



Marine Safety Center Technical Note

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Subj: GENERAL ALARM SYSTEM EQUIVALENCIES

Ref: (a) Navigation and Vessel Inspection Circular 2-89, "Guide to Electrical Installations on Merchant Vessels and Mobile Offshore Drilling Units"

1. **PURPOSE:** To outline design elements that must be addressed in order for a combined public address/general alarm system to be evaluated for equivalency to a conventional general alarm system using general alarm bells.

2. **DESCRIPTION:** The Marine Safety Center has recently received several submittals proposing the use of a public address system to sound the requisite emergency distress signals normally sounded with a conventional general alarm system incorporating the use of general alarm bells. Reference (a) points out that such a system may be considered for equivalency to the general alarm system. A similar arrangement is used to sound emergency distress signals on military vessels.

3. **DISCUSSION:** Requirements for general alarm systems are in Title 46 Code of Federal Regulations (CFR) Subpart 113.25. Careful attention must be paid to the powering requirements, distribution and protection of feeder and branch circuits, and the effectiveness of the signaling devices (loudspeakers). Preserving system integrity is of utmost importance. In a conventional system, each feeder circuit and each branch circuit is individually protected to limit the effect of a short-circuit on the entire general alarm system. In addition to the circuit protection and distribution requirements, the location of distribution panels also contributes to preserving system integrity.

To establish the equivalency of a public address or emergency announcing system to the requirements in 46 CFR Subpart 113.25, the following must be addressed:

a. **Powering of the system.** The power supply requirements in 46 CFR 113.25-6 dictate the use of storage batteries. Power available from the emergency generator is not given credit under these requirements. Audio amplifiers, for public address or general announcing, require an AC supply. This requires the use of an uninterruptible power supply (UPS) sized to meet the demand load requirements in 46 CFR 113.25-6. Depending on how the UPS is employed in the system, a UPS bypass switch may be required since the "INVERTER section (the component that converts the DC battery voltage to AC)" can fail. A conventional general alarm system is powered directly from the batteries, i.e., an inverter is not used, resulting in a more reliable power source.

b. Speaker group distribution. Zoning of speaker groups must follow the zoning requirements in 46 CFR 113.25-8. Speaker amplifiers may be installed within the zone served or at a central location. The central location should be adjacent to the system's battery power supply. Each speaker amplifier must be fused. Feeder supply to a group of speaker amplifiers serving a zone must be protected in a manner similar to 46 CFR 113.25-16(a)(2) and (a)(3). A feeder distribution panel, needed to supply power to zone speaker groups, must be located above the uppermost continuous deck, outside the machinery casing, in a protected space, and adjacent to or near the UPS and batteries. Branch distribution panels used to power an individual or a group of speaker amplifiers in a zone, must be located above the uppermost continuous deck of the zone served. Each feeder circuit and each branch circuit must have individual circuit protection.

c. A system using control logic to select and direct tones/signals and announcements to all or selected speaker groups, must be equivalent to a system using simple, reliable, and strategically located general alarm contact makers. Hardwired control systems are preferable.

d. A software-driven system must employ non-volatile memory device(s) for storage of control and/or tone programs. A qualitative failure analysis (QFA) may be used for this evaluation. Single non-concurrent failures of easily replaceable components or circuit cards/modules must not render the entire system inoperable.

e. Tone generator hardware must be provided in duplicate. This is consistent with both the design used on military vessels and with maintaining system integrity. A readily accessible manual switch for quick shiftover must be provided. With a conventional general alarm system, every bell is a tone generator and the loss of any one of these tone generators does not jeopardize the sounding of the remaining bells. A loss of a general alarm branch circuit, at most, affects only 5 bells. A loss of a tone generator, if not duplicated, results in a total system failure.

f. General alarm tone (vibrating bell) signals must meet the sound level requirements in 46 CFR Table 113.50-15. Speaker volume controls must not jeopardize compliance with the required sound level.

4. ACTION: The designer of such a system must be thoroughly familiar with the requirements in 46 CFR 113.25 for general alarm systems and ensure all of these requirements, and the items mentioned in this Technical Note, are specifically addressed in their submittal. Providing this information is imperative for the MSC to be able to evaluate a proposed design for equivalency.



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