

MSC Guidelines for Review of Emergency Evacuation Plans (NVIC 8-93)

Procedure Number: H2-11

Revision Date: 1/24/2018

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Purpose

The purpose of this Plan Review Guideline is to provide the submitter with general guidance and information for application of Navigation and Vessel Inspection Circular (NVIC) 8-93, with Change 1. This NVIC addresses application of equivalent alternatives to existing 46 CFR Subchapter H requirements for Means of Escape, Safe Refuge Areas, and Main Vertical Zone length and width. Additionally, certain vessels certificated as Subchapter T (T-L) may also be designed in accordance with these alternatives.

References

- a. NVIC 8-93, "Equivalent Alternatives to 46 CFR Subchapter H Requirements Related To Means of Escape, Safe Refuge Areas, Main Vertical Zone Length."
- b. NVIC 8-93, Change 1, "Equivalent Alternatives to 46 CFR Subchapter H Requirements Related To Means of Escape, Safe Refuge Areas, Main Vertical Zone Length."
- c. NVIC 9-97, Change 1, "Guide to Structural Fire Protection."

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 **H2-11**.

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General

- ❑ Check NVIC applicability (Ref (a)/para. 1). The guidance of this NVIC may not be applied to vehicle ferries; however, it may be applied to non-vehicle ferries which meet all other applicability criteria.
- ❑ It is recommended that the structural fire protection plan and the emergency evacuation plan be concurrently designed and reviewed on initial construction and at any time the escape arrangements or structural fire protection are altered. A number of issues are intertwined and must be reviewed together.

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- Verify NVIC Enclosure applicability [Ref (a)/encl. 2/para. 1-3) and Ref (b)/encl. 4/para. 2]:
 - If Main Vertical Zone (MVZ) length is less than or equal to 131 ft, then only enclosure 1 applies.
 - If MVZ length is greater than 131 ft (Long Main Vertical Zone – LMVZ), then both enclosure 1 and enclosure 2 apply.
 - If MVZ or LMVZ width is greater than 131 ft (Wide Main Vertical Zone – WMVZ), then enclosure 4 applies in addition to enclosures (1) and (2) as applicable.
- Ensure the Emergency Evacuation Plan (EEP) indicates the maximum number of persons permitted to occupy the various spaces [Ref. (a)/encl. 1/para. 6-9]. Maximum number determined by:
 - Gross Deck Area Criterion: 1 person/10 ft²
 - Fixed Seating Criterion: 1 person/fixed chair or 18 in. of fixed bench seating.
 - Where appropriate, the criterion may be combined.
- Ensure the effect of inclement weather is addressed when determining the maximum number of persons permitted. [Ref. (a)/encl. 1/para. 7]
- Note: The Net Deck Area must be greater than 7 ft²/person. The cognizant Officer in Charge, Marine Inspection (OCMI) may further limit the number of persons permitted.
- Ensure the EEP contains simple, sensible and correct instructions for evacuation. [Ref. (a)/encl. 1/para 35, 36 & encl. 2/para 23]
- Ensure the cumulative width of all doors in an MVZ bulkhead on any deck is limited to 25% of the MVZ bulkhead breadth. [Ref. (a)/encl. 1/para 14]
- For multiple deck spaces, if the deck opening is not less than 20% of the full deck area without the opening, ensure the opening is protected in accordance with Ref. (a)/encl. 1/para. 17b.

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- Ensure compliance with atrium protection requirements of NVIC 16-91, “Special Fire Protection Systems for Atriums,” if applicable. [Ref. (a)/encl. 1/para. 27-29]
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Stage I Egress

