

# **UNOLS Portable Scientific Vans Manual**

**Compiled By:**

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**Revised January 2003**

# UNOLS Portable Scientific Vans Manual

Revised January 2003

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# **Introduction**

## UNOLS Standardized Scientific Van Design October 2002

The main goals of the standardization effort were to make vans more interchangeable among UNOLS ships, enable transport by common carrier, facilitate group purchase, and standardize certain design elements for the benefit of the scientific user. The most important result, however, was a clarification of the basic standards to which portable scientific vans should be built. The intent was not to rewrite the existing rules in 46 CFR, or create new rules, but rather to clarify the ones that already exist for “sub-Chapter U” vessels.

Standards from other industries, other classes of vessels, and classification societies (ABS and DNV) were used for guidance. The specifications and design details were sent to the US Coast Guard in Washington, DC for review in order to obtain a single, centralized view of the basic standards to which vans should be built. The review letter that came back from the Coast Guard addressed most van types to some degree, but the response dealt mostly with requirements for inspected vans. Many key elements needed to standardize design, namely side panel strength and structural fire protection, had been very difficult to ascertain before now.

The three primary decisions of the review were:

- An ABS side and aft deckhouse design pressure of 2.0 psi. for plate and 1.5 psi. for stiffeners is suitable for accommodations vans in “sheltered locations”. A definition of “sheltered location” was negotiated, which is based on the premise that the loads experienced by the van will primarily be wind loads. A standard ISO container does NOT meet this requirement and requires additional stiffening.
- Portable vans on sub-Chapter U vessels are allowed to take into account the “van/ship system” when considering the overall fire rating of the “boundary”. This includes the van structure, adjoining ship’s structure, and the air space in between. The actual suitability of this “boundary” being subject to formal flame testing. This ruling allows most van types (including labs) to be built of aluminum, though some types will still be required to be built of steel.
- Accommodations vans must be built of “incombustible materials” all around. This means that either the wooden deck normally found in a standard ISO container must be replaced with a metal deck, or a metal “belly plate” must be added.

One additional benefit of the review process was to obtain a formal ruling that laboratory vans are not “accommodations”, and thus, not required to be inspected. However, it was stated in the review letter that for lab vans the “...design and material selection must [consider] forces and environmental conditions to which the vans ...will be exposed.” Normally lab vans are placed in very similar locations to accommodations vans on UNOLS vessels, and there is very little difference in the conditions and forces

experienced. Also, scientific personnel occupy the van while the ship is underway. Because of this fact, the members of the Research Vessel Operators Committee (RVOC) voted at the October 2001 meeting to accept the accommodations van standards as the minimum for all new vans which are occupied by personnel – including laboratory vans. Vans which currently meet the other basic safety requirements given in the new specifications and the CFR's (egresses, electrical, etc.) may be "grandfathered" with regard to the structural requirements. However, all new vans, whether ship or science owned, should be built to these new standards.

Formal flame tests were completed at a US Coast Guard approved testing facility. The standard steel panel design (stiffened 20-foot container) passed the A-0 requirements. The aluminum "van/ship system" 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 adjacent space.

The *UNOLS Scientific Van Manual* was assembled to be a resource to ship operators, scientific users, and the federal funding agencies alike. This manual can be used as a guide during construction, and also when dealing with local US Coast Guard inspectors to ensure the vans are built and used to standards. An electronic version of the *UNOLS Scientific Van Manual* can be accessed by going to the UNOLS Research Vessel Operators Committee web site at [www.unols.org](http://www.unols.org). Technical questions or comments can be directed to Matthew Hawkins, 302-645-4341, [hawkins@udel.edu](mailto:hawkins@udel.edu).

# **US Coast Guard Letter and Discussion**

- Review Letter (May 24, 2001)
- Discussion



16710/P006893  
Serial H1-0101248  
May 24, 2001

Mr. David J. Bonney  
Bay Marine, Inc.  
239 New Meadow Road  
Barrington, RI 02806

Subj: Standardized Portable Vans for the University–National Oceanographic Laboratory System (UNOLS) Oceanographic Research Vessels Regulated Under Subchapter U

Dear Mr. Bonney:

We understand that it is your intent to develop a single type of portable van that can be customized for a variety of missions and used on a variety of Subchapter U vessels across the UNOLS fleet. This will ensure regulatory compliance of these vans while attached to any of the ships of the UNOLS fleet that operate around the world, and also provide some economies of scale by allowing UNOLS to order the vans in batches through a competitive bid process. After reviewing the regulations pertaining to research vessels and portable vans, you submitted several van design concepts with your letters dated October 14, 2000, January 22, March 13, and May 1, 2001. In addition, you asked several questions regarding our policy relating to the design, construction and approval of standardized portable vans for use aboard Subchapter U vessels. This letter is our response to the proposals and questions to date. The following comments apply:

1. Each of the five possible structural configurations, submitted with your letter dated March 13, 2001, have adequate safety and strength for sheltered use as accommodation vans. Sheltered use means the portable vans shall be attached to the vessel in a sheltered location and the master shall exercise his/her judgement in evacuating the vans of all persons in the event of heavy weather. A sheltered location is a location that sufficiently protects the van such that the maximum force to which it will be subjected during normal operations will be wind load, and the van will not experience any significant wave action while attached at that location.

2. Portable vans used for purposes other than increasing accommodation and related spaces, the storage of electrical power generating machinery or batteries, or chemical stores are not subject to the normal plan submission procedures of 46 CFR 189.55. This includes vans occupied by scientific personnel for the sole purpose of performing experiments and other non-hazardous storage vans. The use, arrangement, and handling of such vans, however, shall be approved by the Officer in Charge, Marine Inspection, prior to placement aboard the host vessel. In addition, the design and material selection must incorporate consideration of forces and environmental conditions to which the vans, attachments, and attachment points will be exposed.

3. The boundary bulkheads and decks of power and chemical storage vans must at a minimum be of "A" class construction.



16710/P006893  
Serial H1-0101248  
May 24, 2001

Subj: Standardized Portable Vans for the University-National Oceanographic Laboratory System (UNOLS) Oceanographic Research Vessels

4. The boundary bulkheads and decks of accommodation vans must at a minimum be constructed of incombustible materials.

5. When the accommodation vans are attached in a location adjacent to hold and machinery spaces, galleys, main pantries, laboratories, and storerooms, other than small service lockers, the boundary between the two must provide an equivalent level of protection to that provided by an A-0, A-15, or A-30 class bulkhead or deck, as required by 46 CFR 190.07-10(c) based on the size and type of the adjacent space. This boundary may be comprised of the host vessel's plating, the vans' plating and insulation, and the air gap between. In theory, we accept your proposal to test this "sandwich" to determine whether the resulting boundary meets the appropriate structural fire protection performance criteria. Testing should be conducted at an independent laboratory acceptable to the Coast Guard and the submission of test data should be in accordance with 46 CFR 159.005-11.

Should there be any questions please feel free to contact me at either of the above numbers.

Sincerely,



A. D. WIEST

Lieutenant Commander, U. S. Coast Guard  
Chief, Small Vessel Branch  
By direction of the Commanding Officer

**DISCUSSION**  
**Coast Guard Approval Letter**  
**UNOLS Van Design**  
**March 2002**  
**Matthew Hawkins**

**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 (8<sup>th</sup> 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 8<sup>th</sup> 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.

## **"Sheltered Location" Definition**



**Definition**  
**“SHELTERED LOCATION”**  
**UNOLS Portable Vans**

Approval for “sheltered use” means the van is attached to the vessel in a location as defined below, and the master is required to exercise his/her judgement in evacuating the van of all persons in the event of heavy weather.

Sheltered Location: A location that sufficiently protects the van such that the maximum force to which it will be subjected during normal operations will be wind load, and the van will not experience any significant wave action while attached at that location. To be considered a sheltered location, the location must be either:

- 1) On the vessel's third tier where the first or lowest tier is that located on the freeboard deck; OR
- 2) On the vessel's second tier aft amidships and aft the vessel's superstructure or deckhouse; OR
- 3) On the vessel's first or lowest tier aft amidships, aft the vessel's superstructure or deckhouse, AND is in a location that in the opinion of the vessel's master will not experience any significant wave action due to being sufficiently located inboard the side shell or protected by a full height bulwark.

The “freeboard deck” normally is the uppermost continuous deck having permanent means for closing all openings in its weather portions, and below which all openings in the vessel's side are equipped with permanent means for watertight closure. In cases where a vessel is designed for a special draft considerably less than that corresponding to the least freeboard obtainable under the International Load Line Regulations, the freeboard deck may be taken as the lowest actual deck from which the draft can be obtained under those regulations.

Where the depth to the uppermost continuous weather deck is such that the freeboard to this deck exceeds tabular freeboard by at least one standard superstructure height and the vessel's watertight bulkheads extend to this weather deck, the deckhouses and superstructures on this weather deck may be considered second tier. This consideration for excess freeboard may be followed in a similar manner to determine third tier superstructures or deckhouses.

# **Flame Test Results**

- Description of Fire Boundary Classifications
- Intertek Testing Services Flame Test Report  
(June 29, 2001)

## Description of Fire Boundary Classifications (46 CFR 190.07-5)

- “A” Class Boundary means: “...composed of steel or equivalent metal construction ... [and] if subjected to the standard fire test, would be capable of preventing the passage of flame and smoke for one hour.”
- Standard Fire Test: “[A test]...which develops in the test furnace a series of time temperature relationships as follows:”

5 minutes - 1000° F

10 minutes - 1300° F

30 minutes - 1550° F

60 minutes - 1700° F

~Passage of HEAT as compared to simple passage of smoke and flame~

- In simple terms, A-30 would be constructed of steel (or other suitable metal) such that it prevents the passage of smoke and flame for one hour and the temperature on the side being protected does not reach 1550° F after 30 minutes.
- SOLAS furnace test is slightly different.

**Warnock Hersey**



# Test Report

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**ITS**

Intertek Testing Services

**Full Scale Fire Endurance Test: Two  
non-Loadbearing, VAP Walls**

Client

Sonic Barrier Sound Products Ltd.  
7973 Progress Way  
Delta, BC V4G 1A3  
Canada

Reported by

Intertek Testing Services  
2200 Wymore Way  
Antioch, CA 94509  
Phone: (925) 756-6606  
Fax: (925) 756-6094

Test Number: WHI-495-1659 and WHI-495-1660  
Test Date: February 19 and 20, 2002  
Issue Date: February 25, 2002



Testing supervised by:

Paul M. Dugan  
Project Engineer

Report reviewed by:

Howard W. Stacy  
General Manager



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Telephone 925-756-6606 Fax 925-756-6094 Home Page [www.etlsemko.com](http://www.etlsemko.com)



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WHI-495-1659, WHI-495-1660

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Issued: February 25, 2002

## **INTRODUCTION**

Intertek Testing Services (ITS) Antioch, California Division conducted a one-hour fire test for a Class A bulkhead for the client, Sonic Barrier Sound. The test was conducted in accordance with the *Recommendation on Fire Resistance Tests for A, B and F Class Divisions, Resolution A.754 (18), IMO FTP Code 1998*.

The walls were received on February 11, 2002 in satisfactory condition.

## **TEST MATERIALS**

WHI-495-1659: Aluminum bulkhead wall (95" wide x 97-1/2" high)

WHI-495-1660: Corrugated Steel bulkhead wall (95-1/4" wide x 97-3/8" high)

Masonry Blocks: 8" x 8" x 16" and 8" x 8" x 8" CMU's

Mortar: Sand and cement mortar

## **TEST ASSEMBLY CONSTRUCTION**

The bulkhead wall was anchored into the 12' wide test frame. A masonry block wall was built around the bulkhead using cement blocks and mortar. The wall was allowed to cure. Ten thermocouples were placed on the unexposed face as required by the testing standard.

## **FIRE ENDURANCE TEST**

Data acquisition began after burner ignition and positioning of test assembly. To maintain the time-temperature curve specified in *FTP Code 1998* temperatures within the furnace were monitored with nine thermocouples and controlled by adjusting fuel flow to the burners.

Conditions of the exposed and unexposed faces of the test assembly were periodically observed and recorded (see Appendix B). Unexposed surface temperatures of the wall were recorded with ten thermocouples (see Appendix A). Photographs of the test assembly before and after the fire endurance test are included in Appendix A.

Three pressure taps (located on the vertical centerline of the furnace six inches from the test assembly at the base, midheight and top elevations) measured the furnace pressure in inches of water column. The pressure was controlled by adjusting of dampers in the furnace exhaust stacks.

The table of test results and the graph of the furnace curve are included in Appendix C.



WHI-495-1659, WHI-495-1660

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Issued: February 25, 2002

#### **CONCLUSION**

The aluminum bulkhead described in this report complied with *FTP Code 1998* for an A-30 one-hour fire-rated bulkhead assembly. The corrugated steel bulkhead described in this report complied with *FTP Code 1998* for an A-0 one-hour fire-rated bulkhead assembly.

The average and maximum temperature rises on the unexposed surface of the aluminum bulkhead at 30 minutes were 69°F (thermocouples 1-10) and 80°F (thermocouple 7), respectively. The average and maximum temperature rises allowed by the standard are 250°F and 325°F, respectively.



**APPENDIX A: FIGURES AND PHOTOGRAPHS**  
 Figure 1 – Aluminum Bulkhead

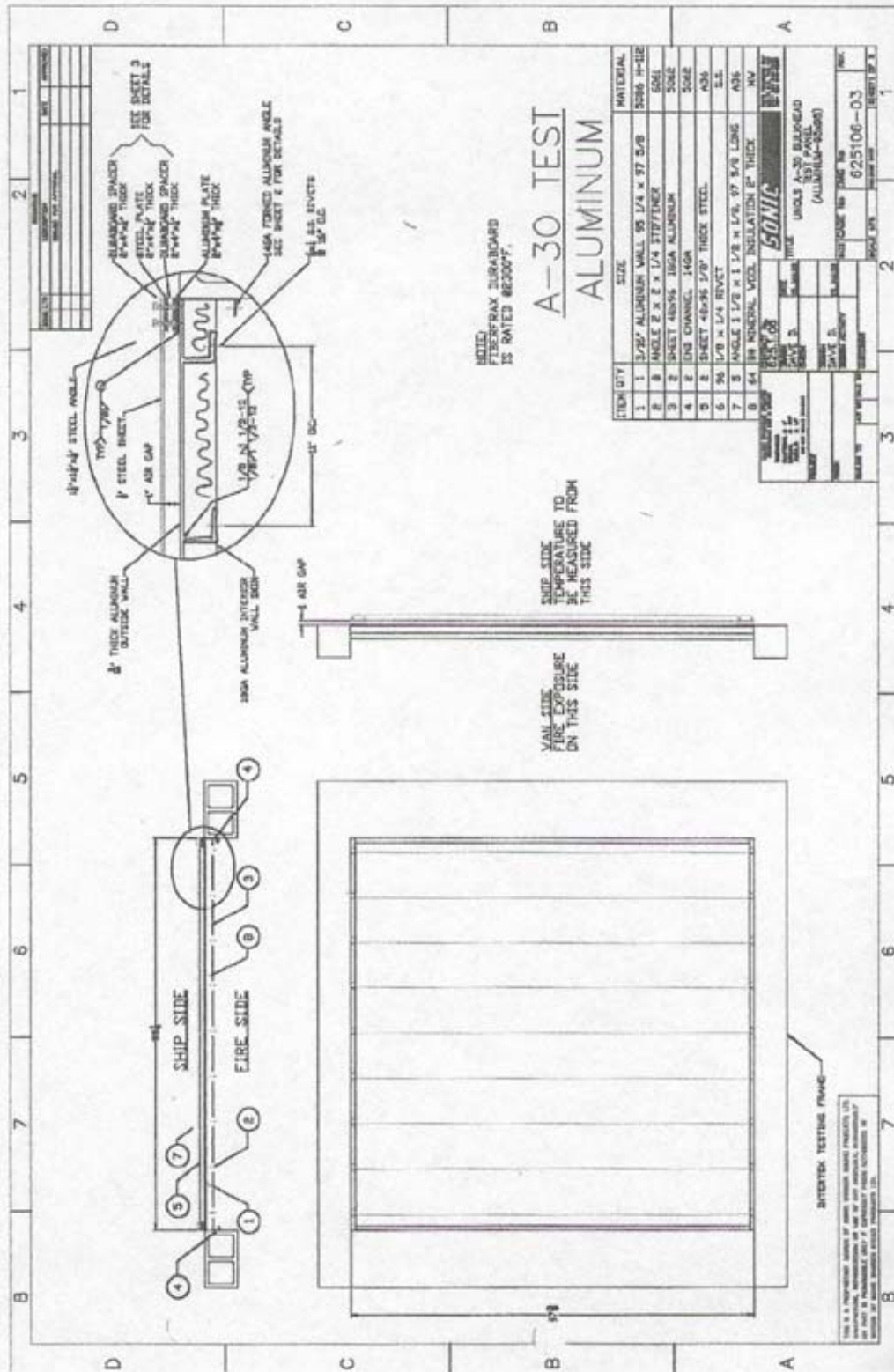
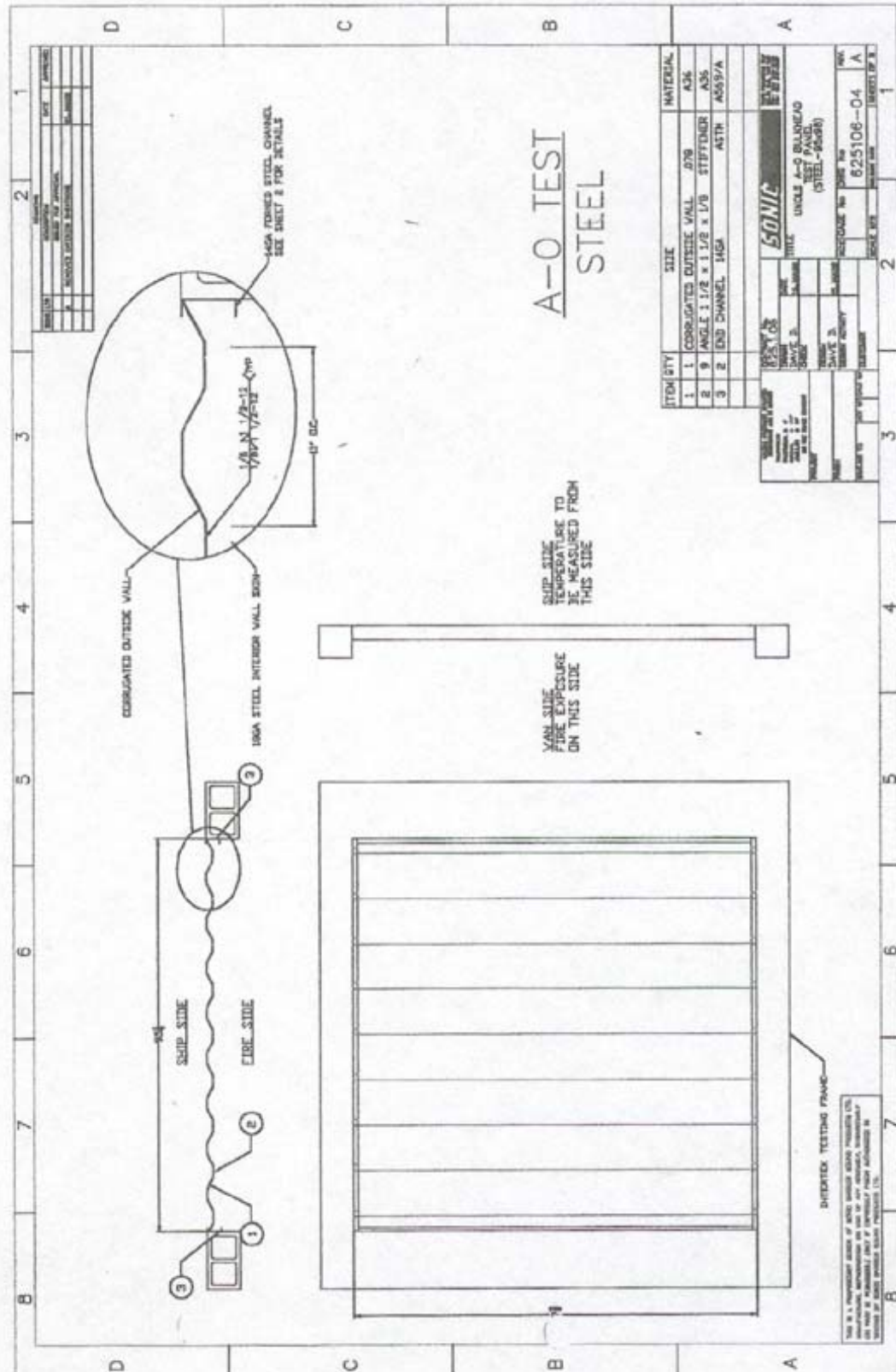


Figure 2 – Corrugated Steel Bulkhead



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**Test WHI-495-1659: Before Fire Endurance Test**





**Test WHI-495-1659: After Fire Endurance Test**

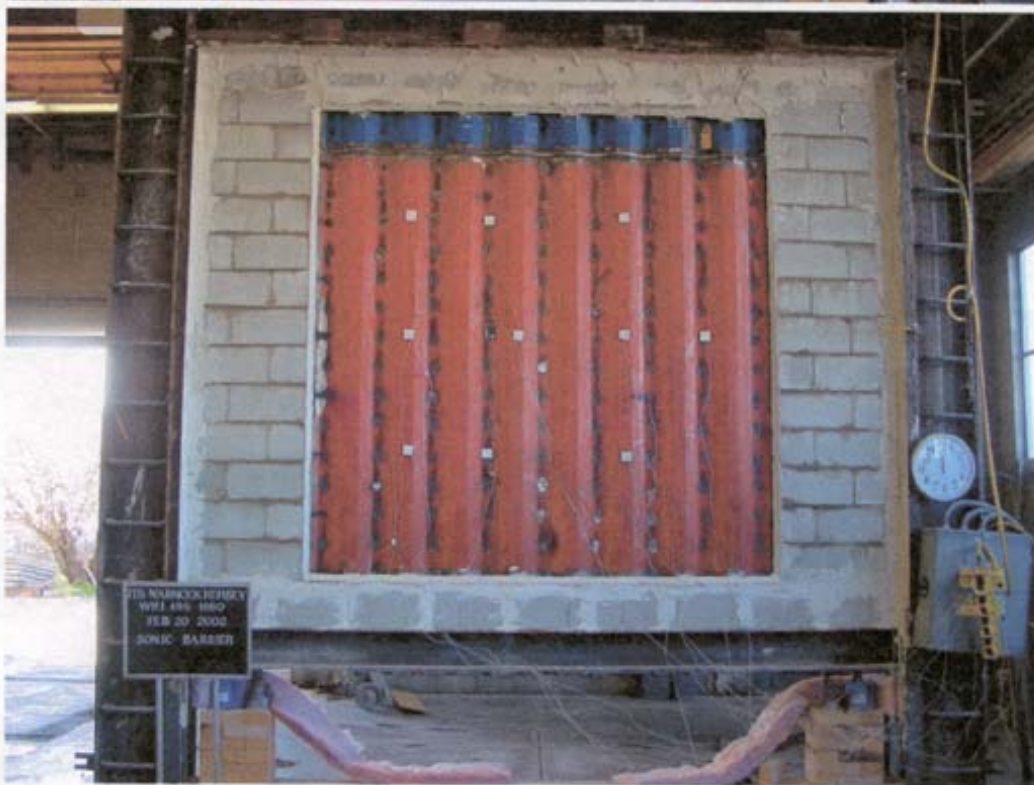


WHI-495-1659, WHI-495-1660

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Issued: February 25, 2002

**Test WHI-495-1660: Before Fire Endurance Test**





Test WHI-495-1660: After Fire Endurance Test



TS WAREHOUSES  
WHI 495 1660  
FEB 25 2002  
DOWD BARBER



WHI-495-1659, WHI-495-1660

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#### APPENDIX B: WHI-495-1659 FIRE ENDURANCE TEST OBSERVATIONS

<u>Approximate Test Time, Min</u>	<u>Exposed Face</u>	<u>Unexposed Face</u>
3	Face rippling and becoming wavy	No change
5	No change	Trace smoke coming from around left side and top of wall
10	Aluminum face beginning to tear and melt	No change
15	More meting of face	No change
30	No change	No change
40	Inner wall bowed into furnace; insulation beginning to swing free	No change
60	Stopped test	No change

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#### WHI-495-1660 FIRE ENDURANCE TEST OBSERVATIONS

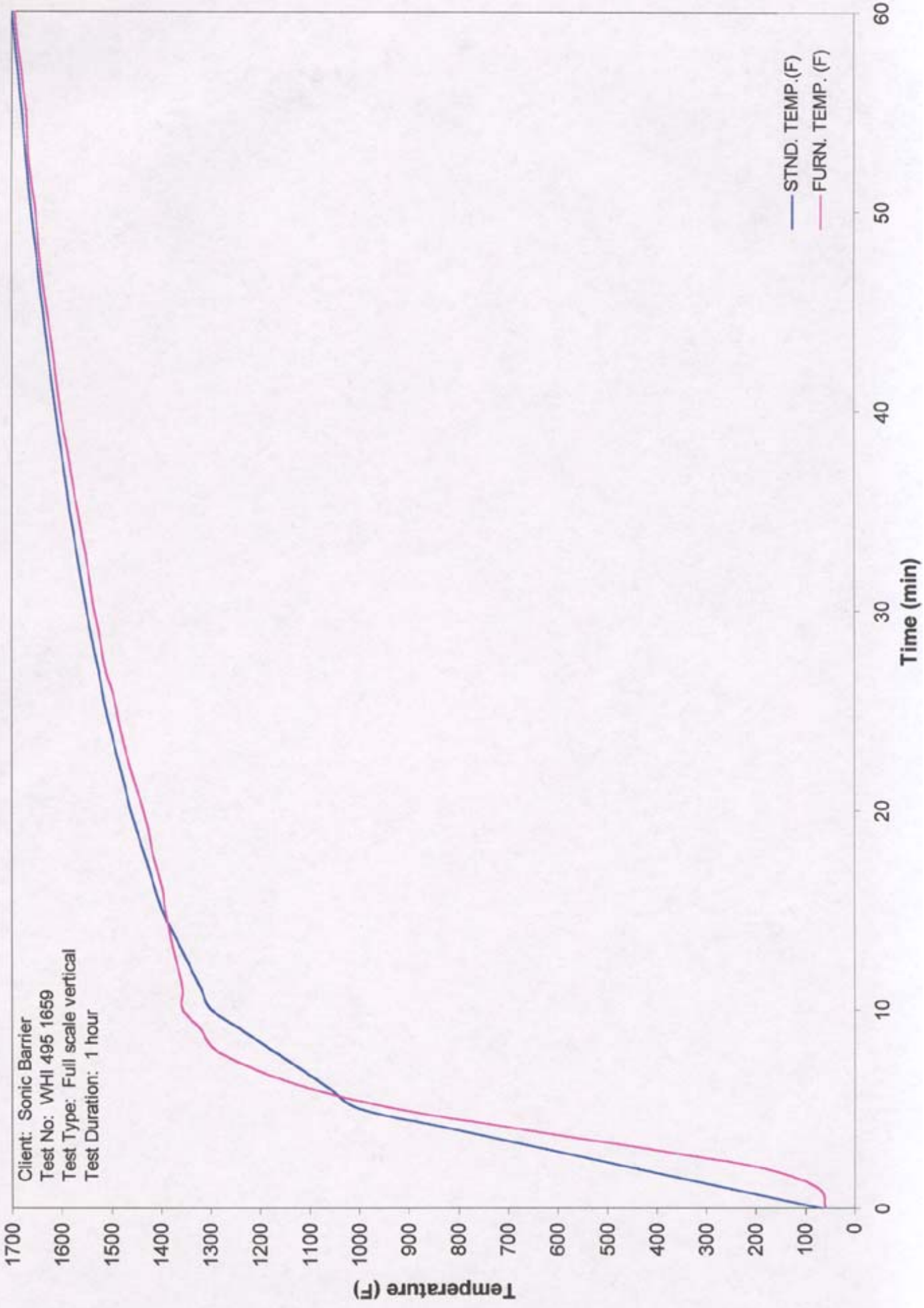
<u>Approximate Test Time, Min</u>	<u>Exposed Face</u>	<u>Unexposed Face</u>
3	No change	Smoke coming off assembly
5	Flaming on inside	Paint charring and falling off; TC's fell off with paint
10	Flaming stopped	Bowing into furnace
12	No change	Face turning green
25	No change	No change
30	No change	Wall becoming more green; N side bowing out of furnace
46	No change	Entire wall beginning to bow out of furnace
60	Stopped test	No change



