

MSC Guidelines for Review of Dynamic Positioning Systems

Procedure Number: E2-24

Revision Date: 11/10/2011



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Purpose:

This Plan Review Guideline (PRG) explains the requirements for plan submittal for Dynamic Positioning (DP) systems in accordance with the references below. This PRG should be used as a guide when DP system plans are submitted to the Marine Safety Center for review.

References:

- a. IMO MSC/Circular 645, "Guidelines for Vessels with Dynamic Positioning Systems", dated June 6, 1994.
- b. Title 46 CFR Subchapter F, Marine Engineering
- c. Title 46 CFR Subchapter J, Electrical Engineering
- d. Navigation and Inspection Circular (NVIC) 2-89, "Guide for Electrical Installations on Merchant Vessels and Mobile Offshore Drilling Units," can be found at: <http://www.uscg.mil/hq/cg5/nvic/pdf/1989/n2-89.pdf>
- e. MTN 02-11, "Marine Safety Center Guidance for Vital System Automation and Dynamic Positioning System Plans".

Contact Information:

If you have any questions or comments concerning this document, please contact the Marine Safety Center (MSC) by email or phone. Please refer to the Procedure Number E2-24.

Email: MSC@uscg.mil

Phone: 202-475-3402

Website: <http://homeport.uscg.mil/msc>

Responsibilities:

Using applicable portions of references (a) through (e), the submitter shall provide sufficient documentation and plans to indicate compliance with the applicable requirements. To facilitate plan review and project management, all plans and information specified in these guidelines should be submitted as one complete package through a single point of contact for the project. The submission should be made in triplicate if a stamped copy is desired.

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General Guidance:

- ❑ When DP systems are used to control vessel propulsion systems during any high risk operations (e.g., in lieu of mooring lines for oil, hazardous material, and/or personnel transfers), DP systems are considered vital equipment. Please see Reference (a) (Section 1.3.2) and 46 CFR 62.10-1(a).
- ❑ Automated systems, including DP systems, include a wide array of individual components which are in many cases independently designed. Integration and testing of these components as a system remains a significant challenge. A single point of contact should be provided for vessel automation systems to avoid significant gaps in integration that may be left unaddressed until onboard testing is conducted. It is also recommended that the DP system installation be discussed with the Marine Safety Center early in the project design phase.
- ❑ The following DP system plans should be submitted as a minimum:
 - a) DP system block diagram showing all components necessary to demonstrate compliance with DP system equipment class requirements. For equipment Class 3 (as defined in reference (a)), the necessary segregation of redundant components by fire and flooding boundaries should be indicated on the block diagram.
 - b) A general arrangement plan showing the location of thrusters and control system components. For equipment Class 3, this plan should show the necessary segregation of redundant components by fire and flooding boundaries.
 - c) Thruster design data and thruster remote control systems, including thruster manual joystick controls and thruster emergency stops.
 - d) Thruster force calculations and DP capability plots. These should include calculations and DP capability plots for the worst case failure.
 - e) Environmental force calculations and design safe operating envelope.
 - f) DP system interconnections with the electrical power generation and distribution and power management systems. Please see requirements in reference (c).
 - g) DP control power system(s), including backup UPS system(s), provided.
 - h) Details of the dynamic positioning alarm system and any interconnections to other vessel vital automations systems (e.g., centralized machinery monitoring and control system). Please see requirements in reference (b).
 - i) Details of the position reference systems provided.
 - j) Details of the environmental monitoring systems provided.
 - k) Interior and exterior communication systems provided.

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General Guidance (continued):

- l) A detailed description of the consequence analyzer software including all parameters monitored, environmental data input, and all alarms provided.
- m) DP Operations Manual.
- n) Failure Mode and Effects Analysis (FMEA). The FMEA should be similar in content and detail to the Qualitative Failure Analysis (QFA) delineated in Reference (b). Please see 46 CFR 50.20-5.
- o) Design Verification Test Procedure (DVTP) or DP FMEA Proving Trial Test Document. The Marine Safety Center will make a recommendation to the cognizant OCMI with regards to approval. Final approval from the Marine Safety Center or the OCMI should not be issued until after the completion of satisfactory testing. Any changes to the test procedures should be resubmitted to MSC for review.
- p) Periodic Safety Test Procedure (PSTP) or DP Annual Proving Trial Test Document. The Marine Safety Center will make a recommendation to the cognizant OCMI with regards to approval. Final approval from the Marine Safety Center or the OCMI should not be issued until after the completion of satisfactory testing. Any changes to the test procedures should be resubmitted to MSC for review.
- For equipment Classes 2 and 3, sufficient detail should be provided to evaluate the following systems for redundancy:
 - a) Fuel supply, including remote and automatic valve closures.
 - b) Lubricating oil.
 - c) Seawater cooling, including sea chests.
 - d) Fresh water cooling.
 - e) Control air.
 - f) Engine air supply.
 - g) Engine starting systems, such as starting air and batteries.
- For equipment Classes 2 and 3, sufficient detail should be provided to evaluate the following systems for potential impact on system redundancy:
 - a) Fire and Gas detection and alarm and associated automatic shutdowns.
 - b) Fixed fire extinguishing systems and agent release-activated shutdowns.
 - c) Machinery, electrical and electronics space ventilation and related ducting, dampers, closures and remote and automatic shutdowns.

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General Guidance (continued):

- For equipment Class 3, sufficient detail should be provided to evaluate fire and flooding segregation. Evaluation should include:
 - a) Failure of all components in any one watertight compartment (from fire or flooding)
 - b) Failure of all components in any one fire subdivision (from fire or flooding).
 - c) Fire or flooding in a switchboard or transformer room.
 - d) Fire or flooding along a common cable route.
 - e) Fire or flooding in the emergency switchboard room.
 - f) Fire or flooding in a main or auxiliary machinery space.
 - g) Fire or flooding in the engine control room.
 - h) Fire boundaries provided (e.g., A.60 class division).
- The following Marine Safety Center guidelines for plan review may be useful in developing the FMEA and the various test documents noted above:
 - a) E2-18, Qualitative Failure Analysis.
 - b) E2-05, Design Verification Test Procedures.
 - c) E2-17, Periodic Safety Test Procedures.

Attachments:

None

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 (MSC), the unit responsible for implementing this guidance.