- Ensure each space complies with the requirements for two means of egress for evacuation of the space of fire origin to Qualified Refuge Areas (QRA’s) (Stage I egress). [46 CFR 72.10-5(a) & Ref (a)/encl. 1/para. 13]
 - At least two means of escape shall be provided from all areas accessible to passengers or where the crew may be quartered or normally employed.
 - At least one of the means from each space must not be a watertight door.
 - The two required means for each space must be widely separated and if possible at opposite ends or sides [46 CFR 72.10-10]
 - On vessels having two or more decks, at least one of the required means of egress from each main vertical zone must be a stairtower. [Ref. (a)/encl. 1/para. 15]
 - Ladders leading to deck scuttles may not be included as a means of escape except as permitted by 46 CFR 72.10-15.
 - For LMVZ vessels, the maximum horizontal distance between any exit door forming part of a Stage 1 Egress route and any point within the LMVZ must be less than 72 ft [Ref. (a)/encl. 2/para. 7].
- Ensure all required Stage I Egress routes are directly accessed from public spaces by “simple modes” [Ref. (a)/encl. 1/para 14].
 - “Simple modes” include:
 - Exits to stairs which lead directly to adequately sized QRA’s, or
 - Exits opening directly to weather decks where a continuous egress path to QRA’s is provided, or

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- Exits through MVZ bulkheads directly accessing an adequately sized QRA only receive credit as Stage 1 Egress components for persons distributed within 72 ft of the doors.
- For LMVZ's, "simple modes" must open directly to QRA's and/or Exit Discharge Areas (EDA's) [Ref. (a)/encl. 2/para. 9]. These include:
 - Exits to stairs which lead directly to adequately sized QRA's, or
 - Exits opening directly to EDA's, or
 - Exits opening directly to weather decks where a continuous egress path to QRA's is provided, or
 - Exits through MVZ bulkheads directly accessing an adequately sized QRA only receive credit as Stage 1 Egress components for persons distributed within 72 ft of the doors.
- Ensure all EDA's meet the following requirements [Ref. (a)/encl. 2/para. 9]:
 - EDA's may be weather deck areas located immediately outside of and adjacent to exit doors from large public spaces.
 - EDA's must lead in the direction of Stage I Egress to the QRA.
 - EDA's must provide area of not less than 3.5 ft²/person for people using the corresponding exit door.
 - Ensure the width of the EDA is greater than or equal to the exit door width (Minimum width is 39 in.) [Ref. (a)/encl. 2/para. 9.d].
 - Doors leading to EDA are limited to the lesser of either the occupancy of the EDA or the limit of the door width [Ref. (a)/encl. 2/para. 10].
- Ensure doors and passageways used in Stage I egress are arranged and sized appropriately. [Ref. (a)/encl. 1/para 15, 17, 25]
 - The minimum clear opening of a door or passageway must not be less than 32 inches.

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- The minimum clear opening of a door or passageway is determined by multiplying the number of persons served by 0.333 in/person.
 - The number and dimensions of the means of egress components for each space must be sufficient for the maximum number of persons permitted to occupy that space.
 - Ensure that (with the exception of staterooms) each door, hatch or scuttle opens toward the expected direction of Stage I egress from the space served [Ref. (a) /encl. 1/ para 25].
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Stairtowers

Examine the required stairtowers [Ref. (a)/encl. 1/para 3, 15-16].

- Each MVZ shall be served by at least one Type 1 stairtower so escape may be effected from any accommodation space, or any other space where persons may be normally quartered or normally employed, to all other decks having any such spaces within the same MVZ without coming out of the stairtower enclosure. [46 CFR 72.05-20(e)]
- A single stairtower may serve two adjacent MVZ's.
- Stairtowers should not give direct access to accommodations or other enclosed spaces in which a fire may originate with the exception of large public spaces. [46 CFR 72.05-20(f)]
- Stairtowers need not extend to below deck spaces if [Ref. (a)/encl.1/para. 22]:
 - These spaces are provided with adequate means of egress directly to weather, or
 - A stairway extends from the below deck space to the stairtower with self-closing fire doors at both the top and bottom.
- Stairtowers must extend to all decks where QRA's are located.
- Uppermost decks accessible to passengers must have direct access to a stairtower.