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**APPENDIX C: TEST DATA FOR WHI-495-1659 & WHI-495-1660**

# Furnace Performance



Client: Sonic Barrier  
Test No: WHI 495 1659  
Test Type: Full scale vertical  
Test Duration: 1 hour

### Test Data

	0	1	2	3	4	5	6	7	8	9	10	11	12
TIME (MIN)													
STND. TEMP.(F)	68	254	441	627	814	1000	1060	1120	1180	1240	1300	1320	1340
FURN. TEMP. (F)	61	74	181	418	677	925	1097	1213	1292	1320	1357	1357	1366
STND. AREA (DEG-MIN)	0	109	404	886	1554	2408	3375	4403	5490	6637	7844	9088	10352
TEST AREA (DEG-MIN)	0	-4	51	299	798	1556	2520	3618	4812	6050	7325	8617	9911
AMBIENT (F)	60	60	60	60	60	60	61	61	60	61	61	61	61
FURN. 1 (F)	61	73	176	395	663	917	1096	1218	1287	1291	1332	1349	1361
FURN. 2 (F)	61	77	180	417	689	960	1146	1266	1338	1360	1406	1400	1401
FURN. 3 (F)	61	73	173	389	638	904	1085	1209	1290	1330	1359	1366	1375
FURN. 4 (F)	60	77	196	443	720	966	1124	1227	1291	1279	1316	1339	1357
FURN. 5 (F)	60	78	203	459	732	994	1164	1277	1349	1349	1404	1396	1403
FURN. 6 (F)	60	70	186	471	738	972	1125	1230	1317	1382	1386	1374	1389
FURN. 7 (F)	60	73	163	367	619	861	1040	1158	1232	1241	1308	1315	1321
FURN. 8 (F)	60	74	173	381	621	861	1042	1171	1271	1310	1356	1348	1351
FURN. 9 (F)	60	71	181	441	669	888	1050	1160	1253	1342	1343	1326	1331
UNEXP. 1 (F)	61	61	61	61	61	61	62	62	63	63	64	65	67
UNEXP. 2 (F)	61	61	61	61	61	61	61	62	62	63	63	64	65
UNEXP. 3 (F)	61	61	61	61	61	61	61	61	62	62	63	64	65
UNEXP. 4 (F)	61	61	61	61	61	61	62	62	63	63	64	65	67
UNEXP. 5 (F)	61	61	61	61	61	61	61	62	62	63	64	65	66
UNEXP. 6 (F)	61	61	61	61	61	61	61	61	62	63	63	65	66
UNEXP. 7 (F)	61	61	61	61	61	61	62	62	63	63	64	66	67
UNEXP. 8 (F)	61	61	61	61	61	61	61	62	62	63	63	64	66
UNEXP. 9 (F)	61	61	61	61	61	61	61	61	61	62	63	64	65
UNEXP. 10 (F)	61	61	61	61	61	61	62	62	63	64	65	67	69
PRESSURE 1(IN. W.C.)	-0.024	0.007	-0.079	-0.079	-0.068	-0.070	-0.067	-0.005	0.082	0.080	0.077	0.082	0.078
PRESSURE 2(IN. W.C.)	-0.026	-0.031	-0.148	-0.148	-0.140	-0.144	-0.141	-0.080	0.009	0.003	0.000	0.007	0.002
PRESSURE 3(IN. W.C.)	-0.026	-0.129	-0.171	-0.172	-0.165	-0.163	-0.168	-0.110	-0.025	-0.034	-0.033	-0.026	-0.026
AVG FURNACE (F)	61	74	181	418	677	925	1097	1213	1292	1320	1357	1357	1366
MIN FURNACE (F)	60	70	163	367	619	861	1040	1158	1232	1241	1308	1315	1321
MAX FURNACE (F)	61	78	203	471	738	994	1164	1277	1349	1382	1406	1400	1403
AVG UNEXP. (F)	61	61	61	61	61	61	61	62	62	63	64	65	66
MIN UNEXP. (F)	61	61	61	61	61	61	61	61	61	62	63	64	65
MAX UNEXP. (F)	61	61	61	61	61	61	62	62	63	64	65	67	69

### Test Data

	13	14	15	16	17	18	19	20	21	22	23	24	25
TIME (MIN)													
STND. TEMP.(F)	1359	1379	1399	1412	1424	1437	1449	1462	1472	1481	1492	1501	1511
FURN. TEMP. (F)	1376	1384	1392	1398	1408	1419	1426	1436	1449	1461	1472	1481	1490
STND. AREA (DEG-MIN)	11635	12938	14261	15600	16951	18315	19691	21080	22480	23890	25310	26739	28178
TEST AREA (DEG-MIN)	11214	12526	13848	15175	16511	17858	19213	20577	21952	23342	24742	26152	27571
AMBIENT (F)	61	62	62	62	62	63	63	63	63	63	63	64	64
FURN. 1 (F)	1371	1379	1393	1405	1422	1433	1439	1449	1463	1472	1483	1493	1503
FURN. 2 (F)	1413	1425	1433	1437	1446	1457	1457	1464	1475	1481	1493	1502	1514
FURN. 3 (F)	1374	1379	1398	1414	1430	1446	1450	1462	1472	1489	1499	1508	1515
FURN. 4 (F)	1368	1375	1386	1392	1405	1417	1424	1435	1450	1463	1474	1483	1490
FURN. 5 (F)	1414	1420	1426	1429	1436	1447	1451	1461	1473	1486	1496	1505	1512
FURN. 6 (F)	1403	1411	1412	1412	1420	1430	1437	1449	1461	1477	1488	1495	1503
FURN. 7 (F)	1331	1339	1348	1355	1365	1376	1387	1399	1412	1426	1438	1447	1454
FURN. 8 (F)	1359	1365	1372	1376	1383	1393	1401	1411	1422	1434	1445	1455	1463
FURN. 9 (F)	1348	1362	1362	1358	1364	1373	1384	1397	1409	1424	1436	1445	1453
UNEXP. 1 (F)	68	70	73	75	78	81	84	88	91	95	99	103	107
UNEXP. 2 (F)	67	69	70	73	75	78	81	84	88	91	95	98	102
UNEXP. 3 (F)	67	68	70	72	75	78	81	84	87	90	93	97	100
UNEXP. 4 (F)	68	70	73	75	78	81	84	87	90	94	98	102	106
UNEXP. 5 (F)	67	69	72	74	77	80	84	87	90	94	97	101	106
UNEXP. 6 (F)	68	70	73	76	79	82	85	88	91	94	97	100	104
UNEXP. 7 (F)	69	71	73	76	78	82	85	88	92	96	101	106	111
UNEXP. 8 (F)	67	69	71	74	76	79	82	86	89	92	96	100	104
UNEXP. 9 (F)	66	68	70	72	75	77	80	82	85	88	91	94	97
UNEXP. 10 (F)	72	75	78	82	85	88	91	93	96	99	104	108	112
PRESSURE 1(IN. W.C.)	0.081	0.084	0.083	0.082	0.083	0.082	0.080	0.082	0.083	0.083	0.084	0.084	0.085
PRESSURE 2(IN. W.C.)	0.005	0.008	0.007	0.007	0.007	0.006	0.005	0.005	0.005	0.007	0.007	0.006	0.007
PRESSURE 3(IN. W.C.)	-0.025	-0.024	-0.025	-0.026	-0.025	-0.025	-0.025	-0.024	-0.025	-0.025	-0.026	-0.024	-0.027
AVG FURNACE (F)	1376	1384	1392	1398	1408	1419	1426	1436	1449	1461	1472	1481	1490
MIN FURNACE (F)	1331	1339	1348	1355	1364	1373	1384	1397	1409	1424	1436	1445	1453
MAX FURNACE (F)	1414	1425	1433	1437	1446	1457	1457	1464	1475	1489	1499	1508	1515
AVG UNEXP. (F)	68	70	72	75	78	81	84	87	90	93	97	101	105
MIN UNEXP. (F)	66	68	70	72	75	77	80	82	85	88	91	94	97
MAX UNEXP. (F)	72	75	78	82	85	88	91	93	96	99	104	108	112



## Test Data

	26	27	28	29	30	31	32	33	34	35	36	37	38
TIME (MIN)													
STND. TEMP.(F)	1519	1527	1535	1543	1551	1557	1564	1571	1578	1584	1590	1596	1602
FURN. TEMP. (F)	1499	1512	1519	1526	1535	1541	1547	1554	1562	1568	1576	1583	1589
STND. AREA (DEG-MIN)	29626	31081	32545	34017	35496	36983	38477	39977	41484	42998	44519	46045	47576
TEST AREA (DEG-MIN)	28998	30437	31887	33342	34806	36276	37753	39236	40727	42225	43730	45242	46761
AMBIENT (F)	63	65	64	64	64	64	65	65	66	67	66	65	65
FURN. 1 (F)	1512	1522	1528	1535	1546	1554	1560	1567	1575	1580	1590	1597	1601
FURN. 2 (F)	1522	1515	1520	1538	1551	1561	1569	1577	1586	1590	1598	1606	1612
FURN. 3 (F)	1525	1538	1541	1550	1562	1567	1574	1583	1590	1597	1605	1612	1620
FURN. 4 (F)	1500	1519	1528	1529	1536	1544	1549	1555	1564	1570	1579	1585	1591
FURN. 5 (F)	1521	1530	1536	1546	1554	1562	1567	1573	1582	1588	1595	1602	1609
FURN. 6 (F)	1512	1532	1538	1543	1550	1555	1560	1568	1576	1583	1590	1597	1605
FURN. 7 (F)	1465	1484	1493	1497	1503	1509	1515	1521	1530	1536	1543	1551	1557
FURN. 8 (F)	1471	1490	1499	1502	1507	1512	1517	1523	1528	1534	1541	1548	1555
FURN. 9 (F)	1462	1478	1488	1494	1501	1507	1512	1519	1527	1534	1541	1548	1555
UNEXP. 1 (F)	113	118	123	129	135	141	147	154	160	167	174	182	190
UNEXP. 2 (F)	105	110	115	120	125	131	136	141	147	153	159	166	173
UNEXP. 3 (F)	103	107	112	117	122	127	132	137	142	148	153	159	165
UNEXP. 4 (F)	111	116	121	127	133	139	145	151	157	164	171	178	185
UNEXP. 5 (F)	111	116	121	126	132	137	143	149	155	161	168	175	181
UNEXP. 6 (F)	109	113	118	123	128	134	139	145	151	157	163	169	175
UNEXP. 7 (F)	116	122	128	135	141	148	155	162	169	177	185	193	201
UNEXP. 8 (F)	109	114	119	124	130	135	141	147	153	160	166	173	180
UNEXP. 9 (F)	101	105	110	114	119	124	129	134	140	145	151	157	163
UNEXP. 10 (F)	116	121	126	130	136	141	146	152	158	164	171	177	184
PRESSURE 1(IN. W.C.)	0.086	0.085	0.083	0.084	0.084	0.084	0.084	0.085	0.085	0.085	0.085	0.086	0.085
PRESSURE 2(IN. W.C.)	0.009	0.007	0.007	0.007	0.006	0.006	0.006	0.006	0.007	0.006	0.007	0.007	0.007
PRESSURE 3(IN. W.C.)	-0.025	-0.026	-0.027	-0.026	-0.026	-0.026	-0.026	-0.026	-0.027	-0.025	-0.027	-0.027	-0.024
AVG FURNACE (F)	1499	1512	1519	1526	1535	1541	1547	1554	1562	1568	1576	1583	1589
MIN FURNACE (F)	1462	1478	1488	1494	1501	1507	1512	1519	1527	1534	1541	1548	1555
MAX FURNACE (F)	1525	1538	1541	1550	1562	1567	1574	1583	1590	1597	1605	1612	1620
AVG UNEXP. (F)	109	114	119	125	130	136	141	147	153	160	166	173	180
MIN UNEXP. (F)	101	105	110	114	119	124	129	134	140	145	151	157	163
MAX UNEXP. (F)	116	122	128	135	141	148	155	162	169	177	185	193	201

## Test Data

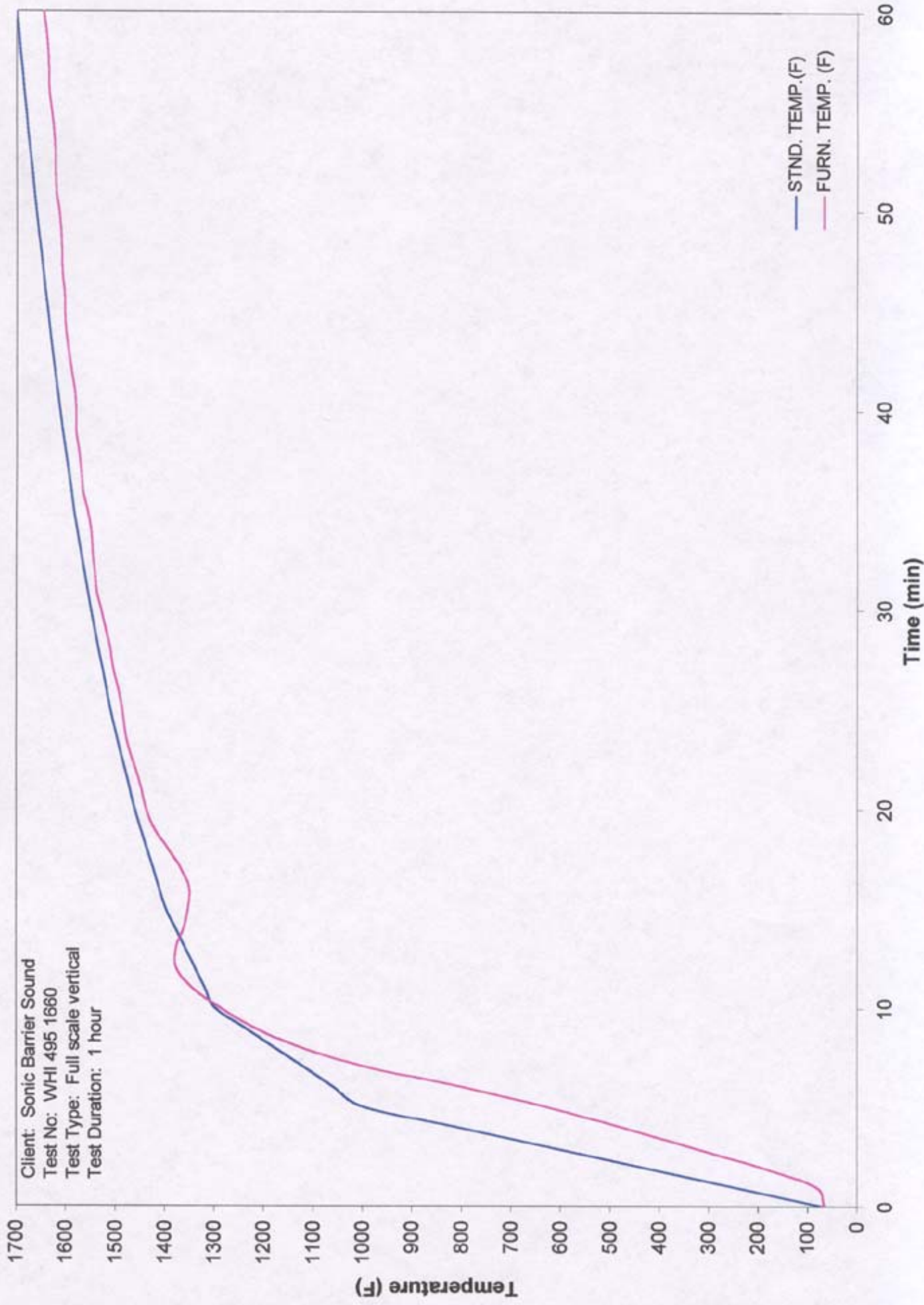
	39	40	41	42	43	44	45	46	47	48	49	50	51
<b>TIME (MIN)</b>													
<b>STND. TEMP.(F)</b>	1608	1613	1618	1623	1628	1633	1638	1643	1648	1652	1657	1661	1665
<b>FURN. TEMP. (F)</b>	1596	1604	1609	1614	1618	1625	1630	1636	1642	1646	1649	1653	1658
<b>STND. AREA (DEG-MIN)</b>	49114	50657	52206	53760	55318	56882	58451	60024	61602	63184	64772	66363	67959
<b>TEST AREA (DEG-MIN)</b>	48287	49820	51359	52904	54453	56007	57567	59133	60705	62282	63862	65446	67034
<b>AMBIENT (F)</b>	65	65	66	65	67	66	66	67	67	65	66	67	66
<b>FURN. 1 (F)</b>	1608	1617	1622	1627	1629	1636	1642	1648	1655	1659	1661	1665	1669
<b>FURN. 2 (F)</b>	1617	1626	1631	1634	1640	1646	1653	1657	1661	1666	1670	1674	1675
<b>FURN. 3 (F)</b>	1629	1633	1640	1645	1649	1654	1661	1669	1672	1676	1681	1684	1692
<b>FURN. 4 (F)</b>	1597	1605	1609	1615	1618	1626	1630	1636	1644	1647	1650	1654	1659
<b>FURN. 5 (F)</b>	1616	1623	1628	1633	1637	1643	1648	1654	1659	1662	1665	1669	1674
<b>FURN. 6 (F)</b>	1613	1619	1625	1632	1635	1641	1647	1655	1659	1662	1666	1670	1677
<b>FURN. 7 (F)</b>	1564	1571	1576	1582	1587	1593	1598	1603	1610	1613	1617	1621	1626
<b>FURN. 8 (F)</b>	1562	1567	1574	1580	1583	1589	1595	1600	1605	1609	1614	1617	1623
<b>FURN. 9 (F)</b>	1563	1570	1575	1581	1586	1593	1599	1605	1611	1615	1619	1624	1629
<b>UNEXP. 1 (F)</b>	198	206	214	216	221	228	237	248	259	270	281	292	302
<b>UNEXP. 2 (F)</b>	179	186	193	201	208	215	218	226	233	242	250	259	267
<b>UNEXP. 3 (F)</b>	170	176	182	188	194	199	204	208	213	213	214	214	215
<b>UNEXP. 4 (F)</b>	193	205	212	218	224	232	240	250	259	268	277	287	296
<b>UNEXP. 5 (F)</b>	189	196	203	211	216	222	230	238	247	256	265	273	282
<b>UNEXP. 6 (F)</b>	181	188	194	200	206	210	214	219	225	232	239	246	254
<b>UNEXP. 7 (F)</b>	210	212	213	215	218	226	239	253	265	278	291	303	315
<b>UNEXP. 8 (F)</b>	187	194	202	209	215	216	222	232	243	253	263	273	283
<b>UNEXP. 9 (F)</b>	170	176	182	188	195	201	207	211	211	212	214	218	227
<b>UNEXP. 10 (F)</b>	192	199	206	213	214	215	218	224	235	247	260	272	283
<b>PRESSURE 1(IN. W.C.)</b>	0.084	0.085	0.084	0.084	0.084	0.085	0.086	0.086	0.084	0.085	0.085	0.085	0.085
<b>PRESSURE 2(IN. W.C.)</b>	0.005	0.006	0.005	0.005	0.006	0.005	0.007	0.006	0.005	0.006	0.006	0.005	0.006
<b>PRESSURE 3(IN. W.C.)</b>	-0.026	-0.026	-0.023	-0.026	-0.026	-0.027	-0.024	-0.027	-0.026	-0.026	-0.026	-0.025	-0.027
<b>AVG FURNACE (F)</b>	1596	1604	1609	1614	1618	1625	1630	1636	1642	1646	1649	1653	1658
<b>MIN FURNACE (F)</b>	1562	1567	1574	1580	1583	1589	1595	1600	1605	1609	1614	1617	1623
<b>MAX FURNACE (F)</b>	1629	1633	1640	1645	1649	1654	1661	1669	1672	1676	1681	1684	1692
<b>AVG UNEXP. (F)</b>	187	194	200	206	211	216	223	231	239	247	255	264	273
<b>MIN UNEXP. (F)</b>	170	176	182	188	194	199	204	208	211	212	214	214	215
<b>MAX UNEXP. (F)</b>	210	212	214	218	224	232	240	253	265	278	291	303	315



## Test Data

	52	53	54	55	56	57	58	59	60
<b>TIME (MIN)</b>									
<b>STND. TEMP. (F)</b>	1669	1673	1677	1681	1685	1689	1693	1697	1700
<b>FURN. TEMP. (F)</b>	1664	1668	1670	1672	1678	1682	1687	1691	1694
<b>STND. AREA (DEG-MIN)</b>	69559	71163	72771	74383	75999	77619	79242	80870	82501
<b>TEST AREA (DEG-MIN)</b>	68628	70227	71829	73432	75040	76652	78269	79891	81516
<b>AMBIENT (F)</b>	67	67	67	67	68	67	67	66	66
<b>FURN. 1 (F)</b>	1676	1680	1680	1683	1688	1694	1699	1701	1705
<b>FURN. 2 (F)</b>	1676	1681	1688	1689	1694	1698	1694	1692	1701
<b>FURN. 3 (F)</b>	1696	1699	1701	1703	1710	1713	1719	1722	1724
<b>FURN. 4 (F)</b>	1667	1672	1673	1674	1680	1685	1695	1701	1701
<b>FURN. 5 (F)</b>	1679	1684	1688	1689	1694	1698	1700	1704	1709
<b>FURN. 6 (F)</b>	1684	1687	1687	1689	1696	1699	1707	1714	1715
<b>FURN. 7 (F)</b>	1632	1638	1640	1641	1647	1651	1658	1664	1666
<b>FURN. 8 (F)</b>	1629	1633	1634	1635	1641	1644	1653	1659	1659
<b>FURN. 9 (F)</b>	1635	1639	1642	1643	1648	1652	1658	1665	1666
<b>UNEXP. 1 (F)</b>	313	323	332	342	352	361	371	379	388
<b>UNEXP. 2 (F)</b>	276	286	295	304	313	323	332	341	350
<b>UNEXP. 3 (F)</b>	216	218	222	228	237	246	257	267	278
<b>UNEXP. 4 (F)</b>	305	314	322	331	340	349	357	365	373
<b>UNEXP. 5 (F)</b>	291	300	309	318	326	335	344	352	360
<b>UNEXP. 6 (F)</b>	262	270	278	285	292	299	306	313	320
<b>UNEXP. 7 (F)</b>	326	337	348	358	368	377	386	395	403
<b>UNEXP. 8 (F)</b>	293	303	313	322	331	340	349	358	366
<b>UNEXP. 9 (F)</b>	238	248	258	267	276	285	294	302	310
<b>UNEXP. 10 (F)</b>	293	303	313	322	331	339	347	356	363
<b>PRESSURE 1 (IN. W.C.)</b>	0.085	0.083	0.083	0.085	0.085	0.085	0.085	0.083	0.083
<b>PRESSURE 2 (IN. W.C.)</b>	0.006	0.004	0.004	0.005	0.005	0.005	0.005	0.003	0.003
<b>PRESSURE 3 (IN. W.C.)</b>	-0.026	-0.026	-0.028	-0.025	-0.024	-0.025	-0.028	-0.028	-0.025
<b>AVG FURNACE (F)</b>	1664	1668	1670	1672	1678	1682	1687	1691	1694
<b>MIN FURNACE (F)</b>	1629	1633	1634	1635	1641	1644	1653	1659	1659
<b>MAX FURNACE (F)</b>	1696	1699	1701	1703	1710	1713	1719	1722	1724
<b>AVG UNEXP. (F)</b>	281	290	299	308	317	326	334	343	351
<b>MIN UNEXP. (F)</b>	216	218	222	228	237	246	257	267	278
<b>MAX UNEXP. (F)</b>	326	337	348	358	368	377	386	395	403

# Furnace Performance



Client: Sonic Barrier Sound  
Test No: WHI 495 1660  
Test Type: Full scale vertical  
Test Duration: 1 hour

— STND. TEMP. (F)  
— FURN. TEMP. (F)



