

DISCUSSION
Coast Guard Approval Letter
UNOLS Van Design
March 2002
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Opening Remarks: The subject states that the approval letter applies to vessels “regulated under Subchapter U”. This implies that vans on vessels under 300 gross tons (domestic) do not need to follow these requirements since they are uninspected. Technically this is correct. However, the intent of this undertaking was to develop a standard van design that could legitimately go on ANY vessel in the UNOLS fleet regardless of its inspection status. Fortunately, the requirements spelled out by the Coast Guard are not that onerous, and can easily and economically be implemented on vans carried by smaller vessels. It is highly recommended that all future vans be built to these requirements to ensure interchangeability in the fleet.

This letter applies only to Oceanographic Research Vessels. The vans built under the guidance of this letter could not necessarily be used on mobile drilling rigs or offshore supply vessels. This is the reason for the specific labeling in the specifications.

Though not referred to in the Coast Guard letter, TABLE 1 follows the requirements listed therein and provides a more comprehensive summary of most van types.

Item 1: This item refers to structural adequacy of the side panels. Technically, it applies only to “accommodation” vans (i.e. berthing). As explained in Item 2 below, laboratory vans are not considered accommodations, and thus are not expressly required to meet this requirement. However, they are routinely occupied by personnel while the ship is underway (See **Item 2** below).

The original construction specification used the bulkhead pressures given in NVIC 11-80 or 1.0 psi. This was the lowest, written standard for superstructure bulkheads that could be found, and applies to aluminum passenger vessels (crew boats) in the Gulf of Mexico (8th CG District). A standard ISO container panel with no additional stiffening met this criteria, and it was originally felt that this was an adequate, minimum standard for portable vans. It was found that Coast Guard is apparently relying more on classification society guidelines and standards such as ABS and DNV for these types of issues.

For the vans to go anywhere on the ship, in any ocean region, the Coast Guard suggested they be able to meet ABS rules for steel vessels under 295 feet. For deck houses, this ranges from 4.8 to 14.4 psi. which is essentially full ship’s structure. It was felt that this was completely inappropriate to apply to portable vans given how they are normally used. The end design would be extremely heavy and costly.

A compromise was reached by going up one level from NVIC 11-80 and putting some constraints on van location. It was decided that ABS “High Speed Vessel” rules (for aft

end and side house plating on vessels over 100 feet) would be acceptable as long as the vans were placed in a “sheltered location”. In other words, the van would be placed in an area similar to the side or back end of a deck house. The pressures in this standard are 2.0 psi. for the plate and 1.5 psi. for the stiffeners. Verbiage for “sheltered locations” was developed based on previous Coast Guard language and circumstances particular to the research vessel industry. The Coast Guard was reasonable in giving the Master primary responsibility in determining proper location depending on the particular characteristics of the vessel. (See definition of “Sheltered Location”).

The original design had envisioned adding angle stiffeners to an ISO container so that thermal insulation and interior sheathing could be installed. Structural calculations were conducted on several side panel designs to determine plate thickness and stiffeners (size and spacing) for both aluminum and an ISO container. For an ISO container to meet the proposed pressures, 1.75” x 1.0” x 0.125” angle stiffeners had to be added 11” O/C, or at every inward corrugation. For aluminum, similar angles on 3/16” plate were required. Angles with an equivalent (or greater) section modulus can also be used. For example, 1.5” x 1.5” x 0.125” is a readily available, standard section that will also meet the requirement.

The added weight from this modification seemed acceptable. A standard section, such as 2” x 2” x 0.125” angle, weighs 1.7 lbs. per foot. Adding these all around the perimeter increased the weight of the van by 800 pounds. Given the fact that half of these were originally envisioned, the incremental weight added to meet this bulkhead standard is only 400 pounds. There would also be increased labor and material costs, but this too was deemed acceptable.

The operational impact of carrying vans only in “sheltered locations” needed to be determined. Photographs and plans were reviewed for as many UNOLS vessels as possible to determine where vans were typically carried. It appeared that ship designers and Masters were already positioning vans so that they did not experience the full brunt of the sea, either on the aft deck, behind superstructure, or several decks above the water line forward (such as on the AGOR class vessels).