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- Each Type 1 Stairtower must provide at least 44 in. of exit door width to each side of the vessel on the embarkation deck, either directly to weather or indirectly by passageways and/or corridors which lead to weather. [46 CFR 72.05-20(s)(3)]
 - Stairtower arrangements may be accepted which provide access to only one side of the vessel on the embarkation deck, provided the design includes adequate and redundant means of egress for persons in QRA's to gain access to embarkation areas on the opposite side of the vessel [Ref. (a)/encl. 1/para. 20].
 - For LMVZ's which use the above exemption, at least one other stairtower in that LMVZ must provide access to the embarkation deck on the opposite side of the vessel. [Ref. (a)/encl. 2/para. 13]
- Check stairtower sizing requirements. [Ref. (a)/encl. 1/para. 23-24]
 - Landings for stairways shall be provided as follows: [46 CFR 72.05-20(r)]
 - For all types of stairways, at the top and bottom of each flight of stairs, there shall be a clear landing having an area at least equal to the square of the actual tread width.
 - Where an aisle around a stairway is required due to the relationship of the flights, such aisle shall have a clear width at all points at least equal to the actual stair width.
 - Tread width for interior and exterior stairs shall be as follows:
 - The minimum tread width is determined by multiplying the number of persons served by 0.333 inches/person.
 - The tread width of required stairtowers shall not be less than 44 in.
 - The tread width of other stairs shall not be less than 36 in, unless the stairway is for crew only in which case the width shall not be less than 28 in.
 - Once a minimum required width has been established at any one level, that width may not be reduced at any subsequent deck level in the direction of Stage 1 egress.

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- For LMVZ vessels the maximum longitudinal distance between Type 1 stairtowers and any point within the LMVZ must be less than 131 ft [Ref. (a)/encl. 2/para. 7]. As a result, some LMVZ vessels may require more than one stairtower per LMVZ.
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Stage II Egress

- Ensure that means of egress, protected from potential fire impacted areas, are provided from QRA's to the embarkation area (Stage II Egress). [Ref. (a)/encl. 1/para 18-21]
 - No special Stage II egress protection is required on a vessel which has:
 - Multiple MVZ's, and
 - Provides out-of-zone QRA for all persons on board after evacuation of the fire affected MVZ, and
 - Provides access to the embarkation area from within each MVZ.
 - The following arrangements are also acceptable:
 - Type 1 stairtowers which can be accessed directly from QRA's, or
 - Routes via non-affected QRA's leading to port and starboard embarkation areas which can be directly accessed from the QRA's being considered.
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Qualified Refuge Areas

The definition of "area of refuge" in 114.400 states that the area of refuge must provide separation from the "effects" of fire. In the absence of a systematic approach which considers plausible fire scenarios and methods used to protect passengers while the crew attempts fire suppression or passengers await embarkation of lifesaving appliances, the Coast Guard considers the following minimum provisions acceptable:

- (1) minimum separation of A-60 integrity from spaces other than voids, cofferdams, and tanks;

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(2) ventilation systems shall only service a single area of refuge, unless separated from other spaces by smoke and fire dampers; and

(3) the refuge area shall be located in a public space above the bulkhead deck.

- Ensure there are adequate QRA's identified on the EEP for the maximum number of persons on board. [Ref. (a)/encl. 1/para. 4,10]
 - Note: this should be evaluated with a fire in the largest space to ensure refuge for all persons is still available.
 - QRA sizing criterion:
 - Deck Area Criterion: 1 person/5 ft² [Ref. (a)/encl. 1/para. 11]
 - Fixed Seating Criterion: 1 person for each fixed chair or 18 in. of fixed bench seating.
 - Where appropriate, the criterion may be combined.
 - Ensure the effect of inclement weather has been addressed when determining the maximum number of persons permitted. [Ref. (a)/encl. 1/para. 7]
 - Determine if the QRA's are in permissible locations. [Ref. (a)/encl. 1/Tables 1 & 2]
 - Ensure the QRA's are properly protected. [Ref. (a)/encl. 1/Tables 1 & 2]
 - Ensure windows in boundaries adjacent to QRA's or Stage II Egress Routes are properly protected [Ref. (a)/encl. 1/para. 30]
 - For LMVZ's, windows installed in exterior bulkheads that face out of zone QRA's are to be protected with sprinklers. [Ref. (a)/encl. 2/para. 12]

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Special consideration should be given to windows/openings located in the ship side below lifeboat/liferaft embarkation areas, refuge/safety areas, or lifeboats/liferafts based on the potential for fire and smoke to affect the embarkation area or the actual lowering of the lifesaving appliances. Windows or openings in the ship side of the vessel shall not degrade the integrity of the decks by permitting fire spread to compartments above through other windows or openings. Consideration shall be given in the design of the vessel exterior boundaries and ship side to prevent this mechanism of fire spread.