## Test Data

	0	1	2	3	4	5	6	7	8	9	10	11	12
TIME (MIN)													
STND. TEMP.(F)	68	254	441	627	814	1000	1060	1120	1180	1240	1300	1320	1340
FURN. TEMP. (F)	66	84	198	338	477	627	798	993	1127	1221	1289	1346	1378
STND. AREA (DEG-MIN)	0	109	404	886	1554	2408	3375	4403	5490	6637	7844	9088	10352
TEST AREA (DEG-MIN)	0	4	80	291	642	1138	1795	2636	3647	4763	5957	7209	8509
AMBIENT (F)	65	65	65	65	65	65	66	66	66	67	67	67	68
FURN. 1 (F)	66	86	201	358	520	678	855	1025	1178	1266	1329	1386	1411
FURN. 2 (F)	66	82	205	356	516	682	847	1015	1136	1216	1291	1355	1369
FURN. 3 (F)	66	80	172	320	471	632	812	1006	1115	1211	1295	1354	1385
FURN. 4 (F)	66	89	224	384	536	693	866	1057	1215	1293	1337	1386	1419
FURN. 5 (F)	66	86	225	359	483	621	799	1012	1128	1235	1316	1377	1402
FURN. 6 (F)	66	78	161	304	454	617	806	1021	1129	1233	1305	1361	1405
FURN. 7 (F)	66	83	174	296	425	577	746	944	1138	1224	1272	1319	1355
FURN. 8 (F)	66	92	253	378	484	602	753	952	1059	1169	1245	1304	1341
FURN. 9 (F)	66	81	167	284	403	538	699	903	1041	1142	1213	1271	1315
UNEXP. 1 (F)	66	75	126	202	222	-	-	-	-	-	-	-	-
UNEXP. 2 (F)	66	90	179	246	325	-	-	-	-	-	-	-	-
UNEXP. 3 (F)	66	84	161	229	262	-	-	-	-	-	-	-	-
UNEXP. 4 (F)	66	85	169	223	295	402	530	692	844	948	1031	1080	1102
UNEXP. 5 (F)	65	87	170	221	246	-	-	-	-	-	-	-	-
UNEXP. 6 (F)	66	88	174	215	241	349	523	735	887	994	1057	1103	1137
UNEXP. 7 (F)	66	104	214	270	404	-	-	-	-	-	-	-	-
UNEXP. 8 (F)	66	93	207	272	377	-	-	-	-	-	-	-	-
UNEXP. 9 (F)	66	104	212	230	292	-	-	-	-	-	-	-	-
UNEXP. 10 (F)	66	92	180	228	298	-	-	-	-	-	-	-	-
PRESSURE 1(IN. W.C.)	-0.123	-0.173	-0.076	-0.145	-0.154	-0.094	-0.094	0.087	0.063	0.074	0.080	0.083	0.087
PRESSURE 2(IN. W.C.)	-0.122	-0.218	-0.142	-0.210	-0.225	-0.164	-0.166	0.013	-0.012	-0.002	0.005	0.005	0.012
PRESSURE 3(IN. W.C.)	-0.110	-0.225	-0.137	-0.221	-0.215	-0.181	-0.181	-0.021	-0.048	-0.035	-0.020	-0.020	-0.015
AVG FURNACE (F)	66	84	198	338	477	627	798	993	1127	1221	1289	1346	1378
MIN FURNACE (F)	66	78	161	284	403	538	699	903	1041	1142	1213	1271	1315
MAX FURNACE (F)	66	92	253	384	536	693	866	1057	1215	1293	1337	1386	1419
AVG UNEXP. (F)	66	90	179	234	296	376	526	713	865	971	1044	1091	1119
MIN UNEXP. (F)	65	75	126	202	222	349	523	692	844	948	1031	1080	1102
MAX UNEXP. (F)	66	104	214	272	404	402	530	735	887	994	1057	1103	1137

## Test Data

	13	14	15	16	17	18	19	20	21	22	23	24	25
TIME (MIN)													
STND. TEMP.(F)	1359	1379	1399	1412	1424	1437	1449	1462	1472	1481	1492	1501	1511
FURN. TEMP. (F)	1378	1362	1353	1351	1368	1395	1422	1439	1448	1460	1473	1482	1486
STND. AREA (DEG-MIN)	11635	12938	14261	15600	16951	18315	19691	21080	22480	23890	25310	26739	28178
TEST AREA (DEG-MIN)	9824	11123	12411	13695	14987	16302	17645	19011	20386	21775	23175	24585	26002
AMBIENT (F)	68	68	68	68	69	69	69	69	69	69	69	69	70
FURN. 1 (F)	1409	1401	1399	1401	1422	1443	1458	1467	1484	1491	1506	1509	1518
FURN. 2 (F)	1364	1377	1382	1387	1407	1417	1416	1413	1434	1436	1443	1445	1460
FURN. 3 (F)	1386	1383	1384	1384	1405	1441	1447	1452	1470	1470	1486	1487	1504
FURN. 4 (F)	1414	1385	1371	1368	1389	1422	1456	1478	1482	1497	1514	1520	1522
FURN. 5 (F)	1396	1373	1359	1355	1369	1394	1427	1439	1442	1448	1464	1482	1489
FURN. 6 (F)	1404	1373	1358	1351	1369	1404	1436	1458	1466	1479	1491	1499	1503
FURN. 7 (F)	1358	1335	1322	1317	1336	1366	1403	1431	1439	1460	1470	1481	1480
FURN. 8 (F)	1344	1325	1311	1307	1316	1341	1380	1407	1405	1428	1438	1456	1451
FURN. 9 (F)	1325	1304	1293	1288	1302	1330	1376	1404	1406	1435	1443	1458	1451
UNEXP. 1 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 2 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 3 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 4 (F)	1099	1095	1092	1090	1098	1111	1113	1114	1125	1126	1129	1124	1125
UNEXP. 5 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 6 (F)	1145	1125	1108	1098	1103	1119	1150	1169	1173	1186	1199	1207	1207
UNEXP. 7 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 8 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 9 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 10 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
PRESSURE 1(IN. W.C.)	0.079	0.077	0.075	0.075	0.083	0.085	0.083	0.082	0.085	0.086	0.082	0.085	0.083
PRESSURE 2(IN. W.C.)	0.004	0.002	0.002	0.001	0.006	0.011	0.007	0.006	0.010	0.009	0.007	0.009	0.009
PRESSURE 3(IN. W.C.)	-0.020	-0.018	-0.012	-0.019	-0.019	-0.019	-0.016	-0.022	-0.019	-0.014	-0.019	-0.031	-0.021
AVG FURNACE (F)	1378	1362	1353	1351	1368	1395	1422	1439	1448	1460	1473	1482	1486
MIN FURNACE (F)	1325	1304	1293	1288	1302	1330	1376	1404	1405	1428	1438	1445	1451
MAX FURNACE (F)	1414	1401	1399	1401	1422	1443	1458	1478	1484	1497	1514	1520	1522
AVG UNEXP. (F)	1122	1110	1100	1094	1101	1115	1131	1142	1149	1156	1164	1165	1166
MIN UNEXP. (F)	1099	1095	1092	1090	1098	1111	1113	1114	1125	1126	1129	1124	1125
MAX UNEXP. (F)	1145	1125	1108	1098	1103	1119	1150	1169	1173	1186	1199	1207	1207



Test Data

	26	27	28	29	30	31	32	33	34	35	36	37	38
TIME (MIN)													
STND. TEMP.(F)	1519	1527	1535	1543	1551	1557	1564	1571	1578	1584	1590	1596	1602
FURN. TEMP. (F)	1495	1505	1511	1520	1530	1539	1543	1547	1549	1557	1567	1570	1575
STND. AREA (DEG-MIN)	29626	31081	32545	34017	35496	36983	38477	39977	41484	42998	44519	46045	47576
TEST AREA (DEG-MIN)	27425	28859	30300	31747	33206	34673	36146	37625	39104	40590	42086	43586	45092
AMBIENT (F)	70	70	70	70	71	71	71	71	71	72	72	72	72
FURN. 1 (F)	1531	1538	1550	1564	1569	1575	1574	1577	1583	1591	1597	1600	1603
FURN. 2 (F)	1475	1470	1499	1511	1514	1506	1498	1501	1524	1531	1527	1522	1520
FURN. 3 (F)	1507	1510	1527	1540	1536	1550	1557	1557	1561	1569	1570	1571	1584
FURN. 4 (F)	1529	1544	1544	1553	1565	1582	1589	1589	1584	1595	1608	1616	1622
FURN. 5 (F)	1502	1493	1500	1518	1538	1531	1519	1531	1538	1555	1555	1553	1552
FURN. 6 (F)	1511	1524	1523	1539	1543	1556	1565	1564	1567	1572	1582	1584	1598
FURN. 7 (F)	1486	1508	1505	1509	1522	1541	1553	1555	1549	1556	1571	1580	1589
FURN. 8 (F)	1455	1477	1471	1469	1487	1501	1512	1519	1512	1518	1537	1546	1548
FURN. 9 (F)	1457	1479	1478	1476	1497	1509	1517	1528	1525	1529	1551	1557	1556
UNEXP. 1 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 2 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 3 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 4 (F)	1129	1130	1137	1153	1156	1156	1153	1151	1157	1164	1166	1162	217
UNEXP. 5 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 6 (F)	1211	1219	1222	1219	1232	1238	1240	1245	1244	1247	1260	1266	1269
UNEXP. 7 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 8 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 9 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 10 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
PRESSURE 1(IN. W.C.)	0.088	0.084	0.086	0.082	0.086	0.080	0.084	0.084	0.086	0.086	0.087	0.084	0.088
PRESSURE 2(IN. W.C.)	0.013	0.006	0.010	0.005	0.010	0.004	0.008	0.006	0.010	0.009	0.010	0.006	0.011
PRESSURE 3(IN. W.C.)	-0.014	-0.012	-0.018	-0.012	-0.020	-0.020	-0.013	-0.017	-0.018	-0.016	-0.012	-0.018	-0.016
AVG FURNACE (F)	1495	1505	1511	1520	1530	1539	1543	1547	1549	1557	1567	1570	1575
MIN FURNACE (F)	1455	1470	1471	1469	1487	1501	1498	1501	1512	1518	1527	1522	1520
MAX FURNACE (F)	1531	1544	1550	1564	1569	1582	1589	1589	1584	1595	1608	1616	1622
AVG UNEXP. (F)	1170	1175	1179	1186	1194	1197	1197	1198	1200	1206	1213	1214	743
MIN UNEXP. (F)	1129	1130	1137	1153	1156	1156	1153	1151	1157	1164	1166	1162	217
MAX UNEXP. (F)	1211	1219	1222	1219	1232	1238	1240	1245	1244	1247	1260	1266	1269

### Test Data

	39	40	41	42	43	44	45	46	47	48	49	50	51
TIME (MIN)													
STND. TEMP.(F)	1608	1613	1618	1623	1628	1633	1638	1643	1648	1652	1657	1661	1665
FURN. TEMP. (F)	1580	1581	1583	1590	1596	1601	1603	1605	1609	1609	1611	1615	1621
STND. AREA (DEG-MIN)	49114	50657	52206	53760	55318	56882	58451	60024	61602	63184	64772	66363	67959
TEST AREA (DEG-MIN)	46603	48116	49630	51149	52675	54207	55742	57277	58817	60359	61902	63448	64999
AMBIENT (F)	73	73	73	73	73	73	73	73	72	73	72	73	73
FURN. 1 (F)	1610	1618	1623	1627	1630	1634	1641	1648	1652	1649	1653	1653	1659
FURN. 2 (F)	1543	1555	1555	1553	1562	1558	1560	1574	1572	1578	1586	1584	1578
FURN. 3 (F)	1585	1592	1599	1600	1608	1604	1606	1613	1625	1626	1623	1633	1642
FURN. 4 (F)	1619	1616	1625	1632	1636	1644	1647	1644	1655	1650	1650	1657	1666
FURN. 5 (F)	1571	1578	1573	1568	1591	1593	1593	1600	1603	1604	1609	1605	1601
FURN. 6 (F)	1592	1593	1596	1609	1613	1613	1612	1614	1619	1624	1626	1628	1641
FURN. 7 (F)	1584	1577	1583	1594	1596	1605	1609	1605	1611	1610	1608	1618	1630
FURN. 8 (F)	1550	1541	1544	1556	1557	1571	1573	1562	1563	1564	1564	1573	1582
FURN. 9 (F)	1569	1558	1553	1567	1575	1588	1590	1584	1579	1580	1581	1586	1591
UNEXP. 1 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 2 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 3 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 4 (F)	133	1170	1170	1166	1169	1168	1168	1174	1180	1182	1187	1187	1186
UNEXP. 5 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 6 (F)	1271	1267	1266	1273	1279	1288	1291	1286	1285	1285	1283	1287	1293
UNEXP. 7 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 8 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 9 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
UNEXP. 10 (F)	-	-	-	-	-	-	-	-	-	-	-	-	-
PRESSURE 1(IN. W.C.)	0.083	0.084	0.084	0.089	0.088	0.087	0.085	0.088	0.081	0.085	0.085	0.086	0.087
PRESSURE 2(IN. W.C.)	0.005	0.009	0.008	0.012	0.011	0.009	0.009	0.010	0.004	0.007	0.008	0.007	0.009
PRESSURE 3(IN. W.C.)	-0.019	-0.017	-0.018	-0.020	-0.018	-0.009	-0.019	-0.024	-0.021	-0.013	-0.018	-0.009	-0.020
AVG FURNACE (F)	1580	1581	1583	1590	1596	1601	1603	1605	1609	1609	1611	1615	1621
MIN FURNACE (F)	1543	1541	1544	1553	1557	1558	1560	1562	1563	1564	1564	1573	1578
MAX FURNACE (F)	1619	1618	1625	1632	1636	1644	1647	1648	1655	1650	1653	1657	1666
AVG UNEXP. (F)	702	1219	1218	1220	1224	1228	1230	1230	1232	1234	1235	1237	1240
MIN UNEXP. (F)	133	1170	1170	1166	1169	1168	1168	1174	1180	1182	1187	1187	1186
MAX UNEXP. (F)	1271	1267	1266	1273	1279	1288	1291	1286	1285	1285	1283	1287	1293

## Test Data

	52	53	54	55	56	57	58	59	60
TIME (MIN)									
STND. TEMP.(F)	1669	1673	1677	1681	1685	1689	1693	1697	1700
FURN. TEMP. (F)	1623	1623	1625	1629	1635	1636	1638	1641	1646
STND. AREA (DEG-MIN)	69559	71163	72771	74383	75999	77619	79242	80870	82501
TEST AREA (DEG-MIN)	66554	68109	69666	71226	72790	74358	75927	77499	79074
AMBIENT (F)	73	73	73	74	74	74	74	74	75
FURN. 1 (F)	1662	1663	1666	1670	1678	1675	1676	1683	1686
FURN. 2 (F)	1588	1593	1592	1594	1594	1599	1598	1602	1604
FURN. 3 (F)	1635	1633	1631	1636	1646	1648	1649	1658	1664
FURN. 4 (F)	1662	1660	1665	1669	1680	1676	1679	1683	1691
FURN. 5 (F)	1615	1613	1616	1618	1622	1627	1625	1625	1632
FURN. 6 (F)	1636	1632	1633	1641	1650	1645	1646	1657	1664
FURN. 7 (F)	1625	1623	1627	1630	1638	1639	1643	1647	1654
FURN. 8 (F)	1582	1585	1591	1594	1593	1597	1603	1601	1605
FURN. 9 (F)	1601	1603	1608	1614	1612	1615	1618	1613	1615
UNEXP. 1 (F)	-	-	-	-	-	-	-	-	-
UNEXP. 2 (F)	-	-	-	-	-	-	-	-	-
UNEXP. 3 (F)	-	-	-	-	-	-	-	-	-
UNEXP. 4 (F)	1187	1187	1186	1188	1191	1194	1194	1197	1200
UNEXP. 5 (F)	-	-	-	-	-	-	-	-	-
UNEXP. 6 (F)	1297	1299	1301	1302	1302	1307	1310	1309	1312
UNEXP. 7 (F)	-	-	-	-	-	-	-	-	-
UNEXP. 8 (F)	-	-	-	-	-	-	-	-	-
UNEXP. 9 (F)	-	-	-	-	-	-	-	-	-
UNEXP. 10 (F)	-	-	-	-	-	-	-	-	-
PRESSURE 1(IN. W.C.)	0.084	0.083	0.082	0.085	0.085	0.081	0.083	0.083	0.082
PRESSURE 2(IN. W.C.)	0.004	0.006	0.004	0.008	0.006	0.004	0.006	0.006	0.003
PRESSURE 3(IN. W.C.)	-0.017	-0.021	-0.016	-0.012	-0.012	-0.020	-0.029	-0.016	-0.017
AVG FURNACE (F)	1623	1623	1625	1629	1635	1636	1638	1641	1646
MIN FURNACE (F)	1582	1585	1591	1594	1593	1597	1598	1601	1604
MAX FURNACE (F)	1662	1663	1666	1670	1680	1676	1679	1683	1691
AVG UNEXP. (F)	1242	1243	1244	1245	1246	1250	1252	1253	1256
MIN UNEXP. (F)	1187	1187	1186	1188	1191	1194	1194	1197	1200
MAX UNEXP. (F)	1297	1299	1301	1302	1302	1307	1310	1309	1312





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# **General Specifications**

**General Construction Specification  
for  
UNOLS Standard Portable Scientific Van**

Rev 7  
January 2005

**General:**

This document is intended to be used as the specification for the construction of portable scientific vans used aboard research vessels in the UNOLS (or academic) research fleet. This document may also be used as guidance for institutions or scientists who wish to construct their own vans for use on UNOLS or other research vessels.

The goals of this document are:

- To ensure safe design and construction of portable vans used on UNOLS vessels.
- To standardize certain design elements to best meet the needs of the scientific community.
- To make portable vans no longer “ship specific”, and thus usable throughout the UNOLS fleet.
- To reduce overall cost by facilitating bulk purchase.
- To ensure the ability to transport by common carrier as “containerized cargo”.

This specification includes requirements based on US regulations (46CFR, sub-Chapter “U”), and the UNOLS/RVOC “Research Vessel Safety Standards”. There are currently no international regulations (IMO or other) dictating the construction requirements for portable scientific vans. Some classification society standards for portable structures do exist (ABS and DNV) and were used for guidance in certain areas.

**Notes and Highlights:**

Notes (shown in italics) are included for informational purposes to aid both the Owner and the Vendor. They are not considered part of the specification requirements per se. Highlighted text is intended to emphasize the critical aspects of the specification and are generally regulatory requirements.

**Drawings:**

The drawings attached to this specification are for REFERENCE ONLY. They are included only to show intent, not the exact details of final construction. Final construction drawings shall be provided by the vendor.



**Intended Purpose:**

These vans are intended to be transportable by common carrier between institutions and foreign ports, as well as used on different research vessels. The ships involved may either be USCG inspected or uninspected. They are intended to be secured in a variety of locations on board. This will vary between ships and from project to project. However, the locations and use on research vessels, generally speaking, should not be considered “hazardous”, other than the normal rigors of being at sea.

The standard van “box” described herein is considered to be generic and may be outfitted in a variety of configurations depending on the particular need. Separate Outfitting Specifications and suggested arrangements for each type of van shall be included as attachments to this specification. See **TABLE 1** for summary of van types and associated requirements.

**Size:**

The standard 20-foot ISO shipping container is considered the preferred configuration for portable scientific vans in the UNOLS fleet. The dimensions for 20-foot containers are given in the chart below. All details given in this specification are for the 20-foot van.

It is recognized that smaller, larger, or custom sized vans may also be needed in certain instances. These may be built as long as the dimensions shown below are provided by the owner. Though a standard 10-foot container may no longer be available, this may be a very convenient size for some applications and the dimensions are included for information.

*Note: The standard 20-foot container shall be used whenever possible to allow the standardization benefits listed above and facilitate economical transport by common carrier.*

	<b>20-foot</b>	<b>10-foot</b>	<b>Custom</b>
<b>L1</b>	19'-10.5"	9'-9.75"	Variable
<b>L2</b>	19'-2.5"	9'-1.75"	L1 - 8"
<b>W1</b>	8'-0"	8'-0"	8'-0" (or less)
<b>W2</b>	7'-5"	7'-5"	W1 - 7"
<b>H</b>	8'-6"	8'-6"	8'-6" (or less)

**Weight:**

Gross Weight: The 20-foot van shall be designed for a maximum gross weight of at least **25,000 lbs.** The empty, or “tare” weight, should be kept to a minimum to allow for outfitting and a maximum scientific payload.

*Note: A standard 20-foot ISO shipping container is rated for a gross weight of approximately 60,000 lbs.*

Tare Weight: For the purposes of outfitting, the “tare weight” shall be considered to be the equipment and materials given in this specification. All additional items added to outfit the van for its intended purpose (See Outfitting Specification), and equipment added by the scientific party for a particular project, shall be considered “payload”.

Once completed, the van “box” (less outfitting items) shall be weighed to determine the tare weight. Both gross weight and tare weight shall be clearly indicated. (See **Placards and Labeling**).

*Note: The owner of the van (e.g. vessel operator or Principle Investigator) shall be responsible for determining the weight of the van after outfitting and loading for stability calculation purposes, and to ensure that the van does not exceed the maximum allowable gross weight.*

### **Inspections and Certifications:**

US Coast Guard: Once outfitted for its intended purpose, the van shall be USCG inspected as required in **TABLE 1**. The van shall be fitted with an inspection plate (See **Placards and Labeling** below).

*Note: Only accommodations, power and machinery, and chemical storage vans are required to be USCG inspected. Lab vans are NOT considered to be accommodations (See **TABLE 1**). Since these vans may be used on both inspected and uninspected UNOLS vessels, and may be outfitted in a variety of configurations, the structural and fire rating requirements described herein make basic van “box” capable of being USCG inspected by submitting for formal plan approval if needed.*

American Bureau of Shipping (ABS): If the van is constructed by modifying a standard ISO container, once completed the van shall be re-certified and fitted with an ABS approved “CSC Plate” (Convention for Safe Containers) and/or “Customs Approval Plate”.

**“TOP LOAD” ONLY:** If not fitted with an original CSC and Customs Approval Plate, or if the vendor’s design is not certified by ABS, the van may, as an alternative, be specified as “Top Load Only” and shall be properly labeled to this effect. (See *Placards and Labeling*).

*Note: Since the containers are structurally altered from their original condition to construct these vans, the “CSC Plate” and “Customs Approval Plate” will have to be re-certified for the van to be carried as containerized cargo. These certifications guarantee structural suitability so that (among other things) a certain number of other containers may be stacked on top of them. Custom built vans (such as aluminum) will not normally have these original certification, and the cost for acquiring such a certification can be prohibitive. A second and more cost effective option is to specify that the vans be carried as “TOP LOAD ONLY”. Top loading will ensure that other containers are not stacked on top of them, however, there will be an increase in the shipping cost. They can also be shipped via Roll-ON/Roll-Off ship (R/O-R/O) on a standard container trailer chassis.*

**Construction:**

The details of construction must be adequate to withstand the rolling and pitching of a ship at sea, vibration, lifting with a crane by the ISO corners, and transport via commercial carrier as containerized cargo. “Carried as containerized cargo” implies that it may can be carried with other containers, and be secured by conventional container securing hardware. **The vans shall have ISO corners all around.**

Materials, equipment, and workmanship involved in the construction are to be new and of a quality conforming to “first-class marine practice” for use on vessel in ocean service. By “first-class marine practice” it is meant to a standard or level which leads to: 1) long service life, 2) lower maintenance cost, 3) ease of operation by shipboard personnel, 4) increased reliability in service, 5) availability of spare parts and or service from the manufacturer.

**All external construction seams shall be 100% continuously welded to reduce possible areas for corrosion.**

Scientific vans are portable and not structurally integral to the ship. This specification establishes the following requirements to ensure personnel are adequately protected.

**Panel Stiffness:** For vans “normally occupied by personnel” (See **TABLE 1**), the panel stiffness shall be designed to meet the pressures described in **ABS High Speed Rules, Side and Aft Bulkheads (2.0 psi for plate, 1.5 psi for stiffeners)**. A standard steel, 20-foot ISO container DOES NOT meet this requirement on its own, and additional stiffening is required. See DETAILS A and B for steel and aluminum side panel details.

*Note: Vans built to this standard must also be carried in a “Sheltered Location” per the US Coast Guard definition negotiated with UNOLS.*

**Fire Rating:** The van shall have a fire rating as described in **TABLE 1**. Vans “normally occupied by personnel” should be constructed of non-flammable material all around to help control the spread of fire and protect personnel. Vans which are NOT normally occupied by personnel may be constructed of “other substantial material suitable for a marine environment” per 46CFR 195.11-10(b).

*Note: Other than as described in **TABLE 1**, portable vans aboard research vessels are not required to have a specific fire rating on their own. The maximum fire rating aboard Sub-Chapter U vessels is “A-30” which is for boundary bulkheads between accommodations and laboratories greater than 500 square feet. US Coast Guard has determined that the entire “van/ship system” may be considered in determining the overall rating of the boundary.*

*The aluminum “van/ship system” (DETAIL A) has been flame tested to an “A-30” rating in order for the aluminum standardized van to be placed anywhere on board without regard to the van type or adjoining compartment. The aluminum configuration was considered to be a worst case, and a similarly insulated steel van should easily meet this requirement as well. The stiffened ISO container (DETAIL B with no insulation) has been tested to “A-0” requirements and is suitable for vans which require that rating.*

**Deck Loading:** The interior deck structure shall be designed and built to support a minimum van payload of 20,000 pounds evenly distributed (125 lbs./sqft).

**Top Panel Loading:** The top panel of the van shall be stiffened to support a load of 8,000 pounds evenly distributed (50 lbs/sqft).

**Recessing:**

Even if not specifically stated in this specification, all appendages to the van shall be recessed or removable such that no part extends beyond the sides, top, ends, or bottom of the van to facilitate transport by common carrier.

**Materials:**

The materials used in constructing the “box” itself depend on the final purpose of the van (See **TABLE 1**). All materials used in both construction and outfitting must be of commercial grade, suitable for the marine environment, and meet applicable USCG and ABS standards. Particular attention shall be taken to bulkhead sheathing, decking material, and insulation. All fasteners (bolts, screws, etc.) used shall be marine-grade stainless steel.

*Note: If weight is not an issue, the van may be constructed of steel. Aluminum or other lightweight materials should be used when weight (or maintenance) considerations are important to a particular operation or project.*

**Steel Option:** If constructed of steel, a standard 20-foot shipping container may be modified to meet the requirements in **TABLE 1**. The shipping container used shall have a steel deck, or have a steel deck inserted in lieu of the standard wooden deck. If the standard wooden deck is retained, a minimum 14 gauge steel “belly plate” must be added (10 gauge is recommended per **DETAIL C**), and the wooden deck treated on both sides with a fire retardant coating. A steel van may be constructed new if it generally follows the standard 20-foot container design.

**“Lightweight” Option:** If constructed of aluminum, only marine grade alloys such as 5086 plate and 6061 structural framing sections shall be used, and the design shall be such that it meets (or exceeds) the construction requirements given herein. Also, it shall be ALL aluminum with welded seams, as opposed to aluminum fastened to steel framing by mechanical means to prevent corrosion from the contact of dissimilar metals in the marine environment. Other materials may be considered for the “light weight” option as long as they meet the construction requirements given in this Specification, including **TABLE 1**.