“Sheltered Location” also addresses when the van should be evacuated. One notable weak link in all portable structures is how they are secured to the deck. It would seem prudent for the Master of any vessel to evacuate portable vans in heavy seas for this reason alone, regardless of side panel strength. As a result, it was felt that specifying “Sheltered Location” would not have a significant impact on operations. In fact, the Coast Guard letter gives even greater guidance for the Master in determining appropriate van location and when to evacuate the van than is now given in 46 CFR 195.11-25.

“Significant wave action” is somewhat open to interpretation by the Master. It is believed that the Coast Guard is concerned only with seas that could cause damage or injury to personnel – i.e. “green water”. “Spray” and “wash” would not be considered in this category.

Item 2: 46 CFR 195.11-15(a) states that “...accommodation, power, and chemical storage vans are subject to the normal plan submission procedures of 189.55”, and are required to be inspected when constructed, and again on two-year intervals. By their exclusion, our community has long held that laboratory vans were not required to be inspected. At the Coast Guard level, however, this was still open to interpretation, and the potential existed that laboratory vans, as “service areas”, COULD be considered accommodations. It was vigorously argued that 40 years of history had established a de facto standard, and that many “prestigious oceanographic institutions” had long been building uninspected laboratory vans. The Coast Guard 8th District “Interim Recommended Practice for Accommodation Modules on Inspected Vessels” also supports this assumption. This standard, we assume, is being applied to supply vessels and drilling units. It expressly states that laboratories located in “industrial areas” (as opposed to other hazardous areas on a mobile drilling unit) are not considered accommodations. Our original view had been that research vessels are more properly considered “industrial” platforms than hazardous areas. This argument prevailed, and it is now clearly stated, that for oceanographic research vessels, laboratory vans are not required to be inspected.

This in itself does not mean that laboratory vans should be built to no particular standard. Per 46 CFR 195.11-10 (a) all vans must be designed for their intended use. The last sentence of this paragraph also makes note of this (See “**New Vans**” below).

Item 3: This item addresses the structural fire protection issue for portable vans. The Coast Guard was most concerned about vans which posed a potential fire risk to the vessel itself. Therefore, they specified that chemical storage and power vans must be of “A” class construction. Since these are two of the three van types required to be inspected, and they are not very numerous in the UNOLS fleet, this was deemed acceptable. By US standards, “A” class for normal ship construction is generally considered to be at least 3mm (11 gauge) of steel. An ISO container is only 13-14 gauge steel, and does not, on first glance, meet this requirement. As a side note, the only type of van expressly required to be “A” construction, per the CFR’s, is an explosives storage van (“A-15” by 46 CFR 194.10-15). This additional requirement for power and chemical storage vans (A-0) looks appropriate when reviewing TABLE 1 in its entirety.

According to 46CFR 190.07-1(b) “A” construction only needs to be “...composed of steel or equivalent metal construction, suitably stiffened ...capable of preventing the passage of flame and smoke for one hour” under the standard fire test. There is no temperature rise requirement associated with this level of construction. Through further investigation with testing firms, the van vendor, and our own consultants, it was felt that the proposed stiffened container design might meet the basic “A” requirement after all. For normal ship construction, there is little advantage (in either cost or weight savings) by eliminating 1-2mm of steel. With vans, where the “box” already exists in the form of an ISO container, there is a great potential for savings. Until now, there was little or no incentive to expend resources to formally test a thinner panel.

Chemical storage, power, and explosive storage vans are the ONLY types whose bulkheads and deck, on their own (i.e. to the open deck), are required to be of “A” class construction. Neither accommodation nor laboratory vans have to meet this requirement (See Item 5 below). The standard aluminum UNOLS van, which meets the panel strength requirements in Item 1, does NOT meet the “A-0” requirement because of differing material properties. Steel is recommended for the van types requiring this class of construction as shown in TABLE 1.

Item 4: The only structural fire protection requirement for other van types is on accommodations, where they must be of “incombustible materials”. Incombustible is defined in 46CFR 164.009. Since laboratory vans are uninspected, they are not referred to specifically in the Coast Guard letter in this regard. However, 46CFR 194.15-1 for chemical laboratories states that “ Incombustible materials shall be used, insofar as is reasonable and practicable...” Therefore, it is considered prudent that the laboratory van “box” be built of incombustible materials as well.

