E5 Voltage and frequency variations

E5 (1979) (Rev.1 Sep 2005) (Rev.2 Sep 2026)

1. All electrical appliances supplied from the main or emergency systems are to be so designed and manufactured that they are capable of operating satisfactorily under the normally occurring variations in voltage and frequency.

2. Unless otherwise stated in the national or international standards, all equipment should operate satisfactorily with the variations from its rated value shown in the Tables 1 to 3 on the following conditions.

(a) For alternating current components, voltage and frequency variations shown in the Table 1 are to be assumed.

(b) For direct current components supplied by DC generators or converted by fixed voltage rectifiers, voltage variations shown in the Table 2 are to be assumed.

(c) For direct current components supplied by electrical batteries, voltage variations shown in the Table 3 are to be assumed.

3. Any special system, e.g. electronic circuits, whose function cannot operate satisfactorily within the limits shown in the Tables should not be supplied directly from the system but by alternative means, e.g. through stabilized supply.

Table 1: Voltage and frequency variations for AC distribution systems

Quantity in Operation	Variations	
	Permanent	Transient
Frequency	±5%	±10% (5 s)
Voltage	+6%, -10%	±20% (1.5 s)

Table 2: Voltage variations for DC distribution systems

Parameters	Variations
Voltage tolerance (continuous)	±10%
Voltage cyclic variation deviation	5%
Voltage ripple (AC RMS over steady DC voltage)	10%

Note:

1. Rev.2 of this Unified Requirement is to be uniformly implemented by IACS Societies on ships contracted for construction on or after 1 January 2028.

2. The “contracted for construction” date means the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. For further details regarding the date of “contract for construction”, refer to IACS Procedural Requirement (PR) No. 29.

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(cont)

Table 3: Voltage variations for battery systems

Systems	Variations
Components connected to the battery during charging (see Note)	+30%, -25%
Components not connected to the battery during charging	+20%, -25%
Note: Different voltage variations as determined by the charging/discharging characteristics, including ripple voltage from the charging device, may be considered.	

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