

(d) *Alarms.* (1) All alarms must clearly distinguish among—

(i) Normal, alarm, and acknowledged alarm conditions; and

(ii) Fire, general alarm, CO₂/halon, vital machinery, flooding, engineers' assistance-needed, and non-vital alarms.

(2) Required alarms in high ambient noise areas must be supplemented by visual means, such as rotating beacons, that are visible throughout these areas. Red beacons must only be used for general or fire alarm purposes.

(3) Automatic transfer to required backup or redundant systems or power sources must be alarmed in the machinery spaces.

(4) Flooding safety, fire, loss of power, and engineers' assistance-needed alarms extended from the machinery spaces to a remote location must not have a duty crewmember selector.

NOTE: Other alarms may be provided with such a selector, provided there is no off position.

(5) Automation alarms must be separate and independent of the following:

(i) The fire detection and alarm systems.

(ii) The general alarm.

(iii) CO₂/halon release alarms.

(6) Failure of an automatic control, remote control, or alarm system must be immediately alarmed in the machinery spaces and at the ECC, if provided.

(e) *Alarm details.* (1) All alarms must—

(i) Have a manual acknowledgement device (No other means to reduce or eliminate the annunciated signal may be provided except dimmers described in paragraph (g)(2) of this section);

(ii) Be continuously powered;

(iii) Be provided with a means to test audible and visual annunciators;

(iv) Provide for normal equipment starting and operating transients and vessel motions, as applicable, without actuating the alarm;

(v) Be able to simultaneously indicate more than one alarm condition, as applicable;

(vi) Visually annunciate until the alarm is manually acknowledged and the alarm condition is cleared;

(vii) Audibly annunciate until manually acknowledged;

(viii) Not prevent annunciation of subsequent alarms because of previous alarm acknowledgement; and

(ix) Automatically reset to the normal operating condition only after the alarm has been manually acknowledged and the alarm condition is cleared.

(2) Visual alarms must initially indicate the equipment or system malfunction without operator intervention.

(3) Power failure alarms must monitor on the load side of the last supply protective device.

(f) *Summarized and grouped alarms.* Visual alarms at a control location that are summarized or grouped by function, system, or item of equipment must—

(1) Be sufficiently specific to allow any necessary action to be taken; and

(2) Have a display at the equipment or an appropriate control location to identify the specific alarm condition or location.

(g) *Central control locations.* (1) Central control locations must—

(i) Be arranged to allow the operator to safely and efficiently communicate, control, and monitor the vital systems under normal and emergency conditions, with a minimum of operator confusion and distraction;

(ii) Be on a single deck level; and

(iii) Co-locate control devices and instrumentation to allow visual assessment of system response to control input.

(2) Visual alarms and instruments on the navigating bridge must not interfere with the crew's vision. Dimmers must not eliminate visual indications.

(3) Alarms and instrumentation at the main navigating bridge control location must be limited to those that require the attention or action of the officer on watch, are required by this chapter, or that would result in increased safety.

§ 62.25–25 Programable systems and devices.

(a) Programable control or alarm system logic must not be altered after Design Verification testing without the approval of the cognizant Officer in Charge, Marine Inspection (OCMI). (See subpart 61.40 of this subchapter, Design Verification Tests). Safety control or

automatic alarm systems must be provided with means, acceptable to the cognizant OCMI, to make sure set-points remain within the safe operating range of the equipment.

(b) Operating programs for microprocessor-based or computer-based vital control, alarm, and monitoring systems must be stored in non-volatile memory and automatically operate on supply power resumption.

(c) If a microprocessor-based or computer-based system serves both vital and non-vital systems, hardware and software priorities must favor the vital systems.

(d) At least one copy of all required manuals, records, and instructions for automatic or remote control or monitoring systems required to be aboard the vessel must not be stored in electronic or magnetic memory.

[CGD 81-030, 53 FR 17838, May 18, 1988; 53 FR 19090, May 26, 1988]

§ 62.25-30 Environmental design standards.

(a) All automation must be suitable for the marine environment and must be designed and constructed to operate indefinitely under the following conditions:

(1) Ship motion and vibration described in section 41.37 of the American Bureau of Shipping's "Rules for Building and Classing Steel Vessels."

NOTE: Inclination requirements for fire and flooding safety systems are described in § 112.05-5(c) of this chapter.

(2) Ambient air temperatures described in section 41.29.1 and 41.29.2 of the American Bureau of Shipping's "Rules for Building and Classing Steel Vessels."

(3) Electrical voltage and frequency tolerances described in section 41.29.3 of the American Bureau of Shipping's "Rules for Building and Classing Steel Vessels."

(4) Relative humidity of 0 to 95% at 45 °C.

(5) Hydraulic and pneumatic pressure variations described in section 41.39.3e of the American Bureau of Shipping's "Rules for Building and Classing Steel Vessels."

NOTE: Considerations should include normal dynamic conditions that might exceed

these values, such as switching, valve closure, power supply transfer, starting, and shutdown.

(b) Low voltage electronics must be designed with due consideration for static discharge, electromagnetic interference, voltage transients, fungal growth, and contact corrosion.

Subpart 62.30—Reliability and Safety Criteria, All Automated Vital Systems

§ 62.30-1 Failsafe.

(a) The failsafe state must be evaluated for each subsystem, system, or vessel to determine the least critical consequence.

(b) All automatic control, remote control, safety control, and alarm systems must be failsafe.

§ 62.30-5 Independence.

(a) Single non-concurrent failures in control, alarm, or instrumentation systems, and their logical consequences, must not prevent sustained or restored operation of any vital system or systems.

(b)(1) Except as provided in paragraphs (b)(2) and (b)(3) of this section, primary control, alternate control, safety control, and alarm and instrumentation systems for any vital system must be independent of each other.

(2) Independent sensors are not required except that sensors for primary speed, pitch, or direction of rotation control in closed loop propulsion control systems must be independent and physically separate from required safety control, alarm, or instrumentation sensors.

(3) The safety trip control of § 62.35-5(b)(2) must be independent and physically separate from all other systems.

(c) Two independent sources of power must be provided for all primary control, safety control, instrumentation and alarm systems. Failure of the normal source of power must actuate an alarm in the machinery spaces. One source must be from the emergency power source (see part 112 of this chapter, Emergency Lighting and Power Systems) unless one of the sources is—