*Note: Aluminum is a suitable, nonflammable material for laboratory van construction per TABLE 1. However, the standard aluminum panel design shown in DETAIL A DOES NOT meet A-0 requirements on its own, and thus cannot be used for several of the van types given in TABLE 1.*

**Arrangement:**

Precise door locations and the arrangement type used (“Stand-alone” or “Mating/AGOR”) shall be called out in the Outfitting Specification.

*Note: Three (3) means of escape built into the design helps ensure that at least two (2) can always be kept completely clear no matter which ship the van is embarked on. The exact locations of the doors should best suit the vessel the van is normally carried on.*

**“Stand-alone” Arrangement:** Vans which are likely to be used on a variety of vessels shall normally be fitted with two personnel doors, an escape hatch, and large cargo doors. One of the personnel doors should be located generally on the forward end of the van (Side “F”), and the other door located on the opposite end (Side “A”), or sides of the van. See “General Arrangement” Drawing, Sheet 2 of 5.

**“AGOR” Arrangement:** Vans which are normally carried on ships where the van mates directly to the deck house (as on the AGOR vessels) will require more specific door locations, a smooth forward face (Side “F”), and specific positioning of service connections. See “AGOR-General Arrangement” Drawing, Sheet 3 of 5. In this

arrangement the large cargo doors are eliminated. The aft personnel door shall be as large as practicable (preferably 36" or greater) to facilitate the loading of equipment.

### **Doors and Hatches:**

Except for vans requiring an external "A" fire boundary (See TABLE 1), the doors, hatches, and portlights shall be aluminum. If fitted to a steel van, they shall be bolted in place and fitted with an adequate gasket which mechanically isolates the two materials (to prevent corrosion by dissimilar metals), as well as forms a watertight seal.

Personnel Doors: The personnel doors and escape hatch shall be marine grade (FREEMAN Brand, 1100 Series, or Owner approved equivalent). By "equivalent" it is meant that they are rated "weathertight", fitted with at least 3 dogs, and both the dogs and handle can be fully operated from both sides. **The personnel doors shall be at least 28" wide (clear opening)**, with a height as large as practicable, and open outward if possible. The door shall be thermally insulated. They shall be fitted with a marine grade door handle and either a hasp, a double pad eye for a padlock, or lock set integral to the door handle. The doors shall also be fitted with a means of securing them in an open position while at sea, and a pneumatic closure mechanism to prevent the door from slamming shut due to ship's motion. The doors shall be recessed such that no hardware from the door protrudes beyond the side of the van.

*Note: If a padlock is used, it may secure the van during transport or while alongside, but should be removed by the operator or owner while the van is at sea.*

Escape Hatch: The emergency escape hatch shall be FREEMAN Brand, 2400 Series or Owner approved equivalent, and **have a minimum 20" x 20" clear opening**. By "equivalent" it is meant that they are rated "watertight", fitted with at least 4 dogs, and all dogs can be fully operated from both sides. The dogs may be operated from the outside themselves, or by means of a deck "wrench" ("T" handle). If a deck wrench is used, a bracket for stowage shall be located in the corner recess and the wrench's intended use shall be clearly label with an engraved placard. The hatch shall be located between the rows of mounting channel in the overhead. **A ladder, or adequate means of egress, shall be installed both on the inside and outside to facilitate escape**. The internal ladder shall be able to be stowed such that it is out of the way, but readily available and **clearly marked for use**. The external ladder shall be recessed into the side of the van.

Cargo Hatch: The aft end of the van shall be fitted with a large cargo hatch having the largest practicable clear opening. The hatch shall be fitted with hinged double doors, fitted with a locking mechanism or internal dogs sufficient in number to rate it "weather-tight". The lower edge of the hatch opening shall be flush (or nearly flush) with the finished deck of the van to facilitate loading of large equipment by forklift or dolly. The cargo doors, and inserted personnel door (if installed) shall be recessed such that no hardware from the door or cable pass protrudes beyond the side of the van.

If one of the personnel doors is inserted in the large double doors of a modified 20-foot container, the structure of the door shall be reinforced appropriately to support the door, or the entire door shall be fabricated new, whichever is deemed cost effective.

*Note: The standard cargo doors on an ISO container can not be considered an adequate “means of escape” since the dogging mechanism can not be operated from the inside. Thus proper personnel doors and escape hatches (described above) are required.*

**Interior Preparation and Finish:**

If the van is constructed of steel, all of the interior steel surfaces shall be properly prepared and coated with a marine-grade paint system (epoxy or other) before application of insulation, sheathing, or decking.

The interior finish of the van, including bulkhead/overhead sheathing and decking, shall be according to the appropriate Outfitting Specification.

**Mounting Channel:**

All vans shall utilize mounting channel (Uni-strut, Kindorf, or equivalent) to secure outfitting and scientific equipment in the van per Options 009 and 010 below. The recommended size is 1-5/8” x 1-5/8” mounting channel for optimal utility, but thinner sections may be used to maximize internal space in the van if desired.

**Insulation:**

The vans are intended to be used in both cold climates (0 degrees Fahrenheit) and tropical climates (100 degrees Fahrenheit). For vans “normally occupied by personnel”, all exterior surfaces shall be insulated with an **incombustible material suitable for marine use, such as rock wool**. Insulation thickness shall fully fill the voids and suite the structural configurations shown in DETAILS A and B. Normally the 1.5”-2” of rock wool is sufficient to provide adequate thermal insulation for the climates described above, without sacrificing internal space. Additional insulation or boundary layers may be added for more severe climates, or for vans of a special purpose (such as cold laboratory vans). Special insulating requirements shall be called out in the appropriate Outfitting Specification. **Insulation other than rockwool may be considered for these specialized van types, though careful consideration should be given to flammability.**

*Note: Rockwool insulation is required per DETAILS A and B in order for vans to meet the A-30 van/ship system requirement, and thus be placed anywhere on board.*

**Exterior Finish:**

Unless otherwise specified by the Owner, the color of the van shall be white. White, other light colors, or special paint additives, are preferable because of their ability to reflect heat in the climates described above.

The paint system used shall be marine grade and applied according to paint manufacturer’s recommendations. The surfaces shall be adequately prepared before

application of primer. The exterior shall be coated with a marine-grade primer (epoxy or other) suitable for the material used. The finished top coat(s) shall be semi-gloss and easily cleaned.

**Wire Passes/Vents:**

Vans which are “normally occupied by personnel” shall have at least one (1) 4-6”DIA wire pass for connection of general alarm, ship’s internal phone system or public address system, data and/or scientific cables, and ship’s fire detection system (if available). The details, number, and precise location of the wire passes/vents will be called out in the Outfitting Specification, but shall be as described in Option 008.

*Note: It is recommended that laboratory vans have 5 – 6 such penetrations for use with fume hoods, fresh make-up air, and for the routing of various scientific systems.*



**Electrical:**

All wiring shall be in accordance with “Subchapter J” of 46 CFR (Parts 110-113), “Shipboard Wiring Requirements”, IEEE Standard 45-1998, “IEEE Recommended Practice for Electric Installations on Shipboard” and applicable SOLAS requirements (Chapter II-1, Part D , SOLAS Consolidated Edition, 1997)

Shipboard wiring methods shall be used for all cables. Cables should be surface mounted and routed in between, over, or under the mounting channel. All fixtures, boxes, and devices must be corrosion resistant and intended for marine/commercial use. Major equipment, such as the HVAC unit or water heater, should be on separate circuits. Several “spare” circuits shall be provided in the distribution panel. All electrical components must be located at least 18” above the deck of the van.

The van shall be specified with either:

- **3-phase** power supply and distribution which will operate either from a “460” Vac, ungrounded ship’s system or 208/115 Vac, grounded neutral, system. “240” Vac may also be selected as the input voltage if desired by the owner.
- or
- **Single-phase** power supply and distribution which will operate from 460, 240 or 208 Vac, ungrounded ship’s systems and either 240 Vac or 208/115 Vac, grounded neutral, systems.
- The van shall be fitted with two (2) power supply plugs: one for ungrounded shipboard systems and the other for grounded neutral systems, which will generally be shore based.

*Note 1: The most common electrical service available on ships in the UNOLS, NOAA, USCG, and international research vessel fleet is 460 Volt (V), 3-phase ( $\phi$ ) power. US ships will run at 60 Hertz (Hz) while some foreign vessels can be expected to operate at 50 Hz. 3-phase supply and distribution systems should be considered for vans with high power requirements such as air compressors or refrigeration systems. Single-phase power supply and distribution should be adequate for general purpose lab, berthing, and storage vans. If a ship with 3-phase van supply power is using a single-phase van, then the electrical load will only be on 2 of the 3 legs. A 460 V, 20 Ampere or 240 (208) V, 40 A service should be adequate for most vans.*

*Note 2: “460” Vac can vary from 440 volts to 480 Volts depending on the ship. “240/120” Vac supplies are single-phase supplies found in residential and light commercial buildings. 208/115 Vac systems are 3-phase systems found in commercial/industrial buildings and some ships (generally ungrounded). The single phase van specified in this document will provide 240/120 Vac when connected on shipboard (regardless of the supply voltage), but may provide either 240/120 Vac or 208/115 Vac when connected ashore depending on the supply voltage. The distribution side of the van supply systems have a grounded neutral which requires isolation*

*transformers for shipboard use and must be connected to the grounded neutral to comply with the National Electric Code when the van is ashore.*

Distribution Panel (Single-phase van): The interior distribution in the single-phase van will be 240/120 Vac with the neutral grounded to the van structure at the main circuit breaker. This service is generally found in shore-based residences and small commercial buildings allowing readily available equipment (e.g., HVAC units) to be installed in the van and will allow the van to be connected to shore-side services when not on the ship. The van shall include a step-down/isolation transformer of a suitable rating to isolate and convert the ship's 460, 240 or 208 V to the 240/120 V for the interior.

Distribution Panel (3-phase van):The interior distribution in the 3-phase van will be 208/115 Vac with the neutral grounded to the van structure at the main circuit breaker. This service is generally found in shore-based commercial and light industrial buildings, again, allowing readily available equipment (e.g. HVAC units) to be installed in the van and will allow the van to be connected to shore-side services when not on the ship. The van shall include a step-down/isolation transformer of a suitable rating to isolate and convert the ship's 460V (or 230V if chosen by the owner) to the 208/115 V for the interior.

The primary side of the transformer(s) will be ungrounded. The secondary (240 or 208/115V) side(s) of the transformer(s) shall have a grounded neutral. All structural metal parts of the van, all electrical panels and enclosures, any metal plumbing lines, the HVAC unit, and the uni-strut, will be bonded together and to the electrical system neutral.

The van shall be fitted with the male end ("inlet") of the power plugs specified for ship and shore power. The inlets shall be located in the recessed corner of the van as shown in the General Arrangement Drawings. 50-foot power cables shall be provided. The cable shall be 3 or 4 conductor as required (2 or 3 current carrying plus a ground0 SOWA or equivalent rubber covered cable), sized to match the electrical service, and fitted with a female connector to mate with the van inlet. The other end of the cable shall be left unterminated so that the vessel operating institution can match the cable to the existing ship's power feed plug.

The van shall be fitted with four (4), 4-foot, white, fluorescent light fixtures, and two (2), 2-foot, red fluorescent light fixtures secured to the mounting channel in the overhead. The red and white lights shall be on separate switches. A total of eight (8), 20 Amp receptacles shall be placed on the long sides of the van (4 per side), at 48" above the deck, in between the uni-strut. All receptacles are to be on separate GFI circuit breakers, or alternatively, GFI receptacles may be used in all locations.

**HVAC:**

As a minimum, vans normally occupied by personnel shall be fitted with a self-contained, air cooled, HVAC (Heating, Ventilating, and Air Conditioning) unit. The unit shall be sized to provide enough cooling capacity to maintain an internal temperature of 70 degree Fahrenheit with a maximum outside temperature of 100 degrees F, a fume hood in operation (120 LFM and 320 CFM), and two people working inside (minimum 20,000 BTU). The unit would preferably be fitted with a thermostat. It shall be capable of providing external ventilation for fume hood supply air, and operate from the 240/208VAC service. The exterior coils of the unit shall be resistant to corrosion in the marine environment. The unit shall be located in the recessed corner of the van as shown in the “General Arrangement” Drawings.

The recessed area must be sized such that the unit can be easily removed for maintenance, and allow no portion of the unit to extend beyond the sides or top of the van. The unit shall be adequately supported by the van structure to withstand transport, loading, and the rigors of sea. If a “window-style” unit is used, the opening in the van side shall be over-sized by at least 1” on the sides and top to accommodate a different make/model HVAC unit in the future. The gap between the HVAC and the van shall be covered by removable metal trim on the inside and/or outside of the van.

Greater (or less) heating, cooling, or ventilation capacity may be required due to the van’s special purpose, or the environment in which it will be used. These requirements, and/or particular equipment make and model, shall be called out in the Outfitting Specification.

**Plumbing Services:**

The plumbing services shall be located in the recessed corner of the van. They shall be positioned as low as practicable to allow proper drainage of the plumbing fixtures.

The area shall be sized to accommodate the threaded couplings listed below and allow hoses to be easily connected. It shall consist of a bolted cover plate and gasket on an angle coaming as shown in DETAIL F to facilitate maintenance and modifications. The plate and couplings shall be stainless steel. All of the penetrations shall be fitted with shut-off valves on the inside of the van. For “A”-rated vans the valves shall be constructed of metal (stainless steel, bronze, etc.) All penetrations shall be fitted with plastic cam-and-groove fittings on the outside of the van.

Fittings:

Drain	2 Each	1-1/2” DIA
Supply	4 Each	3/4” DIA

If plumbing services are to be omitted or modified, it shall be called out in the Outfitting Specification.

**Placards and Labeling:**

The placards and labeling described below are for ALL vans. Additional placards and labeling required for the van’s intended purpose will be called out in the Outfitting Specification.

1. All electrical devices and services, safety equipment, escape hatches, etc. shall be properly labeled with engraved-type placards, decal of a durable material, or stenciling. All receptacles shall be labeled to the corresponding breaker in the distribution panel.
2. Builder’s Plate: All vans shall be fitted with an engraved placard on the interior of the van giving the following information:

“Owner: ”(*UNOLS operating institution or other*)  
“Van Type:” (*UNOLS Category*)  
“Serial Number:” *XXX*  
“Date of Construction:” *XX/XX/XX*  
“Constructed By:” (*Vendor Name*)

3. USCG Inspection Plate: All vans which are required to be USCG inspected shall also have a stamped **steel** placard permanently attached in a convenient location. The Coast Guard propeller stamp is to be embedded on the steel placard signifying compliance with the approved plans. The placard shall also include the following information:

*Module Serial Number: \_\_\_\_\_*  
*Approval subject to the comments of OCMI \_\_\_\_\_ approval letter dated \_\_\_\_\_.*  
*For use on (type of vessel): \_\_\_\_\_*  
*Approved for installation in a (protected, partially protected or exposed) location.*  
*Structural fire protection boundary: \_\_\_\_\_*  
*Gross Weight of module (van): \_\_\_\_\_*

3. Purpose and Weights Plate: All vans shall be fitted with an engraved placard on the exterior of the van giving the following information:

PORTABLE SCIENTIFIC VAN  
FOR USE ON RESEARCH VESSELS ONLY  
  
MAXIMUM GROSS WEIGHT = 25,000 LBS  
TARE WEIGHT = X,XXX  
  
TOP LOAD ONLY

*Note: If an ISO container is used, the Maximum Gross Weight called out in the CSC plate shall be substituted for the 25,000 lbs. The words "TOP LOAD ONLY" shall be shown only on custom built vans which are not fitted with a CSC Plate.*

4. Plumbing Services (DETAIL F): Once outfitted, the purpose of each penetration on the plumbing panel shall be properly labeled with an engraved placard on the outside of the van. Penetrations which are not used shall be labeled "Spare".
5. Top Panel Loading: A placard indicating the top panel loading capacity (normally 8000lbs) shall be posted on the side of the van.

#### **Securing and Lifting Hardware Options:**

The van shall be fitted with fork-lift pockets at the bottom, as on a standard 20-foot ISO shipping container: The slots are approximately 14" wide, 4-1/2" high, and spaced 81" apart (center to center).

*Note: The van may be secured to the vessel in a variety of ways depending on exact location desired and the arrangement and details of the vessel utilized. Refer to **TABLE 2** for recommended securing options. All securing hardware is to be provided by the vessel operator. **TABLE 2** lists certain hardware and methods of securing for guidance purposes only. Responsibility for properly securing the van lies with the Master of the vessel.*

*The van may be lifted aboard by a variety of means depending on the facilities available aboard the ship and/or ashore. See "LIFTING OPTINS" Drawings, Sheets 1-4. The responsibility for the method selected, and adequacy of the hardware used, is the responsibility of the Master of the vessel.*

#### **Deviation from the Specification:**

Portions or specific details given in this document may be omitted for economy or because of a van's particular purpose. However, it is strongly recommended that parties having a scientific van built adhere to these standards as closely as possible to ensure that it can be carried on UNOLS vessels.

The "Options" section at the end of this specification show items that may be desirable for some applications, but are not required. Other deviations may be noted as part of the Outfitting Specification.



**OPTIONS LIST**  
**UNOLS Standardized Van**

May 2004

- Option #001:** Hand Rail Sockets: If personnel intend to utilize the top of the van, the top perimeter shall be fitted with recessed sockets, approximately 4" deep, to accept 1-1/2" DIA pipe rails, spaced no greater than 60" O/C. The design shall be such that they are "free draining", allowing no debris or water to accumulate. **For steel vans, construction of the sockets shall be of 316 stainless steel or Corten** (See DETAIL G).
- Option #002:** Lifting Hardware: The van shall be provided with lifting hardware per "LIFTING OPTION" Drawings (*Describe and specify sheet number*). If spreader bar is custom fabricated per Sheet 3, it shall be load tested to 125% of Maximum Gross Weight rating before delivery.
- Option #003:** Recess Cover: The open portion of the recess not accommodating the ladder of shall be fitted with a full height, hinged door constructed of the same material as the van and coated similarly. The hinges shall be corrosion resistant and easily lubricated. The door shall be fitted with a means of securing it securely shut in a seaway.
- Note: If it is desired to close off the opening containing the ladder, this may be done by bolting a plate to the ladder rungs. All vans should be fitted with the aluminum flat bar flanges shown in the General Arrangement Drawings, so that blanking plates can be easily added by the Owner at a later date.*
- Option #004:** Recess Louvers: The open sides of the recess shall be fitted with hinged louvered doors, sufficient to allow the flow of air, but designed such that salt spray is deflected. They shall be constructed of the same material as the van and coated similarly. The hinges shall be corrosion resistant and easily lubricated. The doors shall be fitted with a means to keep them secured shut in a seaway.
- Option #005:** Door Window: The door(s) shall be fitted with a fixed, marine grade, window/portlight. The window/portlight shall be fitted externally with a removable deadlight or closure to protect it during transport by common carrier. The deadlight shall be at least 3/16" thick if aluminum, and 1/8" thick if steel. It shall be secured in place by 1/4" DIA (minimum) stainless steel fasteners.

**Option #006:** Window/Portlight: The van shall be fitted with (x) (*number and location to be specified*) marine-grade window/portlight (FREEMAN Brand Series 4000 or Owner approved equivalent) each being approximately 11" x 22". By "equivalent" it is meant that they have corrosion resistant frames and tempered glass. The window/portlight shall be fitted with a removable (or hinged) deadlight or closure to protect it during transport by common carrier. The deadlight shall be at least 3/16" thick if aluminum, and 1/8" thick if steel. It shall be secured in place by 1/4" DIA (minimum) stainless steel fasteners.

**Option #007:** Deck Drain: The deck inside shall have (x) (*number and location to be specified*) 1-1/2" DIA drains. The drains shall be fitted with removable plugs to prevent spillage on deck, and fitted externally with a cam-and-groove type fitting for installation of a drain hose. **For steel vans, the deck drain construction shall be all 316 stainless steel.**

**Option #008:** Wire Passes/Vents: Wire passes shall be installed according to either DETAIL D or DETAIL E (*Specify*). They shall be located halfway between the rows of mounting channel on the bulkheads, and as near the top of the van as practicable per the arrangement drawings.

These penetrations may be used for either cable passes, exhaust vents, or air supplies. They shall be able to accept either a removable cowling, gooseneck, or closure (See DETAIL E). The closure (cover plate, plug, etc.) shall be used during transport or when the penetration is not in use. The penetration shall be such that an exhaust outlet of internal equipment such as fume hoods can be easily attached (or removed) by bolting flange, threaded connection, or clamps.

All removable wire pass closures shall be mechanically fastened to the wire pass by a strong link or hinged strap to prevent misplacement. The plugs or caps should be installed such that they can be inserted with the strap in place. Alternatively, the closures may have a dedicated storage rack or holder inside the van to prevent misplacement. The holder shall be secured to the mounting channel in a convenient location, and designed such that it securely holds all cover plates and cowlings when not in use

*Note: DETAIL D should be used only where economy is important. DETAIL E shall be used on laboratory vans for maximum utility. These penetrations shall be installed as high as practicable in the side corners of the van, and the two ends as shown in the "General Arrangement" Drawing.*

**Option #009:** Bulkhead Mounting Channel: The interior of the van shall be fitted with corrosion resistant mounting channel (Uni-strut, Kindorf, or equivalent) all around for securing equipment and furnishings. It shall be fitted on all four bulkheads (including large cargo doors), and the overhead. The channel shall be surface mounted at approximately 22" O/C, and orientated vertically on the bulkheads. They shall be mechanically fastened directly to the bulkhead and overhead structure (See DETAILS A & B), by 1/4" DIA (min), corrosion resistant fasteners, 12" O/C along their entire length. The channel shall be continuous in length, and extend from 6" above the deck to 6" below the overhead.

**Option #010:** Deck Mounting Channel: The deck shall have corrosion resistant mounting channel (Uni-strut, Kindorf, or equivalent) approximately 22" O/C and aligned with the mounting channel on sides "P" and "S". They shall be recessed such that the finished deck is flush (or nearly flush) with the top of the mounting channel. They shall be mechanically fastened to the deck structure (See DETAIL C), by 1/4" DIA (min), corrosion resistant fasteners, 12" O/C along their entire length. The deck mounting channel shall be fitted with a removable cover to prevent the accumulation of debris.

## **Van Requirements (TABLE 1)**

**TABLE 1 - Summary of Van Types and Requirements (Sub-chapter "U" vessels)**

March 2002

Van Type	Normally Occupied or Experiments Conducted Within	Exterior Fire Rating <i>(See Note 5)</i>	Standard ISO Shipping Container Acceptable?	USCG Inspected	ABS Certified	Applicable CFR's and Regulations
Laboratory <i>General Purpose Isotope Electronics Refrigerated Workshop</i>	Yes <i>(See Note 1)</i>	Non-Combustible Materials <i>(See Note 2)</i>	Yes <i>(with additional stiffening)</i>	No	<i>(See Note 4)</i>	<i>ABS High Speed Rules 46CFR 195.11 46CFR 190.10 46CFR 194.15 46CFR 188.10-11</i>
<b>Accommodations</b> (Berthing)	Yes <i>(See Note 1)</i>	Non-Combustible Materials <i>(See Note 2)</i>	Yes <i>(with additional stiffening)</i>	<b>Yes</b> <i>(See Note 3)</i>	<i>(See Note 4)</i>	<i>ABS High Speed Rules 46CFR 195.11 46CFR 190.10 46CFR 190.15 46CFR 190.20</i>
<b>Chemical Storage</b>	No	A-0	Yes <i>(with additional stiffening)</i>	<b>Yes</b> <i>(See Note 3)</i>	<i>(See Note 4)</i>	46CFR 195.11 46CFR 194.20
<b>Power/Machinery</b>	No	A-0	Yes <i>(with additional stiffening)</i>	<b>Yes</b> <i>(See Note 3)</i>	<i>(See Note 4)</i>	46CFR 195.11
Explosive Storage	No	A-15	Possible <i>(with additional stiffening/insulation)</i> <b>Formal Testing Required</b>	No	<i>(See Note 4)</i>	46CFR 195.11 46CFR 194.10-15
General Storage	No	None	Yes	No	Yes	46CFR 195.11
Freezer/Refrigerator	No <i>(Storage Only)</i>	None	Yes	No	Yes	46CFR 195.11

**Note 1:** Bulkhead pressure in *ABS High Speed Rules/Side and Aft Deckhouse Structure* (1.5 psi for stiffeners, 2.0 psi for plate) has been applied by UNOLS as a minimum for all vans "normally occupied by personnel". Vans to be in a "Sheltered Location".

**Note 2:** "Non-Combustible" = Steel, Aluminum, or materials approved under 46CFR 164.009 (or equivalent).

**Note 3:** Certificate Posted. Inspect every 2-years.

**Note 4:** Once modified, container CSC plate must be re-certified. Custom-built vans may be "TOP LOAD ONLY" in lieu of CSC plate.

**Note 5:** Panel fire rating indicates class of structural fire protection for the exterior of van on its own (to the open deck).



# Outfitting Specifications

- Accommodations
- Calibration Lab
- Chemical Storage
- Cold Lab
- Electronics
- General Purpose
- Isotope Lab
- Power/Machinery
- Trace Metal Clean Lab
- Workshop

# **Outfitting Specifications**

## Accommodations

**This section is under construction!**

Outfitting Specification  
**Calibration Laboratory**  
UNOLS Standard Portable Scientific Van

Version 1  
October 2002

**Owner:** R/V SEWARD JOHNSEN (HBOI). The details described are for the August 2002 Request for Quotation (RFQ) and suit the Owner's particular needs.

**General:**

This document is intended to be used as a specification for the outfitting of an Instrument Calibration Lab van used aboard research vessels in the UNOLS (or academic) research fleet. This specification is intended to comply with 46 CFR 194.15 – “Chemistry Laboratory and Scientific Laboratory” with special consideration for instrument calibration work. It is to be used in conjunction with the UNOLS General Construction Specification.

The van is intended to have stable temperature and humidity control for the accurate processing of water samples. The calibration area of the van shall be capable of maintaining temperature between 18 degrees C (65F) and 24 degrees C (75F) with an accuracy of +/- 1 degree C of the preset temperature, with a minimum outside temperature of 0 degrees C (32F), and a maximum outside temperature of 38 degrees C (100F). Relative humidity shall be maintained at 50%.

This document may also be used as guidance for institutions or scientists who wish to construct their own vans. Specific details given in this document may be omitted for economy or if the van is intended for a particular purpose.

