 62040-4:2013 and/or IEC 62040-5-3:2016, as applicable, or an acceptable and relevant national or international standard.

1.2 The operation of the UPS is not to depend upon external services.

1.3 The type of UPS unit employed, whether off-line, line interactive or on-line, is to be appropriate to the power supply requirements of the connected load equipment.

1.4 An external bypass is to be provided.

1.5 The UPS unit is to be monitored and audible and visual alarm is to be given in a normally attended location for

- power supply failure (voltage and frequency) to the connected load,
- earth fault,
- operation of battery protective device,
- when the battery is being discharged, and
- when the bypass is in operation for on-line UPS units.

**2. Location**

2.1 The UPS unit is to be suitably located for use in an emergency.

2.2 UPS units utilising valve regulated sealed batteries may be located in compartments with normal electrical equipment, provided the ventilation arrangements are in accordance with the requirements of ~~IEC 62040~~ IEC 62040-1:2017, IEC 62040-2:2016, IEC 62040-3:2011, IEC 62040-4:2013 and/or IEC 62040-5-3:2016, as applicable, or an acceptable and relevant national or international standard.

**3. Performance**

3.1 The output power is to be maintained for the duration required for the connected equipment as stated in ~~SOLAS Chapter II-1, Regulation 42 or 43~~ of SOLAS Chapter II-1 as amended by IMO resolutions up to MSC.436(99).

3.2 No additional circuits are to be connected to the UPS unit without verification that the UPS unit has adequate capacity. The UPS battery capacity is, at all times, to be capable of supplying the designated loads for the time specified in the regulations.

3.3 On restoration of the input power, the rating of the charge unit shall be sufficient to recharge the batteries while maintaining the output supply to the load equipment.

**E21**  
(cont)**4. Testing and survey**

4.1 UPS units of 50 kVA and over are to be surveyed by the Society during manufacturing and testing.

4.2 Appropriate testing is to be carried out to demonstrate that the UPS unit is suitable for its intended environment. This is expected to include as a minimum the following tests:

- Functionality, including operation of alarms;
- Temperature rise;
- Ventilation rate;
- Battery capacity.

4.3 Where the supply is to be maintained without a break following a power input failure, this is to be verified after installation by practical test.

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