Laboratory vans which retain or use a wooden deck/subfloor should have a metal “belly plate” welded on the bottom to meet this requirement. The wooden deck should also be coated with a fire retardant paint or compound. The wooden deck in a standard ISO container may also be simply cropped out and inserted with steel.

Aluminum is a perfectly acceptable material for portable labs and accommodations. Steel and aluminum are both readily available and easily maintained by most operating institutions. This requirement does not necessarily rule out fiberglass or composites, as long as they can be shown to be incombustible and meet the recommended panel design pressures in Item 1.

Item 5: This item addresses structural fire protection issues and is perhaps the greatest step forward in clarification of the regulations for portable vans. The intent was to determine what was truly required to prevent fire from spreading from the van to the ship or visa-versa. The letter acknowledges that the entire “van-ship system” (van-air gap-ship) can be considered when evaluating structural fire protection.

Only accommodation vans are specified because they are one of the three inspected types, and result in the worst case scenario under 46CFR 190.07-10. For an accommodations van located over (or next to) a laboratory over 500 square feet, the boundary must have an A-30 rating per paragraph (c)(2). The intention then was to test an aluminum van over an uninsulated steel “ship’s deck” with a 1” air space in between as a worst case scenario.

There are two very important implications of this:

- Combined with Item 3 above, laboratory vans in and of themselves are not required to meet 46CFR 190.07-10 (b) which states that “boundary bulkheads of general

laboratory areas shall be of “A” class construction”. In essence, the “A” portion of this requirement is met by the ship itself. This also means that the doors, portholes, and bulkhead penetrations in lab vans (and accommodation vans) do not have to have an “A” rating either. If built like the chemical storage van (i.e. stiffened ISO container), the bulkheads of a laboratory van may meet this requirement anyway. The implication is clear, however, in that aluminum or other non-flammable materials are acceptable for the van “box”, as well as other non-flammable materials for the sheathing and insulation.

- ANY van built to the standard design can be located ANYWHERE on board a Subchapter U vessel within the definition of “sheltered location”.

In short, to meet the original goals of interchangeability (secured in various locations, use on inspected/uninspected vessels), there is no requirement for vans to be built of ¼” steel, or be “A-60” rated, as had been previously suggested.

Formal flame tests were completed in February 2002 at a US Coast Guard approved testing facility (*Intertek Testing Services*, Antioch, CA). The standard steel panel design (stiffened 20-foot container) passed the “A-0” requirements. The aluminum van/ship system (bulkhead arrangement – worst case scenario) passed the “A-30” requirements. This means that a stiffened 20-foot container can be used for several van types, such as machinery and chemical storage vans. It also means that both the standardized steel and aluminum vans can be placed anywhere on board the vessel without regard to the type of space next to the van.

New Vans:

In October 2001, the UNOLS Research Vessel Operator’s Committee (RVOC) voted to adopt the accommodations van standards as the minimum for all portable vans which are “normally occupied by personnel” - including laboratory vans. This should be applied to both ship and science owned vans going aboard UNOLS vessels.

Existing Vans:

It is understood that many existing vans owned by scientists and ship operations may not meet every aspect of the new standard. However, most are laboratory vans and will never be scrutinized beyond the Master of the vessel since they are not Coast Guard inspected. RVOC members also agreed that these vans should be “grandfathered”. They should be allowed aboard on a case-by-case basis according to 46CFR 195.11-15(b) and 195.11-25 (a)(1) if they meet other basic safety requirements such as proper electrical and egresses. Where reasonable, required upgrades could be made when the van is refurbished, such as the addition of stiffeners, or a “belly plate”.

The greater goal of this standard is that it will give better guidance to the vessel’s Master in evaluating acceptable construction for UNINSPECTED vans, as well as determining suitable location and securing methods for ALL portable vans. There is now an argument

to prohibit clearly substandard vans from coming aboard a vessel, and these can subsequently be phased out of service. This process will also provide better guidance for those constructing vans in the future than was previously available.