**Material:** Aluminum

**Power:** Standard UNOLS variable voltage, single phase.

**Arrangement:**

This van shall use the AGOR arrangement with the following modifications:

- 1) The forward personnel door shall be relocated to side “S”.
- 2) Plumbing and electrical services shall be located in the aft recess.

**Doors and Escape Hatch Location:**

- 1) The aft personnel door shall be located on end “A” toward side “S”, have a 36” wide clear opening, and be left handed.
- 2) The second personnel door shall be located on side “S”, just aft of the internal bulkhead described below, and be right handed.

- 3) The overhead escape hatch shall be located at the forward end (“F”), on the van center line.

**Bulkheads/Overhead Sheathing:**

The interior bulkheads of the van shall be finished in a smooth, nonabsorbent material, resistant to wear, impact, and staining. The material will be exposed to chemicals and must be easily cleaned with soap and water. The material should also be resistant to common chemicals such as alcohol, acetone, and other common organic solvents. The color chosen should be neutral and light in color (off-white or beige). The overhead sheathing should be gloss white or the same color as the bulkheads. All joints and seams shall be properly trimmed.

**Decking:**

The deck of the van shall be covered with a suitable industrial-grade material laid in a single sheet (seamless) and cover the entire deck area of the van. The deck covering shall be such that it will provide a non-slip walking surface when wet. The deck covering shall extend 4” up the bulkheads all around.

**Internal Bulkhead(s):**

The van shall be fitted with an internal bulkhead located 11’-0” aft from end “F”. This bulkhead forms the humidity/temperature controlled area of the van and adjacent vestibule. The bulkhead shall be suitably framed to support the same insulation and sheathing used on the exterior bulkheads of the van, bulkhead mounting channel, as well as an interior joiner door.

The joiner door shall be fitted with marine grade hardware (PERKO Brand or equivalent). At the bottom of the door shall be a louvered vent, fitted with a damper, to allow (and control the amount) of return air from the conditioned space.

Similar bulkhead(s) and joiner door shall be used to create an internal utility closet just outside of the temperature controlled area (in the vestibule) on side “P”. The utility closet shall have an approximate interior dimensions of 3’ x 3’. Precise dimensions will be to suit the HVAC unit described below, as well as other Owner furnished UPS (3 kVa), and chiller units (Cole Palmer 6505) for the water baths. Separate electrical circuits shall be provided for the Owner furnished UPS and chiller unit inside the utility closet.

Both forward and aft bulkheads of the utility area shall be fitted with a plumbing penetration panel (DETAIL F – less shutoff valves and cam-and-groove fittings) and a 6” DIA Wire Pass/Vent (DETAIL E).

**HVAC:**

The standard HVAC unit described in the General Specification shall be omitted. The van shall be fitted with two (2) water cooled 16,000 BTU Cruiseair brand, reverse cycle air

conditioning units with SMXIII controls and auxiliary heat. Both units shall be connected to a common duct with dampers which prevent backflow when only one unit is in operation. The standard plumbing services panel located in the recess aft, shall be used for the connection of continuous flow sea water, and any necessary drains. All piping for the continuous flow sea water shall be corrosion resistant such as stainless steel tubing or PVC. A plenum shall extend from the HVAC units into the humidity and temperature controlled compartment. There shall be numerous (4-6) controllable, louvered vents on the plenum.

An all-electric HVAC unit may be considered if it can be shown that the unit will meet all of the requirements/capabilities of the Cruiseair units described. Use of the all-electric unit shall be approved by the Owner.

**Insulation:**

Standard per the General Specification, plus heat reflecting additive in exterior paint system.

**Counter Modules:**

[Provided by Owner]

**Sink Module:**

The van shall be provided with 1 (one) sink counter module located outside of the temperature controlled area (in vestibule). It shall be constructed similarly to the standard counter modules except that the under-hung drawer may be omitted. The module shall be secured to at least two (2) sections of mounting channel with 3/8" bolts. The module shall be plumbed with hose and/or PVC pipe to allow easy connection/disconnection of the module to the plumbing penetration panel. The hoses and pipe should be properly secured to the mounting channel or module as appropriate.

The sink used shall be a laboratory grade, deep chemical sink. It shall be fitted with a laboratory grade faucet for hot and cold fresh water, and a separate spigot for raw sea water. The sink module shall be fed (both fresh water and sea water) by the 3/4" supply fittings listed in the General Specification. Hot water shall be provided by a small (~10 gallon or instant-type) water heater located in the sink module.

The drain shall be plumbed into one of the 1-1/2" drain fittings listed in the General Specification and fitted with a barrel-type trap. The drain shall be fitted with a manifold (PVC ball valves) to allow diversion of the waste to either the bulkhead penetration, or into secondary containment within the van. The drain line should be angled slightly downward to the bulkhead penetration to prevent pooling of water.

*Note: The "secondary containment" normally provided is a carboy brought by the science party. This allows chemical waste not able to be discharged over the side or into the ship's tanks to be easily and economically disposed of ashore.*



The sink shall be fitted with a combination emergency eye wash/shower mounted to the channel near the sink. It shall have a proper eyewash station placard (green) fasted to the mounting channel nearby to indicate it's intended use.

**Miscellaneous Outfitting Items:**

The van shall be fitted with the following items:

- 1) Marine-grade emergency light which activates when ship's power is interrupted. It shall be tied into the van lighting circuit. It shall be fitted with a manual on/off switch to prevent discharge of the battery when disconnected from power.
- 2) Smoke detector.
- 3) Two (2), 10# Fire extinguishers, Type BC (1 dry chemical, 1 carbon dioxide).

*Note: Internal communication systems vary widely from ship to ship. Therefore, services such as phone, general alarm, and data shall be provided to the van by the vessel operator on an as needed basis through the temporary wire passes.*

**Placards and Labeling:**

The van and/or internal equipment shall be fitted with the following placards because of the van's intended purpose. These are in addition to the Placards and Labeling given in the General Specification.

Personnel Doors: "SCIENTIFIC LABORATORY" (2" high black letters, exterior side of door)

Emergency Light: "To prevent discharge of battery, turn off switch when van disconnected from power for extended period" (Red engraved placard with white letters)

Eye Wash: Standard OSHA eye wash placard (green with white letters) attached to mounting channel near eye wash/shower.

## OPTIONS LIST

- 1) Option #001: Hand Rail Sockets.
- 2) Option #005: Door Windows, both doors.
- 3) Option #006: Portlight, 1 (one) located on van CL, end “F”
- 4) Option #007: Deck Drain, 2 (two), forward corner side “P”, and aft corner side “S”.
- 5) Option #008: Wire Pass/Vents, (3), end “F”, end “A”, and side “S”/aft.
- 6) Option #009: Bulkhead mounting channel.

Marine Grade incandescent lights shall be used in lieu of the florescent lights described in the electrical section of the General Specification.

Outfitting Specification  
**Chemical Storage Van**  
UNOLS Standard Portable Scientific Van

Version 1  
May 2001

**General:**

This document is intended to be used as the specification for the outfitting of a chemical storage van to be used aboard research vessels in the UNOLS (or academic) research fleet. It is intended to be used in conjunction with the UNOLS General Construction Specification. Because of this van's special purpose several items from this specification should be omitted. Likewise, there are aspects of the specification that must be upgraded to meet this special purpose.

Even if not explicitly stated herein, the outfitting and utilization of the van shall comply with all aspects 46 CFR 194.20 – Chemical Stores and/or Storerooms. These vans are considered to be unmanned, with no scientific experiments conducted within. They are intended for bulk storage of chemicals greater than “small laboratory working quantities”, up to 5-gallon containers of flammable liquids, and up to 55-gallon drums of combustible liquids, and up to eight (8) cylinders of nonflammable compressed gases (excluding oxygen).

**Inspections:**

Chemical Storage Vans are required to be USCG inspected and are subject to plan review according to CFR Sub-Chapter U. They must also be re-inspected at two year intervals.

**Bulkheads/Overhead Sheathing:**

The interior bulkheads of the van shall be finished in a smooth, nonabsorbent material, resistant to wear, impact, and staining. The material will be exposed to chemicals and must be easily cleaned with soap and water. The material should also be resistant to common chemicals such as alcohol, acetone, and other common organic solvents. The color chosen should be neutral and light in color (off-white or beige). The overhead sheathing shall be gloss white. All joints and seams shall be properly trimmed.

**Decking:**

The deck of the van shall be covered with a suitable industrial-grade material laid in a single sheet and cover the entire deck area of the van. The deck covering shall be such that it will provide a non-slip walking surface when wet. The deck covering shall extend up the bulkheads 4” all around.

**Omitted Items:**

The following items shall be omitted from the General Specification:

- 1) HVAC unit
- 2) Standard Receptacles and Lighting (See below)

**Lighting and Electrical:**

The van shall be fitted with four explosion-proof light fixtures on the overhead. All electrical components are to be explosion proof. The light switches shall be located conveniently near the personnel doors.

No receptacles are to be installed to prevent other work from being conducted in the van.

**Fire Protection:**

The van shall be fitted with both a fixed automatic carbon dioxide extinguishing system, and portable fire extinguishers according to Sub-part 194.20-7.

**Ventilation:**

An explosion-proof ventilation system providing at least one complete air change in 4 minutes (320 CFM) shall be installed. It shall be tied into the one remaining 6" DIA bulkhead penetration and fitted with a gooseneck. The remaining bulkhead penetration shall be used for supply air and located on the opposite end of the van from the exhaust. The exhaust vent shall be fitted with a flame screen. The ventilation system actuation shall be located at the entrance and capable of being activated before entry.

**Removable Shelving:**

The van shall be outfitted with a total of six (6) removable shelving units. The units shall be approximately 18" deep, by 48" wide, by 84" high, and be attached to at least two sections of the mounting channel. The shelving units shall be constructed of aluminum, coated steel, or other corrosion resistant material.

The units shall be fitted with four (4) shelves adjustable on 2" intervals, each with a capacity of at least 250 pounds. The shelves shall be constructed of reinforced expanded metal (or equivalent) to facilitate the securing of chemical containers. The shelves shall also be fitted with "hurricane bars" on the sides and front to prevent chemical containers from coming loose in a seaway.

**Secondary Containment:**

The van shall have a secondary chemical containment system at deck level. The secondary containment shall be divided into sections, both port and starboard, which

coincide with the removable shelving units such that the mixing of incompatible chemicals is prevented in a spill. The containment system may be designed integral to the removable shelving units. Each section of the secondary containment system shall have a drain fitted with a valve and plug for the attachment of a drain hose.

**Miscellaneous Outfitting Items:**

The van shall be fitted with the following items:

- 1) Marine-grade emergency light which activates when ship's power is interrupted. It shall be tied into the van lighting circuit and fitted with a manual disconnect switch to prevent the battery from discharging when the van is intentionally disconnected from ship's power.
- 2) Smoke detector fitted to an external strobe light. The strobe light shall be red in color and located in the recessed service area.
- 3) Required safety placards per 46 CFR 194.20.
- 4) ¾" DIA hose and nozzle for the flushing away chemical spills. The hose shall have a bulkhead rack for proper stowage. The hose shall be connected to one of the ¾" supply fittings indicated in the General Specification.



Outfitting Specification  
**Cold Laboratory**  
UNOLS Standard Portable Scientific Van

Version 1  
October 2002

**Owner:** “Pooled” van (National Science Foundation). The details described are for the October 2002 Request for Quotation (RFQ) and suit the needs of a wide variety of scientific users.

**Custodian:** *(Not yet known).*

**General:**

This document is intended to be used as a specification for the outfitting of a Cold Laboratory van used aboard research vessels in the UNOLS (or academic) research fleet. This specification is intended to comply with 46 CFR 194.15 – “Chemistry Laboratory and Scientific Laboratory” with special consideration for sample processing which needs to be conducted in a low temperature environment. It is to be used in conjunction with the UNOLS General Construction Specification.

The van is intended to have accurate and stable temperature control for the processing of scientific samples. The cold area of the van shall be thermostatically controlled between 0 degrees Celsius (32 F) and 10 degrees Celsius (50 F). Once the temperature is set, it shall be capable of maintaining an internal temperature accuracy of +/- 1 degree Celsius with a maximum outside temperature of 38 degrees Celsius (100 F), and a minimum outside temperature of 0 degrees Celsius (32 degrees Fahrenheit).

All internal components and finishes (coatings, sheathing, decking, joinery) shall be selected to meet the special temperature requirements needed for this van.

This document may also be used as guidance for institutions or scientists who wish to construct their own vans. Specific details given in this document may be omitted for economy or if the van is intended for a particular purpose.

**Material:** Two units – one aluminum and one steel.

**Power:** Standard UNOLS variable voltage, single phase.

**Electrical:**

Per General Specification. In addition, install two (2) 208Vac, single phase receptacles per side. Red and white incandescent lights shall be used in lieu of the florescent lights described in the General Specification.

**Arrangement:**

This van shall use the “Stand Alone Arrangement”.

### **Doors and Escape Hatch Location:**

- 1) The forward personnel door shall be located on end “F”, toward side “S”, and be right handed.
- 2) The second personnel door shall be located on side “S”/forward (leading into the vestibule), and be right handed.
- 3) The overhead escape hatch shall be located at end “A”/side “S”

### **Bulkheads/Overhead Sheathing:**

The interior bulkheads and overhead of the van shall be sheathed in stainless steel. All joints and seams shall be properly trimmed.

### **Decking:**

The deck of the van shall be covered with a suitable industrial-grade material laid in a single sheet (seamless) and cover the entire deck area of the van. The deck covering shall be such that it will provide a non-slip walking surface when wet. The deck covering shall extend up the bulkheads 4” all around.

### **Internal Bulkhead(s):**

The van shall be fitted with an internal bulkhead located approximately 4 feet aft from end “F”. This bulkhead forms the temperature controlled area of the van by creating a vestibule. This vestibule is to allow personnel to enter the van without disrupting the temperature controlled area. The bulkhead shall be suitably framed to support the same insulation and sheathing used on the exterior bulkheads of the van, bulkhead mounting channel, as well an interior personnel door.

The personnel door shall be fitted with marine grade hardware (PERKO brand or Owner approved equivalent). It shall have a 28” clear opening, and be right handed. It shall be insulated similarly to the external bulkheads of the van as described below.

The internal bulkhead shall be fitted with one (1) 6” DIA cable pass per the Options Section below. The wire pass shall be sealed with a 3” thick circular piece of high density foam which will not loose it’s elasticity when exposed to cold temperatures. The foam shall have a slit cut in it from the center to edge to allow the passage of cables, but also seal in the chilled air.

The internal bulkhead shall have a plumbing services panel identical to exterior plumbing services panel.

### **HVAC:**

The standard HVAC unit described in the General Specification shall be omitted. The van shall be fitted with an electric, air cooled chiller unit sufficiently sized to maintain the

temperature requirements listed above in the General Requirements **with the fume hood in operation and two people working inside.** The chiller unit shall have a digital/mechanical thermostat (no mercury switch) and automatic defrost mode. The system shall be fitted with auxiliary electric heat in the event that outside temperatures fall to the low end of the range stated above for an extended period of time.

A plenum shall extend from the chiller unit into the temperature controlled compartment along the overhead. There shall be numerous (4-6) controllable, louvered vents on the plenum to evenly distribute the chilled air, and to lower discharge velocity at the vents.

**Insulation:**

The 1.5” of rockwool described in the General Specification shall be omitted (if necessary) in the bulkheads and overhead. Instead, thermal insulation of a sufficient thickness and type shall be used to meet the temperature requirements listed in the General Requirements above. All six sides of the temperature controlled area shall be insulated similarly. The depth of the stiffeners used on the sides and overheads may be increased accordingly to support the insulation as necessary, as long as they meet or exceed the panel stiffness requirement given in the General Specification, and shown in DETAIL A and B on the General Arrangement drawing.

Heat reflecting additive in exterior paint system shall be used.

Consideration shall be given to the flammability of the insulation given that the van will be considered a laboratory and chemicals may be used inside. However, proper temperature control shall be priority. If the insulation used in the bulkheads does not meet USCG flammability requirements, the side of the van will have a warning sign indicating a minimum separation between the van and the ship’s bulkheads (See Placards and Labeling).

Rockwool insulation shall be used in the deck if required to maintain proper temperature.

*Note: Flame tests were conducted on the standard UNOLS side panels to ensure an adequate fire boundary (A-30) with only a 1” air gap between ship and van. This is necessary to control the spread of fire between the two. Rockwool was used in the standard panels because it meets USCG flammability requirements. As a practical solution, a minimum 12” separation between the ship and van is established to control the spread of fire if a different insulation type is used. The separation between the ship and the van at the deck cannot be easily increased. Therefore rockwool shall be used in the deck if necessary.*

**Counter Modules:**

The van shall be provided with five (5) counter modules (including the one fitted with the sink) such that the modules are secured to at least two (2) sections of mounting channel by 3/8” DIA bolts.

The standard modules are to be 48" in length, 28" deep, with the finished counter top height 37" above the deck. The module frames are to be three-sided (open on the front and bottom) constructed of 1-1/2" x 1-1/2" x 3/16" aluminum angle. The bottom portion of the frames which contact the deck shall be fitted with a nonabrasive "foot" or glide to prevent them from gouging the decking material.

The modules shall each be fitted with two (2) industrial grade, under-hung drawers attached to the bottom of the counter tops. The drawers shall be fitted with marine grade hardware (PERKO brand or Owner approved equivalent) to prevent the drawers from opening in a seaway.

The counter tops are to be constructed of 3/4" thick AC plywood, and secured to the module in such a way that they can be easily replaced. The counter tops shall have 3" high back and side splashes. The seams between the counter top and back/side splashes shall be sealed with caulk. The front edge of the counter shall have a 1/2" high lip to prevent small items from rolling off in a seaway. The counter tops shall be painted with a fire retardant coating or paint, and finished with at least two (2) coats of a light gray oil based paint. The finished surface shall be as smooth as practicable.

One (1) of the counter modules shall be fitted with a stainless steel pan having a 3"-high lip all around to conduct chemical work in. The pans shall fit over the plywood tops and secured to the side and/or back splashes with mechanical fasteners, but still be easily removed when desired. The pan shall be fitted on the back and side inner faces with 1/8" DIA round stock lashing bars.

*Note: The counters are constructed as removable modules so that the van can be configured for the particular needs of a given cruise. Plywood allows the tops to be drilled into for the convenient securing of science equipment as sea, and then be easily repaired*

#### **Sink Module:**

The van shall be provided with 1 (one) sink counter module. It shall be constructed similarly to the standard counter modules except that the under-hung drawer may be omitted. The module shall be secured to at least two (2) sections of mounting channel with 3/8" bolts. The module shall be plumbed with hose and/or PVC pipe to allow easy connection/disconnection of the module to the plumbing penetration panel. The hoses and pipe should be properly secured to the mounting channel or module as appropriate.

The sink used shall be a laboratory grade, deep chemical sink. It shall be fitted with a laboratory grade faucet for hot and cold fresh water, and a separate spigot for raw sea water. The sink module shall be fed (both fresh water and sea water) by the 3/4" supply fittings listed in the General Specification. Hot water shall be provided by a small (~10 gallon or instant-type) water heater located in the sink module.

The drain shall be plumbed into one of the 1-1/2" drain fittings listed in the General Specification and fitted with a barrel-type trap. The drain shall be fitted with a manifold

(PVC ball valves) to allow diversion of the waste to either the bulkhead penetration, or into secondary containment within the van. The drain line should be angled slightly downward to the bulkhead penetration to prevent pooling of water.

*Note: The “secondary containment” normally provided is a carboy brought by the science party. This allows chemical waste not able to be discharged over the side or into the ship’s tanks to be easily and economically disposed of ashore.*

The sink shall be fitted with a combination emergency eye wash/shower mounted to the channel near the sink. It shall have a proper eyewash station placard (green) fasted to the mounting channel nearby to indicate it’s intended use.

### **Fume Hood:**

A laboratory-grade, counter top fume hood unit (without a sink) shall be installed. The fume hood must provide at least 120 LFM average velocity across the hood face, and a volume of at least 320 CFM (one air change in 4 minutes) with the flame screen and gooseneck installed. It can either be mounted to a 48” counter module, or to a custom sized module, whichever provides for the best arrangement. The hood shall be properly vented through one of the 6" DIA penetrations with either PVC pipe and removable hose connections, or a continuous length of flexible hose rated for fume ventilation use (*Duravent “Bluemax”* IPN, or Owner approved equivalent). The 6” DIA penetration used shall be fitted externally with a 36” gooseneck. The gooseneck shall be removable as given in the Construction Specification and fitted with a suitable flame screen. The flame screen shall have a 20 x 20 mesh.

The fume hood shall be fitted with a removable, stainless steel pan having a 3”-high lip all around. The pan shall be fitted on the back and side inner faces with 1/8” DIA round stock lashing bars.

The fume hood shall be tested by the Vendor to ensure adequate face velocity and volume before delivery, and a written report of adequacy provided to the Owner. The supply air conditions needed, such as the HVAC unit in operation and/or number of open wire passes/vents, shall be clearly indicated both in the report and on the fume hood (See Placards and Labeling).

### **Miscellaneous Outfitting Items:**

The van shall be fitted with the following items located as described:

- 1) Two (2) Marine-grade emergency lights which activates when ship’s power is interrupted (one in main area and one in vestibule). They shall be tied into the van lighting circuit. They shall be fitted with a manual on/off switch to prevent discharge of the battery when disconnected from power.
- 2) Smoke detector. Located in main work area.

- 3) Two (2), 10# Fire extinguishers, Type BC (1 dry chemical, 1 carbon dioxide).  
Located in vestibule.

*Note: Internal communication systems vary widely from ship to ship. Therefore, services such as phone, general alarm, and data shall be provided to the van by the vessel operator on an as needed basis through the temporary wire passes.*

- 4) The van shall be fitted with a laboratory grade thermometer (graduated to 0.1 degrees C and F) for verifying the internal temperature set on the thermostat. The thermometer shall be calibrated with thermostat and the corrections provided before the van is delivered. It shall be secured to the bulkhead mounting channel.

- 5) Core rack, 2 EA (per Owner supplied sketch)

**Placards and Labeling:**

The van and/or internal equipment shall be fitted with the following placards because of the van's intended purpose. These are in addition to the Placards and Labeling given in the General Specification.

Personnel Doors: "SCIENTIFIC LABORATORY" (2" high black letters, exterior side of door)

Emergency Light(s): "To prevent discharge of battery, turn off switch when van disconnected from power for extended period" (Red engraved placard with white letters)

Fume Hood: "EMERGENCY VENTILATION, TURN ON FUME HOOD IN EVENT OF SPILL" (~2" x 7" engraved red placard with white letters). Also, an engraved placard which clearly indicates the supply air conditions needed to obtain the required flow, such as the HVAC unit in operation and/or number of open wire passes/vents.

Eye Wash: Standard OSHA eye wash placard (green with white letters) attached to mounting channel near eye wash/shower.

Minimum Separation (If required because of insulation used): "WARNING: ENSURE A MINIMUM SEPARATION OF 12" BETWEEN SHIP AND VAN", 3" high black letters, sides "P" and "S" near top of van.

Shared-Use Van: "UNOLS SHARED-USE COLD LABORATORY" 4" high blue letters, sides "P" and "S". (A 6" dia National Science Foundation Logo shall be provided by the Owner to place near this label.)



## OPTIONS LIST

1. Option #001: Hand Rail Sockets (Aluminum Van ONLY)
2. Option #004: Services Recess Louvers
3. Option #005: Door Windows (exterior personnel doors only).
4. Option #007: Deck Drain, 2 (two), forward corner side “P”, and aft corner side “S”.
5. Option #008: Wire Pass/Vents, five (5), end “F”, internal bulkhead, 2 on side “S” forward and aft, and 1 on side “P” aft.
6. Option #009: Mounting channel (stainless steel).

Outfitting Specification  
**Electronics/Computer Lab**  
UNOLS Standard Portable Scientific Van

Version 1  
January 2001

**General:**

This document is intended to be used as a specification for the outfitting of electronics, computer, or control vans used aboard research vessels in the UNOLS (or academic) research fleet. It is to be used in conjunction with the UNOLS General Construction Specification. This document may also be used as guidance for institutions or scientists who wish to construct their own vans. Specific details given in this document may be omitted for economy or if the van is intended for a particular purpose.

**Bulkheads/Overhead Sheathing:**

The interior bulkheads of the van shall be finished in a semi-smooth, sound absorbing sheathing material for personnel comfort. The color chosen should be neutral and light in color (off-white or beige). The overhead sheathing shall be gloss white. All joints and seams shall be properly trimmed.

**Decking:**

The deck of the van shall be covered with a suitable, industrial-grade material. The deck covering shall be such that it will provide a non-slip walking surface when wet. A 4" vinyl (or other suitable material) baseboard shall be installed around the perimeter.

**Miscellaneous Outfitting Items:**

The van shall be fitted with the following items:

- 1) Marine-grade emergency light which activates when ship's power is interrupted. It shall be tied into the van lighting circuit.
- 2) Smoke detector.
- 3) Two (2), 10# fire extinguishers, Type BC (1 dry chemical, 1 carbon dioxide).

Internal communication systems vary widely from ship to ship. Therefore, services such as phone, general alarm, and data shall be provided to the van by the vessel operator on an as needed basis through the temporary wire passes.

**Racks, Decks, Seating [Per individual owner/operator]:**

The van shall be furnished with the following items and arranged according to the attached sketch:

<u>Item</u>	<u>Manufacturer</u>	<u>Model</u>	<u>No. Req'd</u>
1	ANIXTER	APW T5701930NBE Single Enclosure rack, no base M style, 10-32 tapped rail, 19" HPO, 22" wide, 70" VPO 40U 30" deep, Royal Blue	3
2	ANIXTER	APW T35V7030E Side Panel Set of 2 vented, 70" VPO 30" Deep	1 set
3	STEELCASE Inc.	#4571313G Steelcase Chair-Desk Mid BK, Arm, UPH, ARM Cap, Mech Hgt, Glides, UPRT, BK LK Plastic: 6205, Uphol 8401	5
4	Desk	(By Owner)	

**Other Requirements:**

The deck of the van shall be covered with an approved laboratory grade electrical matting over the decking material described above. The matting shall be removable and not secured to the deck.

Equipment racks shall be secured to the mounting channel at both the base and at the top.

Outfitting Specification  
**General Purpose Lab**  
UNOLS Standard Portable Scientific Van

Version 2  
October 2002

**Owner:** R/V *CAPE HENLOPEN* (University of Delaware). The details described are for the 2002 Request for Quotation (RFQ) and suit the Owner's particular needs.

