

# MSC Guidelines for Design Verification of Electrical Systems – Towing Vessels

Procedure Number: E2-31

Revision Date: 07Dec17

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## References:

- a. 46 CFR Subchapter M
  - b. Standards and Recommended Practices for Small Craft, American Boat and Yacht Council, Inc. (ABYC)
    1. E-11 (2003) – AC&DC Electrical Systems
  - c. American Bureau of Shipping (ABS)
    1. Rules for Building and Classing Steel Vessels for Service on Rivers and Intracoastal Waterways
    2. Rules for Building and Classing Steel Vessels Under 90 Meters (295 Feet) in Length, including Supplement Part 1
  - d. National Fire Protection Association (NFPA)
    1. NFPA 302 Fire Protection Standard for Pleasure and Commercial Motor Craft
    2. Sections I through VII of Article 430 of NFPA’s National Electric Code (NEC)
    3. Article 450 of NEC
    4. Article 310.15(B) of NEC
  - e. Marine Safety Center Technical Note (MTN) No. 1-17, “Guidance On Design Verification for Subchapter M Towing Vessels”
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## Contact Information:

If you have any questions or comments concerning this document, please contact the Marine Safety Center by e-mail or phone, referring to Procedure Number: **E2-31**.

E-mail:     [MSC@uscg.mil](mailto:MSC@uscg.mil)

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## Responsibilities

The submitter shall provide sufficient plans, drawings, schematics, calculations, and other documents including a complete bill of materials, component technical data sheets, and arrangement plans, to ensure the vessel complies with the standards used. Guidance on the design verification process can be found in reference (f), which should be reviewed by the submitter prior to beginning the design verification process.

The table in this document contains references to the regulations and standards listed in 46 CFR Subpart C as applicable to each vessel system. The first column of each row identifies the electrical system to which the regulations in subsequent

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columns are applicable. The second column indicates the regulatory cite within Subchapter M that applies to the specific machinery system.. The third column contains the requirements from ABS Rules for Building and Classing Steel Vessels for Service on Rivers and Intracoastal Waterways, Part 4, Chapter 5, as incorporated by 46 CFR 143.580(b). The fourth column contains reference to the requirements from ABS Rules for Building and Classing Steel Vessels Under 90 Meters (295 Feet) in Length, Part 4, Chapter 6, as incorporated by 46 CFR 143.580(a). The final column denotes applicability.

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## **Existing Vessels**

Per 46 CFR 136.110, an *Existing Towing Vessel* means a towing vessel, subject to inspection under *Sub M*, which is not a new towing vessel, as defined in this section.

## **New Vessels**

Per 46 CFR 136.110, a *New Towing Vessel* means a towing vessel, subject to inspection under *Sub M*, that:

- i) Had its keel laid or was at a similar stage of construction on or after July 20, 2017; or
  - ii) Underwent a major conversion that was initiated on or after July 20, 2017.
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## **Exempted Vessels**

Per 46 CFR 136.110, an *Excepted Vessel* means a towing vessel that is subject to *Sub M* but is excepted from certain provisions contained within this subchapter. An excepted vessel is:

- i) Used solely:
    - a) Within a limited geographic area, as defined in 46 CFR 136.110;
    - b) For harbor-assist, as defined in 46 CFR 136.110;
    - c) For response to an emergency or a pollution event; or
  - ii) Excepted by the cognizant OCMI for purposes of some or all of the requirements in 46 CFR 142.315 through 142.330, 143.235, 143.265, and subpart C of part 143 of *Sub M*, based on consideration of those requirements and on reasons submitted by the vessel owner or managing operator as to why the vessel does not need to meet these requirements for the safe operation of the vessel.
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## **Vessels of Novel Design (46 CFR 143.210)**

(a) Machinery or electrical systems of a novel design, unusual form, or special material that cannot be reviewed or approved in accordance with this part, may be approved by the Commanding Officer, Marine Safety Center. It must be shown by systematic analysis, based on engineering principles, that the machinery or electrical equipment or system provides an equivalent level of safety. The owner or managing operator must submit detailed plans, material component specifications, and design criteria, including the expected towing vessel service and operating environment, to the Marine Safety Center. Examples of novel design include use of liquefied natural gas, compressed natural gas, or propane fuel for propulsion, and hybrid, fuel cell, or battery propulsion.

(b) Alternate arrangements or equipment to comply with this part may be approved in accordance with 136.115 of this subchapter.