Similarly, NVIC 8-93, Enclosure (1) Paragraph 30 states “Window or glazing assemblies adjacent to or below "Qualified Weather Deck Refuge Areas" or "Stage II Egress Routes" need to be rated as fire resistant or otherwise protected to maintain the intended fire resistance of the boundaries.” Since the affected deck is not protected by sprinklers, the external glass located immediately below the external refuge area must be fire resistant to prevent smoke and flame from impacting the safe refuge of passengers in the external refuge area directly above. Fire resistant glass is generally considered to be laminated glass, wire-inserted glass, or some other fire resistant material. Tempered or annealed glass does not meet this requirement, however it may be utilized below an external refuge area in multi-MVZ vessels if all passengers can be safely refuted in either an out-of-zone refuge area or a refuge area located below the affected deck.

Additional LMVZ Requirements

- ❑ For LMVZ’s, ensure sufficient “out-of-zone refuge” is provided iaw Ref. (a)/encl.2/fig. 3 [Ref (a)/encl. 2/para. 11].
- ❑ For LMVZ vessels, examine the combustible fire load calculations for public spaces. [Ref. (a)/encl. 2/para 15]. For guidance, see Procedure Number H2-23, MSC Guidelines for Review of Fire Load Calculations.
- ❑ For LMVZ vessels, ensure smoke detection & alarms are present & properly indicated iaw Ref. (a)/encl. 2/para 16.
 - Public spaces > 5000 ft² in the LMVZ and not served by smoke detection must be served by a manual fire alarm system complying with 46 CFR 76.35.
 - Spaces other than public spaces > 5000 ft² in the LMVZ posing a fire risk must be served by an approved smoke detection system.

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- ❑ For LMVZ vessels, ensure each accommodation & service space throughout the vessel is protected by an automatic sprinkler system with quick response heads iaw Ref. (a)/encl. 2/para 19.
 - ❑ For LMVZ vessels, ensure two sprinkler pumps have been provided, each capable of providing the required pressure. [Ref. (a)/encl. 2/para 19]
 - ❑ For LMVZ vessels, ensure adequate Out Of Zone (OOZ) refuge has been provided iaw Ref. (a)/encl. 2/para 20.
 - Determine if offered Ooz refuge is acceptable. Ensure vertical extension of LMVZ bulkheads for weather decks. In other words, Ooz may not be above an LMVZ. [Ref. (a)/encl. 3/Defn 27].
 - ❑ For LMVZ vessels, MVZ's below the bulkhead deck cannot be LMVZ's [Ref. (a)/encl. 2/para 21].
 - ❑ For LMVZ vessels, ensure an Automatic Emergency Voice Alarm & Directions System (AEVADS) is indicated [Ref. (a)/encl. 2/para 22].
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Additional WMVZ Requirements

- ❑ For WMVZ vessels, ensure an acceptable performance based tenability analysis has been performed.
 - ❑ For WMVZ vessels, verify dedicated onboard refuge for 100% of the occupants **and**, if applicable, verify the exit system to dockside is sized for 100% of the occupants.
 - ❑ For WMVZ vessels, verify adequate, permanently marked exit access aisles, adequate exit signage, and illuminated exit pathways are provided in all public spaces.
 - ❑ For WMVZ vessels, verify only materials with restricted surface flammability are used on exposed surfaces within the WMVZ
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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

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regulations. If you want to discuss an alternative, you may contact the Marine Safety Center (MSC), the unit responsible for implementing this guidance.