**General:**

This document is intended to be used as the specification for the outfitting of "General Purpose" vans used aboard research vessels in the UNOLS (or academic) research fleet. This specification is intended to comply with 46 CFR 194.15 – "Chemistry Laboratory and Scientific Laboratory". It is to be used in conjunction with the UNOLS General Construction Specification. This document may also be used as guidance for institutions or scientists who wish to construct their own vans. Specific details given in this document may be omitted for economy or if the van is intended for a particular purpose.

**Material:** Aluminum

**Power/Electrical:** Standard UNOLS variable voltage, single phase.

**Arrangement:**

This van shall use the "Stand Alone" arrangement.

**HVAC and Insulation:**

Standard per the General Specification, plus heat reflecting additive in exterior paint system.

**Doors and Escape Hatch Location:**

- 1) The aft personnel door shall be located on end "A", have a 28" clear opening, and be right handed.
- 2) The second personnel door shall be located on end "F", have a 28" clear opening, and be left handed.
- 3) The overhead escape hatch shall be located at end "F", side "P".

**Bulkheads/Overhead Sheathing:**

The interior bulkheads of the van shall be finished in a smooth, nonabsorbent material, resistant to wear, impact, and staining. The material will be exposed to chemicals and must be easily cleaned with soap and water. The material should also be resistant to common chemicals such as alcohol, acetone, and other common organic solvents. The color chosen should be neutral and light in color (off-white or beige). The overhead sheathing shall be gloss white. All joints and seams shall be properly trimmed.

**Decking:**

The deck of the van shall be covered with a suitable, industrial-grade material. The deck covering shall be such that it will provide a non-slip walking surface when wet. A 4" vinyl (or other suitable material) baseboard shall be installed. The seam between the baseboard and the deck shall be properly caulked.

**Counter Modules:**

The van shall be provided with six (6) counter modules (including the one fitted with the sink) such that the modules are secured to at least two (2) sections of mounting channel by 3/8" DIA bolts.

The standard modules are to be 48" in length, 28" deep, with the finished counter top height 37" above the deck. The module frames are to be three-sided (open on the front and bottom) constructed of 1-1/2" x 1-1/2" x 3/16" aluminum angle. The bottom portion of the frames which contact the deck shall be fitted with a nonabrasive "foot" or glide to prevent them from gouging the decking material.

The modules shall each be fitted with two (2) industrial grade, under-hung drawers attached to the bottom of the counter tops. The drawers shall be fitted with marine grade hardware (PERKO brand or Owner approved equivalent) to prevent the drawers from opening in a seaway.

The counter tops are to be constructed of 3/4" thick AC plywood, and secured to the module in such a way that they can be easily replaced. The counter tops shall have 3" high back and side splashes. The seams between the counter top and back/side splashes shall be sealed with caulk. The front edge of the counter shall have a 1/2" high lip to prevent small items from rolling off in a seaway. The counter tops shall be painted with a fire retardant coating or paint, and finished with at least two (2) coats of a light gray oil based paint. The finished surface shall be as smooth as practicable.

One (1) of the counter modules shall be fitted with a stainless steel pan having a 3"-high lip all around to conduct chemical work in. The pans shall fit over the plywood tops and secured to the side and/or back splashes with mechanical fasteners, but still be easily removed when desired. The pan shall be fitted on the back and side inner faces with 1/8" DIA round stock lashing bars.

*Note: The counters are constructed as removable modules so that the van can be configured for the particular needs of a given cruise. Plywood allows the tops to be drilled into for the convenient securing of science equipment as sea, and then be easily repaired.*

**Refrigerator/Freezers:**

The van shall be outfitted with one each, commercial grade, under counter (approximately 7.0 cuft each), refrigerator and freezer. Each shall have an external temperature gauge. They shall each be fitted with a hook latch to prevent opening in a seaway, and a hasp for a padlock (PERKO Brand or Owner approved equivalent). The units shall be properly secured to either the mounting channel or bottom of counter tops as appropriate. The under-hung drawer(s) may be omitted on the modular which accommodates these units.

#### **Sink Module:**

The van shall be provided with 1 (one) sink counter module. It shall be constructed similarly to the standard counter modules except that the under-hung drawer may be omitted. The module shall be secured to at least two (2) sections of mounting channel with 3/8" bolts. The module shall be plumbed with hose and/or PVC pipe to allow easy connection/disconnection of the module to the plumbing penetration panel. The hoses and pipe should be properly secured to the mounting channel or module as appropriate.

The sink used shall be a laboratory grade, deep chemical sink. It shall be fitted with a laboratory grade faucet for hot and cold fresh water, and a separate spigot for raw sea water. The sink module shall be fed (both fresh water and sea water) by the 3/4" supply fittings listed in the General Specification. Hot water shall be provided by a small (~10 gallon or instant-type) water heater located in the sink module.

The drain shall be plumbed into one of the 1-1/2" drain fittings listed in the General Specification and fitted with a barrel-type trap. The drain shall be fitted with a manifold (PVC ball valves) to allow diversion of the waste to either the bulkhead penetration, or into secondary containment within the van. The drain line should be angled slightly downward to the bulkhead penetration to prevent pooling of water.

*Note: The "secondary containment" normally provided is a carboy brought by the science party. This allows chemical waste not able to be discharged over the side or into the ship's tanks to be easily and economically disposed of ashore.*

The sink shall be fitted with a combination emergency eye wash/shower mounted to the channel near the sink. It shall have a proper eyewash station placard (green) fasted to the mounting channel nearby to indicate it's intended use.

#### **Fume Hood:**

A laboratory-grade, counter top fume hood unit (without a sink) shall be installed. The fume hood must provide at least 120 LFM average velocity across the hood face, and a volume of at least 320 CFM (one air change in 4 minutes) with the flame screen and gooseneck installed. It can either be mounted to a 48" counter module, or to a custom sized module, whichever provides for the best arrangement. The hood shall be properly vented through one of the 6" DIA penetrations with either PVC pipe and removable hose connections, or a continuous length of flexible hose rated for fume ventilation use (Duravent "Bluemax" IPN, or Owner approved equivalent). The 6" DIA penetration



used shall be fitted externally with a 36" gooseneck. The gooseneck shall be removable as given in the Construction Specification and fitted with a suitable flame screen. The flame screen shall have a 20 x 20 mesh.

The fume hood shall be fitted with a removable, stainless steel pan having a 3"-high lip all around. The pan shall be fitted on the back and side inner faces with 1/8" DIA round stock lashing bars.

The fume hood shall be tested by the Vendor to ensure adequate face velocity and volume before delivery, and a written report of adequacy provided to the Owner. The supply air conditions needed, such as the HVAC unit in operation and/or number of open wire passes/vents, shall be clearly indicated both in the report and on the fume hood (See Placards and Labeling).

### **Miscellaneous Outfitting Items:**

The van shall be fitted with the following items:

- 1) Marine-grade emergency light which activates when ship's power is interrupted. It shall be tied into the van lighting circuit. **It shall be fitted with a manual on/off switch to prevent discharge of the battery when disconnected from power.**
- 2) Smoke detector.
- 3) Two (2), 10# Fire extinguishers, Type BC (1 dry chemical, 1 carbon dioxide).

*Note: Internal communication systems vary widely from ship to ship. Therefore, services such as phone, general alarm, and data shall be provided to the van by the vessel operator on an as needed basis through the temporary wire passes.*

### **Placards and Labeling:**

The van and/or internal equipment shall be fitted with the following placards because of the van's intended purpose. These are in addition to the Placards and Labeling given in the General Specification.

Personnel Doors: "SCIENTIFIC LABORATORY" (2" high black letters, exterior side of door)

Refrigerator and Freezer: "CHEMICALS ONLY – NO FOOD OR DRINK" (~2" x 5" engraved red placard with white letters)

Emergency Light: "To prevent discharge of battery, turn off switch when van disconnected from power for extended period" (Red engraved placard with white letters)

Fume Hood: "EMERGENCY VENTILATION, TURN ON FUME HOOD IN EVENT OF SPILL" (~2" x 7" engraved red placard with white letters). Also, an engraved placard which clearly indicates the supply air conditions needed to obtain the required flow, such as the HVAC unit in operation and/or number of open wire passes/vents.

Eye Wash: Standard OSHA eye wash placard (green with white letters) attached to mounting channel near eye wash/shower.

## LIST OF OPTIONS

- 1) Option #001: Hand Rail Sockets.
- 2) Option #005: Door Windows, both doors.
- 3) Option #006: Portlight, two (2) located at center of sides “P” and “S”.
- 4) Option #008: Wire Pass/Vents, six (6), per General Arrangement Drawing.
- 5) Option #009: Mounting Channel.
- 6) Option #010: Deck Mounting Channel.

Outfitting Specification  
**Isotope Lab**  
UNOLS Standard Portable Scientific Van

January 2005

**Owner:** University of Delaware – East Coast UNOLS Van Pool. The details described are for the July 2003 Request for Quotation (RFQ) and suit the Owner’s particular needs.

**General:**

This document is intended to be used as a specification for the outfitting of isotope lab vans used aboard research vessels in the UNOLS (or academic) research fleet. This specification is intended to comply with 46 CFR 194.15 – “Chemistry Laboratory and Scientific Laboratory” with special consideration for isotope work. It is to be used in conjunction with the UNOLS General Construction Specification.

**Material:** Aluminum

**Power:** Standard UNOLS variable voltage, single phase.

**Arrangement:** This van shall use the “stand-alone” arrangement.

**Doors and Escape Hatch Location:**

- 1) The forward personnel door shall be located on end “F”, have a 28” wide clear opening, and be left handed.
- 2) The second personnel door shall be located on end “A”, have at least a 28” wide clear opening, and be right handed. This personnel door may be incorporated into the double personnel doors, but DOES NOT replace it.
- 3) The overhead escape hatch shall be located at end “F”, side “P”, just aft of the HVAC recess per the standard design.

**Bulkheads/Overhead Sheathing:**

The interior bulkheads of the van shall be finished in a smooth, nonabsorbent material, resistant to wear, impact, and staining. The material will be exposed to chemicals and must be easily cleaned with soap and water. The material should also be resistant to common chemicals such as alcohol, acetone, and other common organic solvents. The color chosen should be neutral and light in color (off-white or beige). The overhead sheathing should be gloss white or the same color as the bulkheads. All joints and seams shall be properly trimmed.

**Decking:**

The deck of the van shall be covered with a suitable industrial-grade material laid in a single sheet (seamless) and cover the entire deck area of the van. The deck covering shall

be such that it will provide a non-slip walking surface when wet. The deck covering shall extend 4" up the bulkheads all around.

**Internal Bulkhead(s):** [NONE]

**HVAC:** Standard HVAC unit described in the General Specification.

**Insulation:** Standard per the General Specification, plus heat reflecting additive in exterior paint system.

**Counter Modules:** The van shall be provided with six (6) counter modules, including the one fitted with the sink and one specially constructed to hold a Liquid Scintillation Counter (LSC: Beckman 6500 or equal). All modules shall be secured to at least two (2) sections of mounting channel by 3/8" DIA bolts.

The standard modules are to be 48" in length, 28" deep, with the finished counter top height 37" above the deck. The module frames are to be three-sided (open on the front and bottom) constructed of 1-1/2" x 1-1/2" x 3/16" aluminum angle. The bottom portion of the frames which contact the deck shall be fitted with a nonabrasive, nonmetallic/corrosion resistant "foot" or glide to prevent them from gouging the decking material.

The modules shall each be fitted with two (2) industrial-grade, under-hung drawers attached to the bottom of the counter tops. The drawers shall be fitted with marine grade hardware (PERKO brand or Owner approved equivalent) to prevent the drawers from opening in a seaway.

The counter tops are to be constructed of 3/4" thick AC plywood, and secured to the module in such a way that they can be easily replaced. The counter tops shall have 3" high back and side splashes. The seams between the counter top and back/side splashes shall be sealed with caulk. The front edge of the counter shall have a 1/2" high lip to prevent small items from rolling off in a seaway. The counter tops shall be painted with a fire retardant coating or paint, and finished with at least two (2) coats of a light gray oil based paint. The finished surface shall be as smooth as practicable.

Two (2) of the counter modules shall be fitted with a stainless steel pan having a 3"-high lip all around to conduct chemical work in. The pans shall fit over the plywood tops and secured to the side and/or back splashes with mechanical fasteners, but still be easily removed when desired. The pan shall be fitted on the back and side inner faces with 1/8" DIA round stock lashing bars.

*Note: The counters are constructed as removable modules so that the van can be configured for the particular needs of a given cruise. Plywood allows the tops to be drilled into for the convenient securing of science equipment as sea, and then be easily repaired.*

**Refrigerator/Freezers:** The van shall be outfitted with one each, commercial grade, under counter (approximately 7.0 cuft each), refrigerator and freezer. Each shall have an external temperature gauge. They shall each be fitted with a hook latch to prevent opening in a seaway, and a hasp for a padlock (PERKO Brand or Owner approved equivalent). The units shall be properly secured under (and to) the counter modules such that they are prevented from coming loose in a seaway, and are easily removable/replaced without having to take out the counter module itself. If the refrigerator and freezer are in separate counter modules, then the modules holding the units shall be fitted with only one (1) under-hung drawer as described above.

**Sink Module:** The van shall be provided with 1 (one) sink counter module. It shall be constructed similarly to the standard counter modules except that the under-hung drawer may be omitted. The module shall be secured to at least two (2) sections of mounting channel with 3/8" bolts. The module shall be plumbed with hose and/or PVC pipe to allow easy connection/disconnection of the module to the plumbing penetration panel. The hoses and pipe should be properly secured to the mounting channel or module as appropriate.

The sink used shall be a laboratory grade, deep chemical sink. It shall be fitted with a laboratory grade faucet for hot and cold fresh water, and a separate spigot for raw sea water. The sink module shall be fed (both fresh water and sea water) by the 3/4" supply fittings listed in the General Specification. Hot water shall be provided by a small (~10 gallon or instant-type) water heater located in the sink module.

The drain shall be plumbed into one of the 1-1/2" drain fittings listed in the General Specification and fitted with a barrel-type trap. The drain shall be fitted with a manifold (PVC ball valves) to allow diversion of the waste to either the bulkhead penetration, or into secondary containment within the van. The drain line should be angled slightly downward to the bulkhead penetration to prevent pooling of water.

*Note: The "secondary containment" normally provided is a carboy brought by the science party. This allows chemical waste not able to be discharged over the side or into the ship's tanks to be easily and economically disposed of ashore.*

The sink shall be fitted with a combination emergency eye wash/shower mounted to the channel near the sink. It shall have a proper eyewash station placard (green) fasted to the mounting channel nearby to indicate it's intended use.

**LSC Module:** One of the module shall be specially constructed to hold a Beckman 6500 (or equal) Liquid Scintillation Counter. The construction of this module shall be, in general, similar to the standard counter modules with regard to durability, flexibility, and attachment to the mounting channel. The module shall be 48" wide and approximately 75" high to support the adjustable shelf described below. The "counter top" of this unit shall be lower than the standard modules, so that LSC is at a comfortable working height. The bottom of the unit shall be fitted with full width drawers for the storage of LSC supplies. This unit shall be on 4-6" diameter, heavy-duty casters (wheels) so that the



LSC can be easily relocated within the van. A foundation mounted on shock resistant mounts (suitable in capacity and number to support the Beckman 6500) shall be installed above the drawers to provide a surface on which to secure the LSC. The back of the module shall be fitted with a full-width, adjustable shelf, constructed of ¾" plywood treated/painted similarly to the standard module counter tops. The depth of the shelf shall be adequate to support a standard monitor and printer (approximately 16-20" deep). The module shall also be fitted with a fold-down lap top computer shelf that can be moved to either the left or right side of the module, or adjusted up and down to a comfortable working height near the top of the LSC.

**Fume Hood:** A 24" wide, laboratory-grade, counter top fume hood (*Fisher Hamilton, Vented Workstation, acrylic, catalog number 54L27200 or equal*) with remote blower shall be installed. The hood shall be mounted to one of the standard 48" counter modules listed above.

The blower shall be mounted near the overhead on the bulkhead mounting channel and have two speed settings – "normal" and "purge". In the "normal" setting, the fume hood must provide at least 120 LFM average velocity across the hood face. In the "purge" setting, it must discharge a volume of at least 320 CFM (one air change in 4 minutes) with the flame screen and gooseneck installed.

The hood shall be properly vented through one of the 6" DIA penetrations with either PVC pipe and removable hose connections, or a continuous length of flexible hose rated for fume ventilation use (*Duravent "Bluemax" 1PN, or Owner approved equivalent*). The 6" DIA penetration used shall be fitted externally with a 36" high gooseneck. The gooseneck stack shall be removable as given in the Construction Specification and fitted with a suitable flame screen. The flame screen shall have a 20 x 20 mesh.

The fume hood shall be fitted with a removable, stainless steel pan having a 3"-high lip all around. The pan shall be fitted on the back and side inner faces with 1/8" DIA round stock lashing bars.

The fume hood shall be tested by the Vendor to ensure adequate face velocity and volume before delivery, and a written report of adequacy provided to the Owner. The supply air conditions needed, such as the HVAC unit in operation and/or number of open wire passes/vents, shall be clearly indicated both in the report and on the fume hood (See Placards and Labeling).

**Miscellaneous Outfitting Items:**

The van shall be fitted with the following items:

- 1) Marine-grade emergency light which activates when ship's power is interrupted. It shall be tied into the van lighting circuit. It shall be fitted with a manual on/off switch to prevent discharge of the battery when disconnected from power.
- 2) Smoke detector.
- 3) Two (2), 10# Fire extinguishers, Type BC (1 dry chemical, 1 carbon dioxide).

*Note: Internal communication systems vary widely from ship to ship. Therefore, services such as phone, general alarm, and data shall be provided to the van by the vessel operator on an as needed basis through the temporary wire passes.*

**Placards and Labeling:**

The van and/or internal equipment shall be fitted with the following placards because of the van's intended purpose. These are in addition to the Placards and Labeling given in the General Specification.

Personnel Doors: "SCIENTIFIC LABORATORY" (2" high black letters, exterior side of door)

Emergency Light: "To prevent discharge of battery, turn off switch when van disconnected from power for extended period" (Red engraved placard with white letters)

Eye Wash: Standard OSHA eye wash placard (green with white letters) attached to mounting channel near eye wash/shower.

Radioactive Placard: The van shall be fitted with two (2), 6" international radioactive placards (yellow and black) stating: "CAUTION – RADIO ACTIVE MATERIALS IN USE". The placards shall be secured to the inside of each of the personnel doors.

Sink: Approximately 2"H x 3" W placard (Red engraved with white letters) stating: "No Radioisotopes in Sink"

Shared-Use Van: "UNOLS SHARED-USE LABORATORY VAN" 6" high blue letters, sides "P" and "S", with painted (full-color) 12" DIA National Science Foundation logo.

**Institutional Requirements:**

Regulations for isotope labs vary between institutions. Almost all require a **liquid scintillation counter** to be provided for wipe testing in any lab where radiation work is done. If required, the scintillation counter will be provided by the owner of the van (Principle Investigator or ship operator). This Outfitting Specification and the General Construction Specification are written to meet the guidelines of most institutions with

respect to the general requirements of isotope labs. Additional requirements may be necessary to meet the needs of a particular institution in order for the van to go to sea. It is the responsibility of the owner of the van to check with the operating institution before sailing to ensure the van is compliant with internal rules.

## OPTIONS LIST

- 1) Option #001: Hand Rail Sockets.
- 2) Option #005: Door Windows, both doors.
- 3) Option #006: Portlight, 2 (two) located at center of sides “P” and “S”.
- 4) Option #008: Wire Pass/Vents, five (5), 1 end “F”, two each on sides “S” and “P”.
- 5) Option #009: Bulkhead mounting channel (Note: This standard option includes channel on the overhead).

# **Outfitting Specifications**

## Power/Machinery

**This section is under construction!**

Outfitting Specification  
**Trace Metal “Clean” Lab**  
UNOLS Standard Portable Scientific Van

Version 1  
January 2001

**General:**

This document is intended to be used as a specification for the outfitting of trace metal “clean” lab vans used aboard research vessels in the UNOLS (or academic) research fleet. This specification is intended to comply with 46 CFR 194.15 – “Chemistry Laboratory and Scientific Laboratory” with special consideration for trace metal work. It is to be used in conjunction with the UNOLS General Construction Specification. This document may also be used as guidance for institutions or scientists who wish to construct their own vans. Specific details given in this document may be omitted for economy or if the van is intended for a particular purpose.

**Bulkheads/Overhead Sheathing:**

The interior bulkheads of the van shall be finished in a smooth, nonabsorbent material, resistant to wear, impact, and staining. The material will be exposed to chemicals and must be easily cleaned with soap and water. The material should also be resistant to common chemicals such as alcohol, acetone, and other common organic solvents. The color chosen should be neutral and light in color (off-white or beige). The overhead sheathing shall be gloss white. All joints and seams shall be properly trimmed.

All four of the bulkheads and overhead in the “clean” portion of the van should then be lined with a plastic sheathing (PVC, polypropylene, or UHDPE) at least 1/8” thick and secured to the mounting channel with non-metallic fasteners (Nylon, Delrin, or equivalent). Cut-outs in the sheathing shall be made for the receptacles, wire passes, and holes drilled for securing the other equipment (cabinets, lighting, etc.)

**Decking:**

The deck of the van shall be covered with a suitable industrial-grade material laid in a single sheet and cover the entire deck area of the van. The deck covering shall be such that it will provide a non-slip walking surface when wet. The deck covering shall extend up the bulkheads 4” all around.

**Counter Modules:**

The counters shall be constructed as removable modules so that the van can be configured for the particular needs of a given cruise. The standard modules are to be 48” in length, 28” deep, with the finished counter top height 37” above the deck. The module frames are to be three-sided (open on the front and bottom) constructed of a non-metallic material such as wood. The portion of the modules which contact the deck shall be



smooth or fitted with a nonabrasive “foot” to prevent them from gouging the decking material.

The counter tops are to be constructed of ¾” thick AC plywood. This allows the tops to be easily drilled for securing equipment and subsequently repaired. The front edge of the counter shall have a ½” high lip to prevent small items from rolling off in a seaway. The counter tops shall be painted with at least two (2) coats of a light gray oil based paint. The tops are to be secured to the module in such a way that they can be easily replaced.

The plywood counter tops of the modules shall be lined with 1/8” polypropylene (or equivalent) secured in such a way that they can be easily replaced (non-metallic machine screws or bolts). The counter tops shall have 3” high plastic back and side splashes. The seams between the counter top and back/side splashes shall be sealed.

Each module shall have two (2) under-hung drawers, constructed of wood or other non-metallic material. All hardware (pulls, glides, latches, etc.) shall also be constructed of non-metallic materials (wood or plastic). The drawers shall be fitted with marine grade securing devices/hardware to prevent the drawers from opening in a seaway.

The van shall be provided with 5 (five) modules (including the one fitted with the sink) such that the modules are secured to at least two (2) sections of mounting channel. The remaining areas shall be used for larger items or miscellaneous scientific equipment.

#### **Internal Bulkhead:**

A bulkhead should be fitted across the width of the van, at least 3 feet from end “F” fully separating the “clean” laboratory space from the entryway. It should be attached on the bulkheads and overhead by means of the mounting channel. An extra series of mounting channel may be added on the van bulkhead and overhead if needed. The internal bulkhead shall not interfere with either the escape hatch or the HVAC recess. The seam between the bulkhead and the overhead, deck, and van bulkheads should be packed with a soft, removable insulation (neoprene weather stripping or equivalent) to seal the “clean” space from the entryway.

The bulkhead should be sheathed on the “clean” side with the non-metallic material described above. It shall contain a 24” door, having a small (12”x12”) acrylic window. The door shall be fitted with a means of securing open and shut, with non-metallic hardware.

The bulkhead shall be fitted with a HEPA filter to supply all air to the “clean” portion of the van. Suggested Supplier: Envirco, Inc. (or equivalent)

The HEPA filter shall meet the following requirements:

- 1) Remove 99.995% of all particles 0.12 microns or larger
- 2) Minimum 650 CFM @ 90 FPM

- 3) Variable Speed Control
- 4) Weight not to exceed 70 pounds
- 5) Noise level not to exceed 55 dBA when 30” from the filter face with and airflow of 90 FPM.

**Refrigerator/Freezers:**

[None]

**Sink:**

The van shall be equipped with a deep chemical sink (plastic), with side and back splashes, fitted into one of the counter modules. It shall be fitted with a non-metallic faucet (laboratory-grade if available) for cold fresh water and a separate spigot for raw sea water. The cold side of the faucet and spigot shall be plumbed into the ¾” supply fittings listed in the general specification with hose or PVC pipe.

The sink drain shall be plumbed into one of the 1-1/2” drain fittings listed in the general specification with PVC pipe and fitted with a barrel-type trap. The drain shall be fitted with a manifold (PVC ball valves) to allow diversion of the waste to either the through-bulkhead fitting or into secondary containment within the van. The hose and drain should be properly secured to the mounting channel as appropriate. The drain line should be angled slightly downward to the bulkhead penetration to prevent pooling of water.

The sink shall be fitted with a combination emergency eye wash/shower mounted to the channel near the sink.

**Secondary Containment:**

[None]

**Water Heater:**

[None]

**Fume Hood:**

[None]

**Miscellaneous Outfitting Items:**

The van shall be fitted with the following items:

- 1) Marine-grade emergency light which activates when ship's power is interrupted. It shall be tied into the van lighting circuit.
- 2) Smoke detector.
- 3) Two (2), 10# Fire extinguishers, Type BC (1 dry chemical, 1 carbon dioxide).

Internal communications systems vary widely from ship to ship. Therefore, services such as phone, general alarm, and data shall be provided to the van by the vessel operator on an as needed basis through the temporary wire passes.

**Other Requirements:**

Lighting fixtures used shall have all non-metallic cases and covers.

The internal metal surfaces of the portholes and personnel door in the "clean" portion of the van shall be coated with at least two (2) coats of marine grade paint.

Outfitting Specification  
**Work Shop**  
UNOLS Standard Portable Scientific Van

Version 1  
October 2002

**Owner:** R/V *KNORR* (WHOI). The details described are for the October 2002 Request for Quotation (RFQ) and suit the Owner's particular needs.

**General:**

This document is intended to be used as a specification for the outfitting of a Work Shop van used aboard research vessels in the UNOLS (or academic) research fleet. It is to be used in conjunction with the UNOLS General Construction Specification.

This document may also be used as guidance for institutions or scientists who wish to construct their own vans. Specific details given in this document may be omitted for economy or if the van is intended for a particular purpose.

**Material:** Steel

**Power:** Standard UNOLS variable voltage, single phase.

**Electrical:**

Per General Specification. In addition, install two (2) 208Vac, single phase receptacles per side. Omit red lights as described in the General Specification.