The following plans may be required to be submitted to the Marine Safety Center for review, depending on the design standard being applied:

- ❑ Steering gear control system
  - ❑ Fire and smoke detection
  - ❑ AC/DC electrical one line and load analysis
  - ❑ Remote shutdowns
  - ❑ Alarms and monitoring
  - ❑ Main switchboard wiring and details
  - ❑ Shipboard lighting and power
  - ❑ Internal communications (including general alarms or public address, pilothouse alerter system, as applicable)
  - ❑ Navigation lighting
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System	46 CFR	ABS Rivers & ICW Rules	ABS > 90 Meters Rules	All Vessels or New Vessels only
<b>Fire-detection equipment</b>	142.215	4-4-1/19	Table 4-1-1 Table 3D 4-5-2/21 (500+ GT) 4-5-2/27 (ABCU) 4-5-2/29.1 (ABCU) 4-7-4/29.5(ABCU or ACCU) 4-7-6/15.1.2 (PUMS)	All Vessels
<b>Fire Detection in Engine Room</b>	142.330(a)	4-5-5/3.9v	Table 4-1-1 Table 3D 4-5-2/21 (500+ GT) 4-7-4/33.5 (ABCU or ACCU) 4-7-6/15.1.2 (PUMS)	All vessels, but some may be excepted
<b>Smoke Detection in Berthing Spaces</b>	142.330(b)	N/A	4-5-2/23 (500+ GT)	All vessels, but some may be excepted
<b>Heat Detection System in Galley</b>	142.330(c)	N/A	N/A	All vessels, but some may be excepted
<b>General Alarms or Public Address</b>	143.235	N/A	4-6-2/17.1.1 4-6-2/15.9 4-7-2/5	All vessels, but some may be excepted
<b>Internal Communications</b>	143.240	4-5-2/13.5	4-6-2/15	All vessels, but some may be excepted
<b>Shipboard Lighting</b>	143.555(b)(8)	4-5-2/5.1 4-5-2/13 4-5-3/3.17	4-6-2/13 4-6-3/3.11.4 4-6-3/3.17 4-6-3/11.1.2 4-6-2/5.19.2(a)(b)(c)(<500GT, 75 kW+)	New Vessels
<b>Generators</b>	143.555(a)(2); 143.555(b)(2), (3), (5), (6) & (7)	4-5-3/3.1 & 3.3; 4-5-3/3.17 4-5-2/9.3; 4-5-4/3	4-6-2/1.1.2 4-6-2/1.7 4-6-2/3 4-6-4/3	New vessels

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			4-6-5/1.7.1 4-6-5/3.5	
<b>Electric Motors</b>	143.555(a)(2); 143.555(b)(2), (4-6),	4-5-3/3.1 & 3.5; 4-5-3/Table 1; 4-5-2/9.13; 4-5-4/3	4-6-2/7.1.4, 7.1.5 4-6-2/9.13 4-6-3/3.13 4-6-4/3.7.2 4-6-4/7.17	New vessels
<b>Emergency power</b>	143.555(a)(3);(b)(8)(9)	4-5-2/5&13	4-6-2/5.3 4-6-2/5.5.2, 5.5.3, 5.5.4 4-6-2/5.16 (500 GT+) 4-6-2/5.19(<500GT, 75 kW+) 4-6-2/11.5	New Vessels
<b>Electrical Overcurrent Protection other than Generators and Motors</b>	143.565	4-5-2/13.1.4; 4-5-2/9; 4-5-4/11	4-6-2/9.15 4-6-2/11.3	New Vessels
<b>Electrical Grounding and Ground Detection</b>	143.570	4-5-2/7.3 & 7.5; 4-5-3/7; 4-5-2/9.1.1; 4-5-4/5.5; 4-5-4/Table 7, Line 4	4-7-2/15.9.5 4-6-1/3.1 4-6-2/7.5 4-6-2/7.7.2 4-6-3/7 4-6-5/1.3.2	New Vessels
<b>General Requirements for Propulsion, Steering, and Related Controls on Vessels that Move Tank Barges Carrying Oil or Hazardous Material in Bulk</b>	143.585	4-2-1; 4-2-2; 4-2-3; 4-5-5/3	4-3-3 4-3-5/7 4-3-5/9	New Vessels

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<b>Alternative Standards for Vessels that Move Tank Barges Carrying Oil or Hazardous Material in Bulk</b>	143.600	See Notes	4-7-5 (ABCU) 4-3-5 (class R2)	New Vessels

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**Disclaimer**      This guidance is not a substitute for applicable legal requirements, nor is it itself a rule. It is not intended to nor does it impose legally-binding requirements on any party. It represents the Coast Guard’s current thinking on this topic and may assist industry, mariners, the general public, and the Coast Guard, as well as other federal and state regulators, in applying statutory and regulatory requirements. You can use an alternative approach for complying with these requirements if the approach satisfies the requirements of the applicable statutes and regulations. If you want to discuss an alternative, you may contact the Marine Safety Center, the unit responsible for implementing this guidance.

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