**Arrangement:**

This van shall use the "Stand Alone" arrangement.

**Doors and Escape Hatch Location:**

- 1) The aft personnel door shall be on side "S"/aft, have a 28" clear opening, and be right handed.
- 2) The forward personnel door shall be located on end "F, have a 28" clear opening, and be left handed.
- 3) The overhead escape hatch shall be located on side "P"/forward.

**Bulkheads/Overhead Sheathing:**

The interior bulkheads of the van shall be finished in a smooth, nonabsorbent material, resistant to wear, impact, and staining. The material will be exposed to chemicals and must be easily cleaned with soap and water. The material should also be resistant to common chemicals such as alcohol, acetone, and other common organic solvents. The color chosen should be neutral and light in color (off-white or beige). The overhead

sheathing should be gloss white or the same color as the bulkheads. All joints and seams shall be properly trimmed.

**Decking:**

The deck of the van shall be covered with a suitable industrial-grade material laid in a single sheet (seamless) and cover the entire deck area of the van. The deck covering shall be such that it will provide a non-slip walking surface when wet. A 4" vinyl (or other suitable material) baseboard shall be installed. The seam between the deck and baseboard shall be properly caulked.

**Internal Bulkhead(s):**

[None]

**HVAC and Insulation:**

Standard per the General Specification, plus heat reflecting additive in exterior paint system.

**Counter Modules:**

The van shall be outfitted with seven (7) counter/work bench modules. The modules shall be Stanley Vidmar [<http://www.stanleyvidmar.com>] tool grade cabinets and workbenches, or equivalent [Lista, <http://www.listaintl.com/>]. See *Miscellaneous Outfitting Items* for model numbers.

The bottom portion of the modules which contact the deck shall be fitted with a nonabrasive "foot" or glide to prevent it from gouging the decking material. The back of the work bench modules shall be secured to at least two (2) sections of mounting channel with at least a 3/8" bolt. The front edge of the counter shall have a 1/2" high lip to prevent small items from rolling off in a seaway.

**Sink Module:**

The van shall be provided with 1 (one) sink counter module. It shall be constructed similarly to the standard counter modules except that the under-hung drawer may be omitted. The module shall be secured to at least two (2) sections of mounting channel with 3/8" bolts. The module shall be plumbed with hose and/or PVC pipe to allow easy connection/disconnection of the module to the plumbing penetration panel. The hoses and pipe should be properly secured to the mounting channel or module as appropriate.

The sink used shall be a hand washing sink only. It shall be fitted with a commercial grade faucet for hot and cold fresh water. The sink module shall be fed by the 3/4" supply fittings listed in the General Specification. Hot water shall be provided by a small (instant-type preferred) water heater located in the sink module.

The drain shall be plumbed into one of the 1-1/2” drain fittings listed in the General Specification and fitted with a barrel-type trap. The drain line should be angled slightly downward to the bulkhead penetration to prevent pooling of water.

The sink shall be fitted with a combination emergency eye wash/shower mounted to the channel near the sink. It shall have a proper eyewash station placard (green) fasted to the mounting channel nearby to indicate it’s intended use.

**Miscellaneous Outfitting Items:**

The van shall be fitted with the following items:

- 1) Marine-grade emergency light which activates when ship’s power is interrupted. It shall be tied into the van lighting circuit. It shall be fitted with a manual on/off switch to prevent discharge of the battery when disconnected from power.
- 2) Smoke detector.
- 3) Two (2), 10# Fire extinguishers, Type BC (1 dry chemical, 1 carbon dioxide).

*Note: Internal communication systems vary widely from ship to ship. Therefore, services such as phone, general alarm, and data shall be provided to the van by the vessel operator on an as needed basis through the temporary wire passes.*

The following work bench modules (or Owner approved equivalents) shall be provided with the van:

Make/Model

2 Each	Lista/QSWB-4-60
1 Each	Lista/QS 1350-417
2 Each	Lista/QS 900-630
2 Each	Lista/QS 900-629

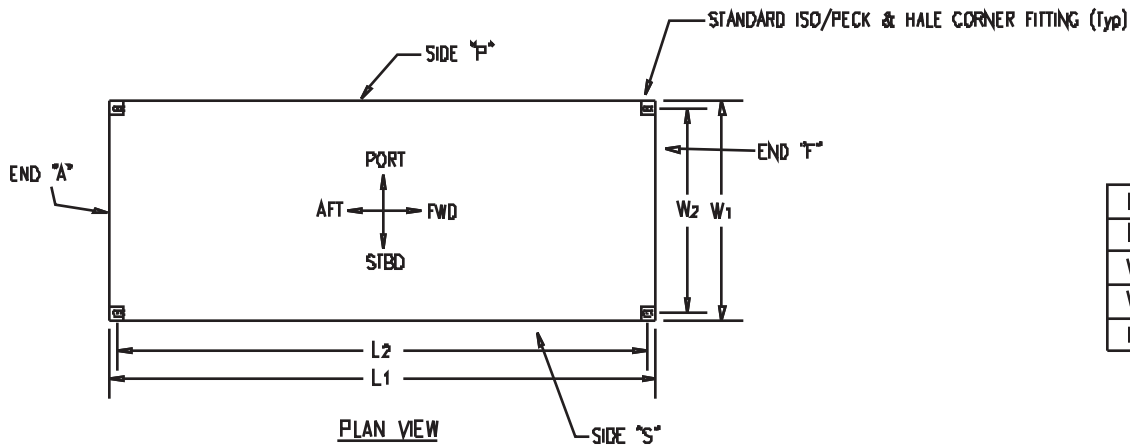
## OPTIONS LIST

- 1) Option #005: Door Windows, both doors.
- 2) Option #006: Portlight, two (2) located at center of sides “P” and “S”
- 3) Option #007: Deck Drain, two (2), forward corner side “P”, and aft corner side “S”.
- 4) Option #008: Wire Pass/Vents, two (1), end “F” and side “S”/end “A”.
- 5) Option #009: Mounting channel.

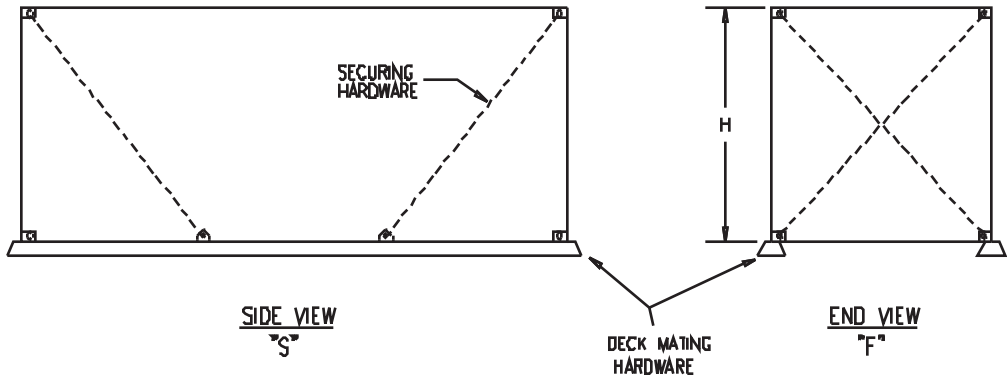


# **General Arrangement Drawings**

- Sheet 1 - Scientific Van -Dimensioned Layout
- Sheet 2 - Portable Van - General Arrangement
- Sheet 3 - AGOR Portable Van - General Arrangement
- Sheet 4 - Portable Van - Typical Details
- Sheet 5 - Portable Van - Structural Cross Sections



	20 FOOT	10 FOOT	CUSTOM
L1	19' 10-1/2"	9' 9-3/4"	VARIABLE
L2	19' 2-1/2"	9' 1-3/4"	L1 - 7"
W1	8'-0"	8'-0"	8'-0" (or less)
W2	7'-5"	7'-5"	W1 - 7"
H	8'-6"	8'-6"	8'-6" (or less)



**BAY MARINE, INC.**  
 238 NEW WEADY RD  
 BARRINGTON, RI 02806  
 (401)-246-8910  
 Baymarine@aol.com

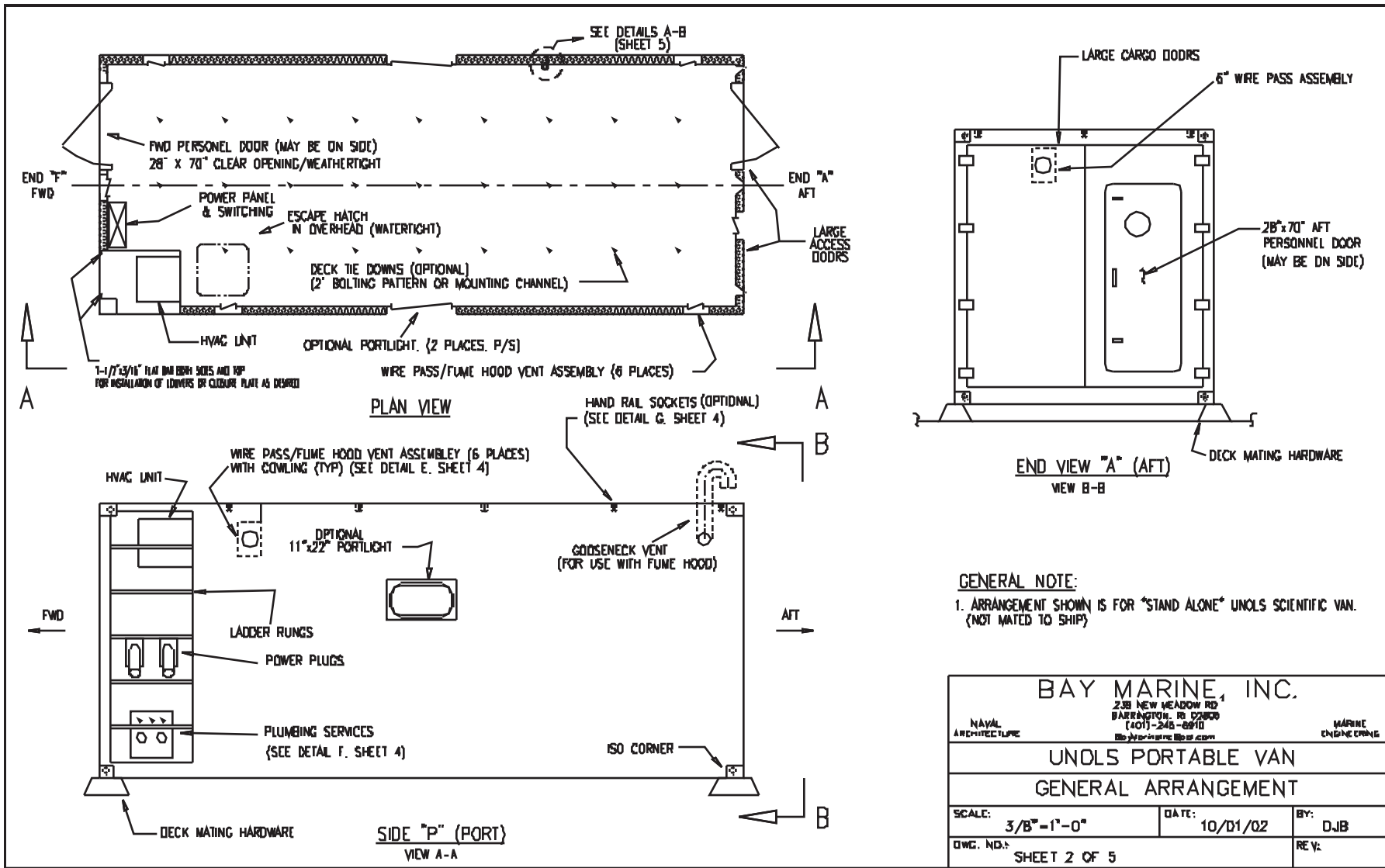
NAVAL ARCHITECTURE

MARINE ENGINEERING

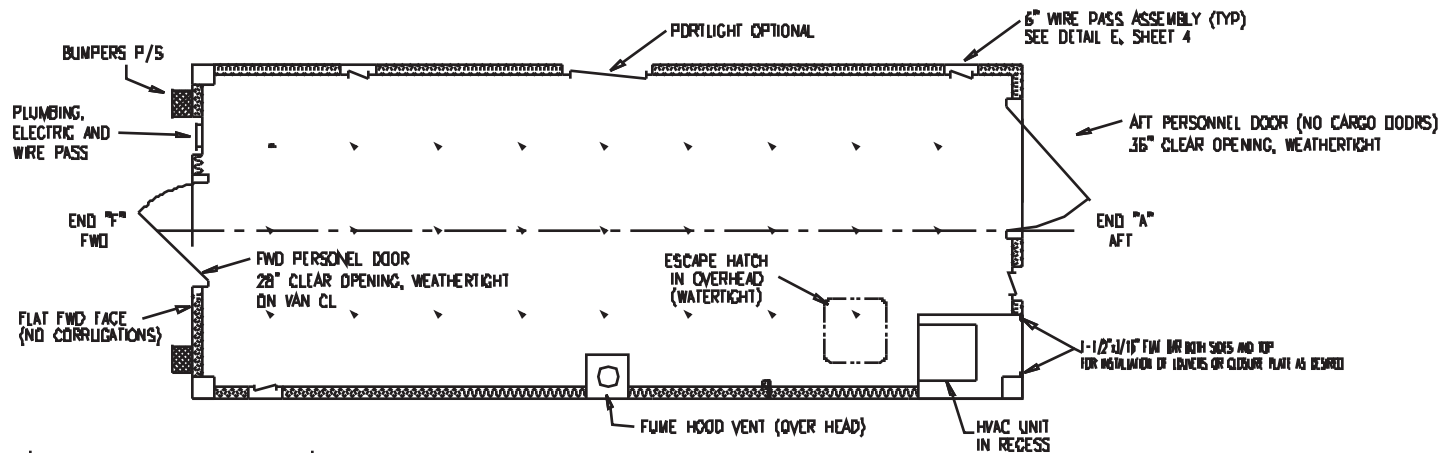
**UNOLS SCIENTIFIC VAN**

**DIMENSIONED LAYOUT**

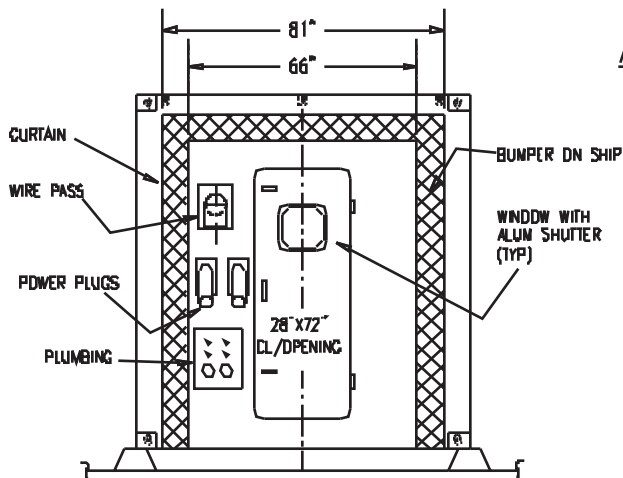
SCALE: 1/4"=1'-0"	DATE: 10/01/02	BY: DJB
DWG. NO.: SHEET 1 OF 5		REV: —



<b>BAY MARINE, INC.</b> 238 NEW MEADOW RD BARRINGTON, RI 02806 (401)-248-6910 <a href="http://www.baymarine.com">http://www.baymarine.com</a>		
NAVAL ARCHITECTURE	MARINE ENGINEERING	
<b>UNOLS PORTABLE VAN</b> <b>GENERAL ARRANGEMENT</b>		
SCALE: 3/8"=1'-0"	DATE: 10/01/02	BY: DJB
DWG. NO.:		RE V.:
SHEET 2 OF 5		



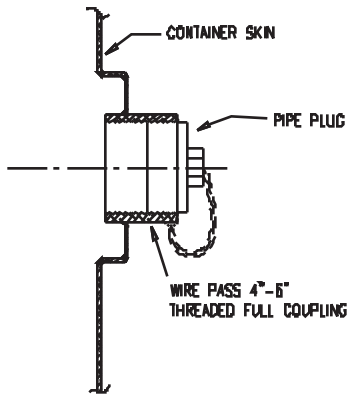
**ALTERNATE ARRANGEMENT**  
(FWD END MATES TO VESSEL)



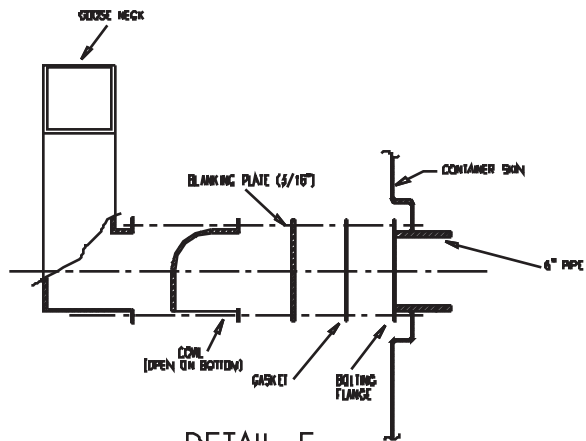
**GENERAL NOTE:**

- ARRANGEMENT SHOWN IS FOR VANS USED ABOARD AGOR VESSELS. VAN MATES DIRECTLY TO SHIP ON FWD END OF VAN

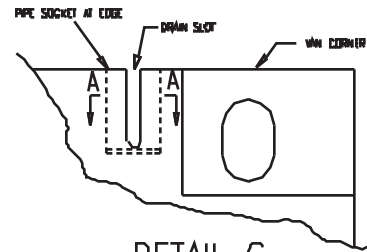
<b>BAY MARINE, INC.</b> 236 NEW MEADOW RD BARRINGTON, RI 02808 (401)-245-0919 Baymarine@aol.com		
NAVAL ARCHITECTURE	MARINE ENGINEERING	
<b>UNOLS PORTABLE VAN</b> <b>AGOR - GENERAL ARRANGEMENT</b>		
SCALE: 3/8" = 1'-0"	DATE: 10/01/02	BY: D.J.B.
DWG. NO.: SHEET 3 OF 5		REV: —



**DETAIL D**  
ECONOMICAL WIRE PASS  
(THREADED COUPLING)



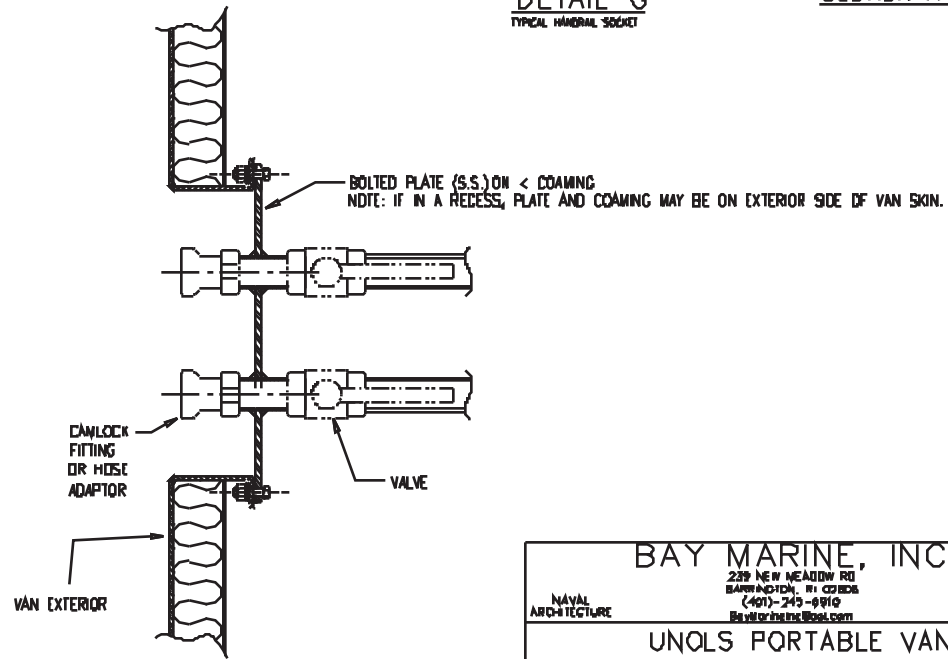
**DETAIL E**  
WIRE PASS ASSEMBLY  
(BOLTING FLANGE)



**DETAIL G**  
TYPICAL HANDRAIL SOCKET

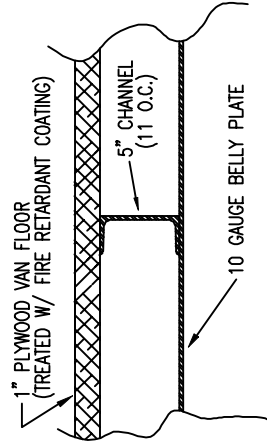
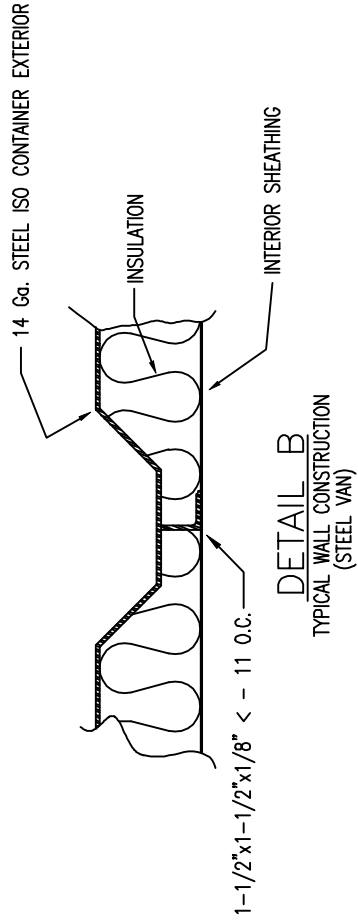
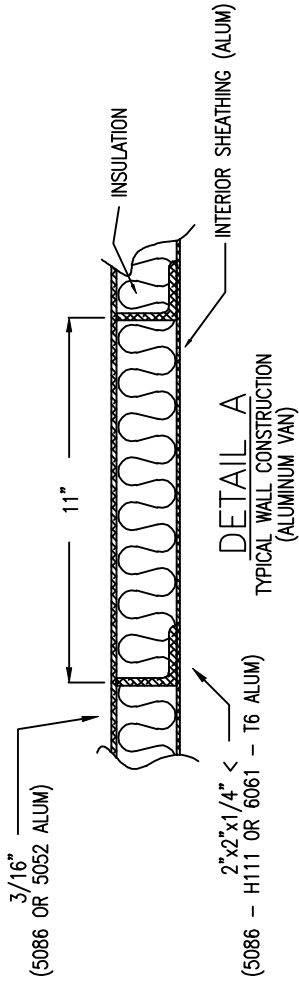


**SECTION A-A**



**DETAIL F**  
TYPICAL PLUMBING SERVICES CONNECTION

<b>BAY MARINE, INC.</b>		
229 NEW MEADOW RD BARNHARTON, RI 02808 (401) 743-9810 BayMarine@BayMar.com		
NAVAL ARCHITECTURE	MARINE ENGINEERING	
<b>UNOLS PORTABLE VAN</b>		
<b>TYPICAL DETAILS</b>		
SCALE: DO NOT SCALE	DATE: 10/01/02	BY: DJB
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NOTE: IN LIEU OF BELLY PLATE, WOOD DECK MAY BE REPLACED WITH 3/16" (MIN) STEEL OR 1/4" (MIN) ALUM. PLATE.

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NAVAL  
ARCHITECTURE

MARINE  
ENGINEERING

UNOLS PORTABLE VAN

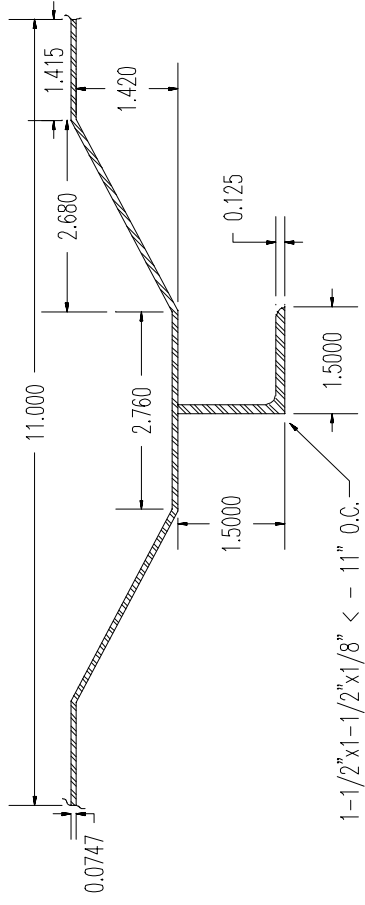
STRUCTURAL CROSS SECTIONS

SCALE: DO NOT SCALE DATE: 10/01/02 BY: DJB

DWG. NO.: SHEET 5 OF 5 REV: —

# **Structural Cross Sections**

- Stiffened Steel Van Side Panel
- Aluminum Van Side Panel
- Steel of Aluminum Van Deck

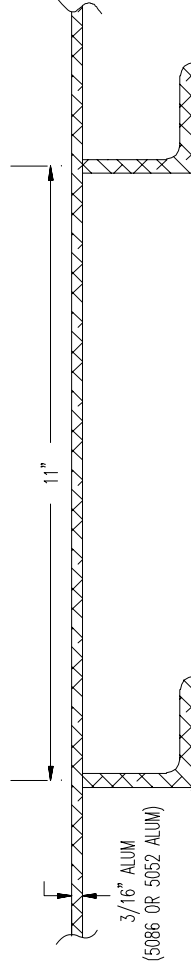


SIDE PANEL  
STIFFENED STEEL CORRUGATED CONTAINER

UNOLS STANDARDIZED VANS  
 7/9/01

DO NOT SCALE

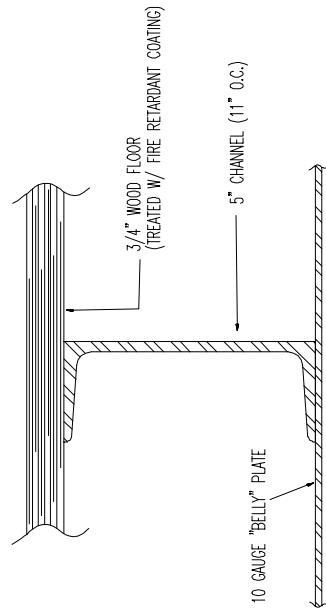




SIDE PANEL  
ALUMINUM VAN  
UNOLS STANDARDIZED VANS  
7/9/01

2" x 2" x 1/4" <  
(5086-H111 OR 6061-T6 ALUM)

3/16" ALUM  
(5086 OR 5052 ALUM)



NOTE: WOOD DECK MAY BE REPLACED WITH  
SUPPORTED 1/2" MIN. STEEL OR ALUM  
PLATE AND BELLY PLATE OMITTED.

BOTTOM PANEL

STEEL CONTAINER OR CUSTOM ALUMINUM VAN

UNOLS STANDARDIZED VANS

7/9/01

# **Electrical Drawings**

- Van Electrical Procedure
- Sheet 1 - Variable Voltage/Single Phase (1)
- Sheet 2 - Variable Voltage/Single Phase (2)
- Sheet 3 - 460 VAC/3 - Phase

## VAN ELECTRICAL PROCEEDURE

System or Equipment: **UNOLS Standard Scientific Van  
Single Phase/Variable Voltage.**

Model:

Serial Number:

Original Author: F. Jones

Date: 19 Sep. '02

Revision Author:

Latest Revision Version and Date:

References:

UNOLS Van Electrical Drawing, Sheets 1/3 and 2/3

See specifically:

*Van manufacturer Owner's Manual and Electrical Drawings*

Attachments:

None

General:

This van may be powered from either from a grounded\*, 3 wire 120/208 or 120/240 Vac single phase connection (the "Shore Supply") or from an ungrounded\*, 2 wire 208, 240 or 460 Vac single phase connection ("Ship Supply"). It is critical, to avoid damage to the van's electrical system and possible electrical shock hazard to personnel, that correct procedures (described below) be followed in connecting the van to a ship or shore based electrical supply.

\* "Grounded" refers to a normal building circuit with the "neutral conductor" bonded to ground in accordance with the National Electric Code. "Ungrounded" refers to a normal shipboard electrical system that doesn't have a grounded neutral. If the van is to be used on a ship with a grounded system, contact the OSU Marine Superintendent or Port Engineer for advice.

Procedure:

Personnel connecting the van to an electrical service should (1) familiarize themselves with the procedures in this document and (2) review the referenced electrical drawings for the van. Only individuals such as licensed Marine Engineers, unlicensed engineering personnel holding Electrician endorsements or other individuals with electrical knowledge and skills should be responsible for the connection of the van. Dangerous voltages are present inside the transfer switch and fused disconnect. Appropriate "lock out – tag out" procedures should be followed when changing fuses.

Power is to be supplied to the van only through the two connectors in the exterior of the van. In no case are connections to be made directly into the panels in the van.

## VAN ELECTRICAL PROCEEDURE

Before energizing any circuit connected to the van the responsible individual shall assure that the manual transfer switch and voltage selection switch are in the appropriate positions and that the appropriate fuses are installed in the fused disconnect.

Those unfamiliar with the van or encountering a circumstance not addressed in this procedure are encouraged to contact the Port Engineer or Marine Superintendent before proceeding.

### Connection to “Shore” Power:

- Use the van’s 4 wire, 60 A cable which has a female plug to mate with the van’s male “Shore” receptacle on one end. A suitable plug for the supply source can be installed on the other end with the green wire being ground, the white wire being the neutral conductor and the other two the “hot” legs. The source may be either 120/208 or 120/240 Vac and must be fused for 60 A or less.
- Set the transfer switch in the van to the “Shore” position. Note, from Sheet 1 of the referenced drawings, that the voltage selection switch and the fused disconnect are not used when the van is supplied through the “Shore” connection.
- Once the van is connected and the power is energized verify the correct operation of lights, HVAC, etc. Check each GFCI protected receptacle by pressing the test button.
- The emergency light has a switch allowing it to be turned off when the van is disconnected from power to avoid depleting the battery for the light. Set this switch in the “Normal” mode and verify operation of the light using either the test button or securing power to it at the circuit breaker panel or by unplugging it.

### Connection to “Ship Power:

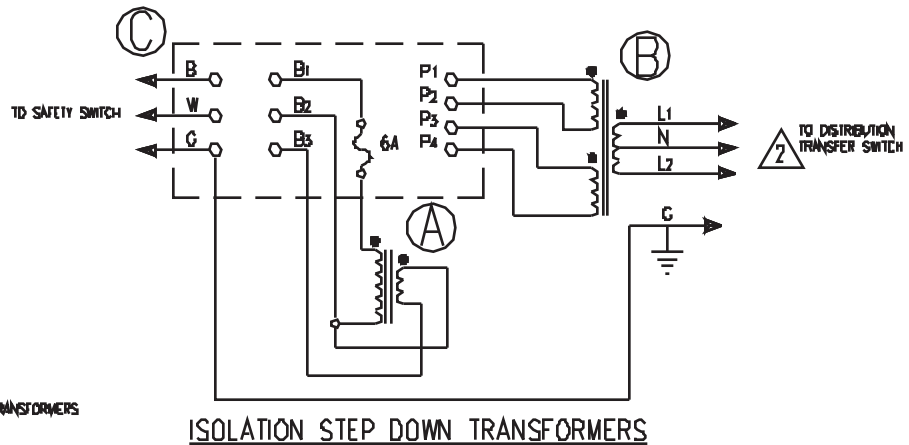
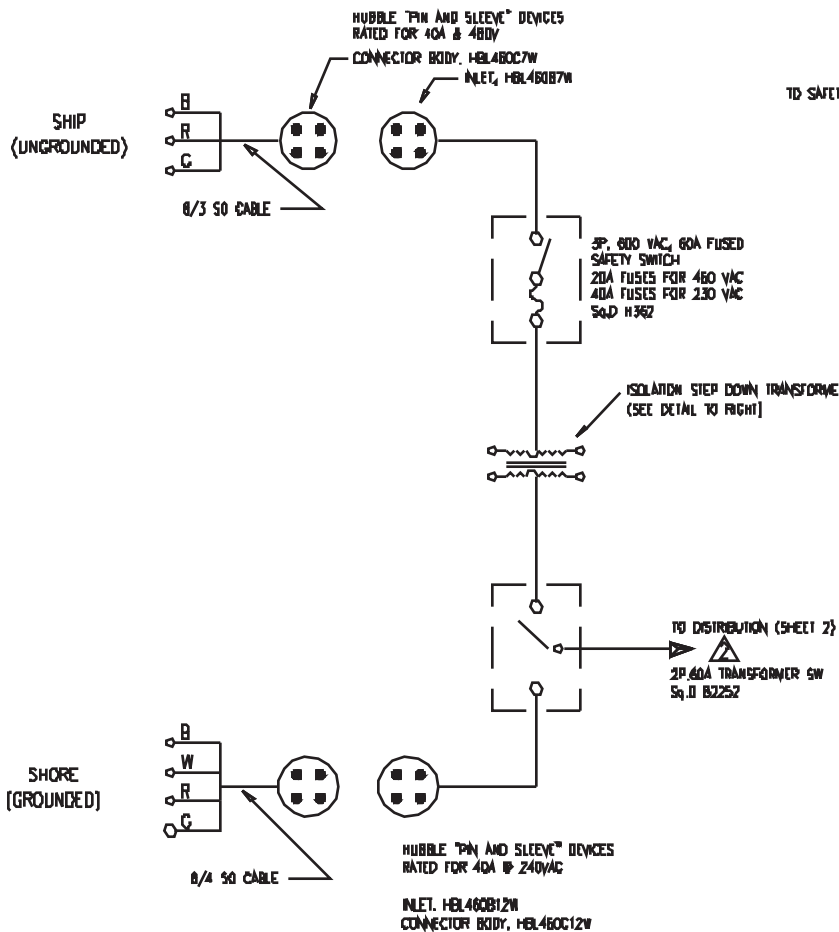
- Use the van’s 3 wire, 60 A cable which has a female plug to mate with the van’s male “Ship” receptacle on one end. A suitable plug for the supply source can be installed on the other end with the green wire being ground and the other two the “hot” legs. The source may be 208, 240 or 460 Vac and must be fused for 60 A or less.
- Set the transfer switch in the van to the “Ship” position.
- Install the appropriate fuses (in the drawer of the van) in the fused disconnect: 30 A for 460 Vac (these will require the Bus No. 663 adapters to fit in the fuse clips), 40 A for 240 Vac or 60 A for 208 Vac. The use of the correct fuses is critical to the protection of the van’s transformers from overload (fuse rating too high for supply voltage) or loss of van power (fuse rating too low for supply voltage.)
- Set the voltage selector switch in the van (under the hinged cover by the distribution panel) to the appropriate voltage. The failure to set the switch to the correct voltage before power is supplied to the van will cause damage to the van’s electrical system and connected electrical equipment! Close the disconnect cover and switch “ON.”

## VAN ELECTRICAL PROCEEDURE

- Once the van is connected and the power is energized, verify the correct operation of lights, HVAC, etc. Check each GFCI protected receptacle by pressing the test button.
- The emergency light has a switch allowing it to be turned off when the van is disconnected from power to avoid depleting the battery for the light. Set this switch in the “Normal” mode and verify operation of the light using either the test button or securing power to it at the circuit breaker panel or by unplugging it.

### Disconnecting from power:

- Put the emergency light switch in the “Off” position – this will avoid draining the battery while the van is disconnected from power.
- Turn off the HVAC and shut off all circuit breakers in the distribution panel including the main breaker.
- Disconnect from the power source.
- Remove any plugs from the cable (don’t just cut the cable – it keeps getting shorter) and return the cable to the van. Place the cover over the van-mounted receptacle.



**JUMPER CONNECTIONS**  
NOTE: SELECTOR SWITCH MAY BE USED IN LIEU OF JUMPER TERMINALS

- 460 VAC, 20 A**  
B-P1  
P2-P3  
W-P4
- 240VAC, 40 A**  
B-P1-P3  
W-P2-P4
- 208 VAC, 40 A**  
B-B1-P1-P3  
W-B2  
B3-P2-P4

**TRANSFORMERS**

- (A) 240 PRI - 32V SEC. 1.5kVA, 1#  
"BUCK & BOOST" Sq. D, 1.5S46F  
(GRAINGER 2CL93)
- (B) 240V X 480V PRI 240V/120V SEC.  
10kVA, 1# Sq. D 10S1F  
(GRAINGER 5B6D5)
- (C) SUITABLE TERMINAL STRIP (40A @ 600 VAC)  
FUSE HOLDER FOR 6A FUSE & ENCLOSURE WITH HINGED LID.

NOTE:  
SEE SEPARATE VAN ELECTRICAL PROCEDURE FOR VOLTAGE SELECTION AND HOOKUP.

**BAY MARINE, INC.**

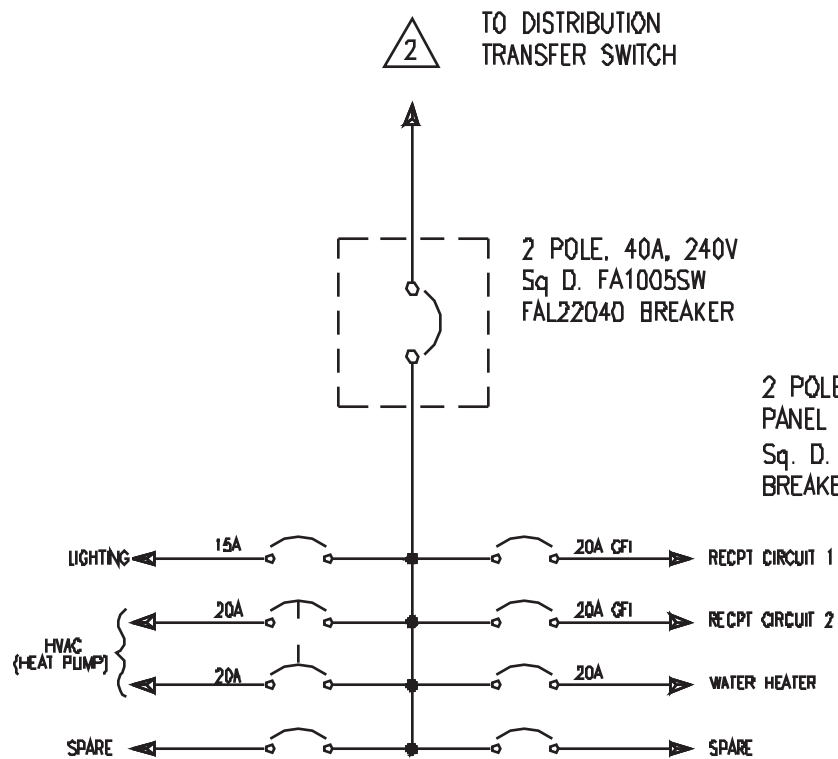
258 NEW MEADOW RD  
BARRINGTON, RI 02808  
(401)-245-8610  
BayMarine@earthlink.net

UNOLS VAN ELECTRICAL

**VARIABLE VOLTAGE/SINGLE PHASE**

SCALE: DD NOT SCALE	DATE: 10/01/02	BY: UC
DWC NO.: SHEET 1 OF 3		REV:

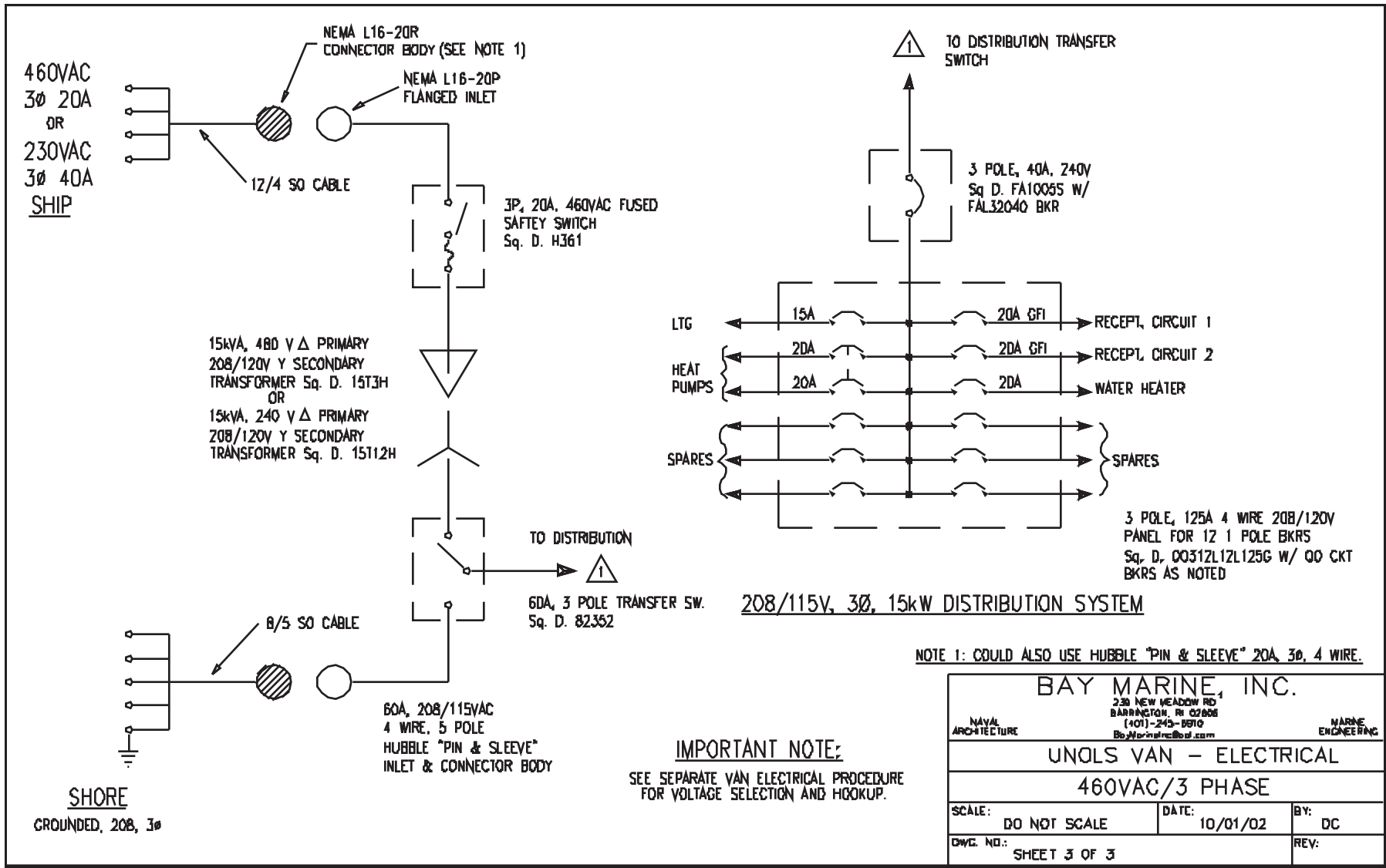
NAVAL ARCHITECTURE      MARINE ENGINEERING



230/115V, 1Ø, 10kW DISTRIBUTION SYSTEM

<b>BAY MARINE, INC.</b>		
<small>220 NEW MEADOW RD BARRINGTON, IL 02506 (417)-244-0910 BayMarine@aol.com</small>		
<small>NAVAL ARCHITECTURE</small>	<small>MARINE ENGINEERING</small>	
<b>UNOLS VAN ELECTRICAL</b>		
<b>VARIABLE VOLTAGE/SINGLE PHASE</b>		
SCALE:	DATE:	BY:
DO NOT SCALE	10/01/02	DC
DWG. NO.:	REV:	
SHEET 2 OF 3		





460VAC  
3Ø 20A  
OR  
230VAC  
3Ø 40A  
SHIP

15kVA, 480 V Δ PRIMARY  
208/120V Y SECONDARY  
TRANSFORMER Sq. D. 15T3H  
OR  
15kVA, 240 V Δ PRIMARY  
208/120V Y SECONDARY  
TRANSFORMER Sq. D. 15T12H

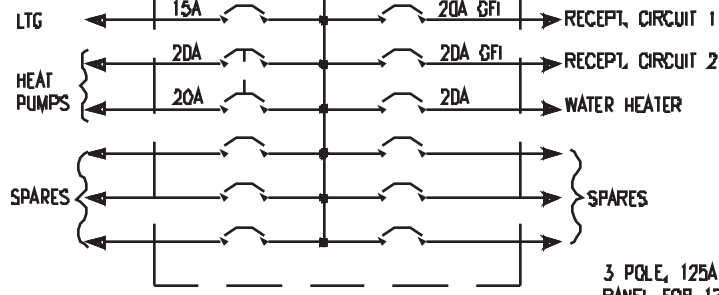
3P, 20A, 460VAC FUSED  
SAFETY SWITCH  
Sq. D. H361

TO DISTRIBUTION

60A, 3 POLE TRANSFER SW.  
Sq. D. 82352

TO DISTRIBUTION TRANSFER  
SWITCH

3 POLE, 40A, 240V  
Sq. D. FA10085 W/  
FAL32040 BKR



3 POLE, 125A 4 WIRE 208/120V  
PANEL FOR 12 1 POLE BKRS  
Sq. D. Q0312L12L125G W/ Q0 CKT  
BKRS AS NOTED

208/115V, 3Ø, 15kW DISTRIBUTION SYSTEM

NOTE 1: COULD ALSO USE HUBBLE "PIN & SLEEVE" 20A, 3Ø, 4 WIRE.

SHORE  
GROUNDED, 208, 3Ø

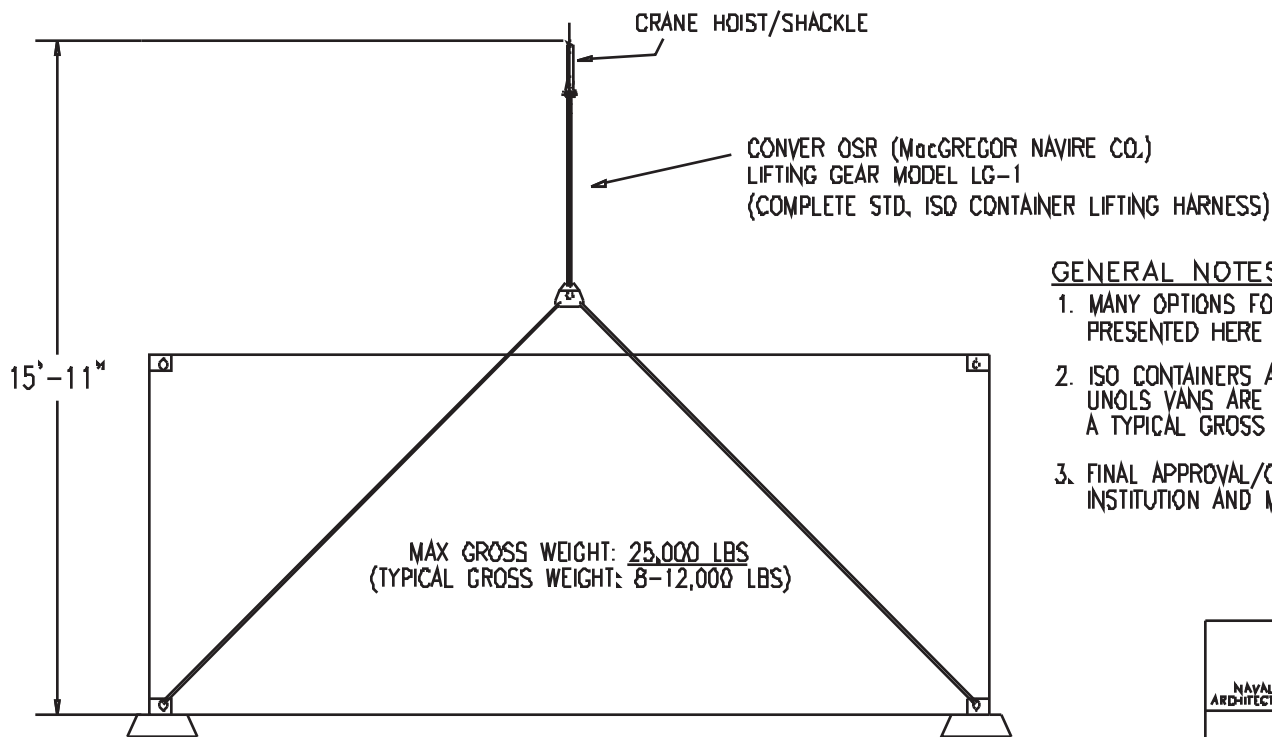
60A, 208/115VAC  
4 WIRE, 5 POLE  
HUBBLE "PIN & SLEEVE"  
INLET & CONNECTOR BODY

**IMPORTANT NOTE:**  
SEE SEPARATE VAN ELECTRICAL PROCEDURE  
FOR VOLTAGE SELECTION AND HOOKUP.

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NAVAL ARCHITECTURE	MARINE ENGINEERING	
<b>UNOLS VAN - ELECTRICAL</b>		
<b>460VAC/3 PHASE</b>		
SCALE:	DO NOT SCALE	DATE: 10/01/02
BY:	DC	REV:
OWC NO.:	SHEET 3 OF 3	

# Lifting Options

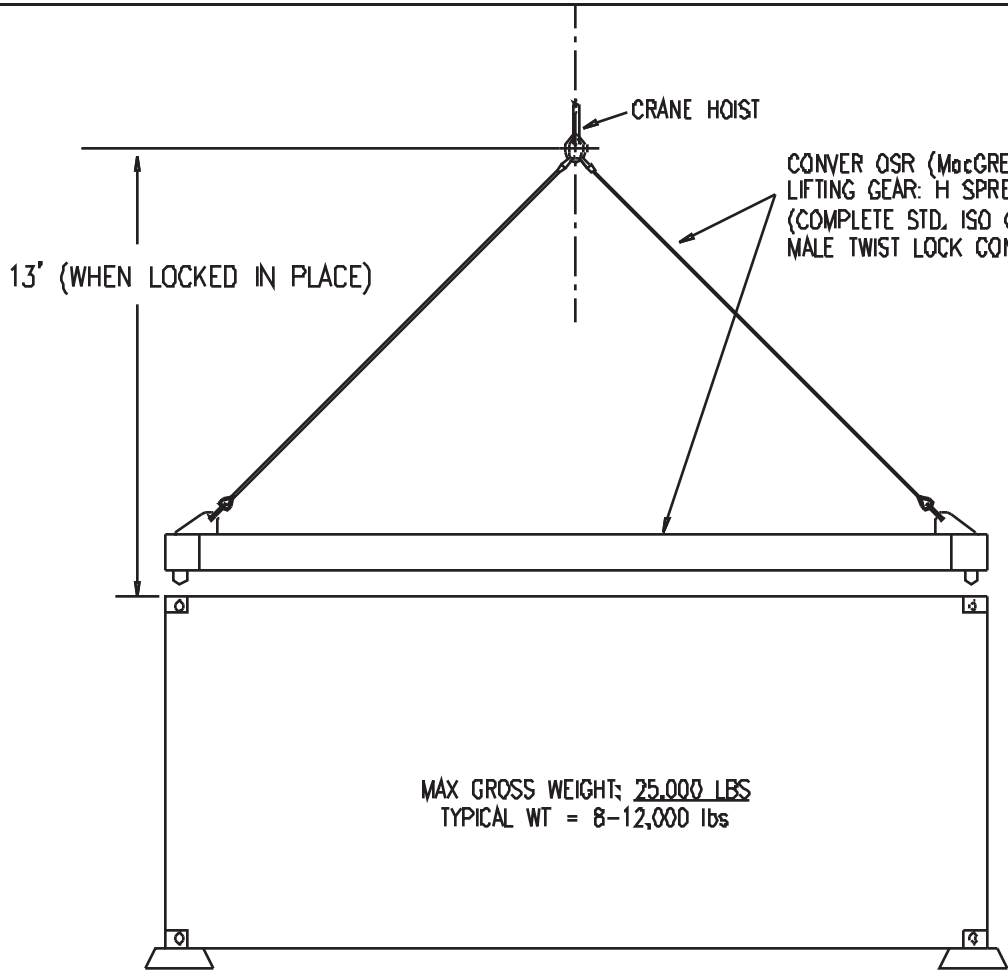
- Sheet 1 - ISO Container Lifting Harness
- Sheet 2 - ISO Container Spreader
- Sheet 3 - Custom Spreader Bar
- Sheet 4 - Slings



GENERAL NOTES

1. MANY OPTIONS FOR CONTAINER LIFTING EXIST. SEVERAL ARE PRESENTED HERE AND ON FOLLOWING SHEETS FOR GUIDANCE.
2. ISO CONTAINERS ARE RATED FOR 54,000-62,000 LBS GROSS WGT UNOLS VANS ARE RATED FOR 25,000 LBS GROSS WEIGHT WITH A TYPICAL GROSS WEIGHT OF 8,000 TO 12,000 LBS.
3. FINAL APPROVAL/CHECK OF LIFTING GEAR IS RESPONSIBILITY OF INSTITUTION AND MASTER OF THE VESSEL.

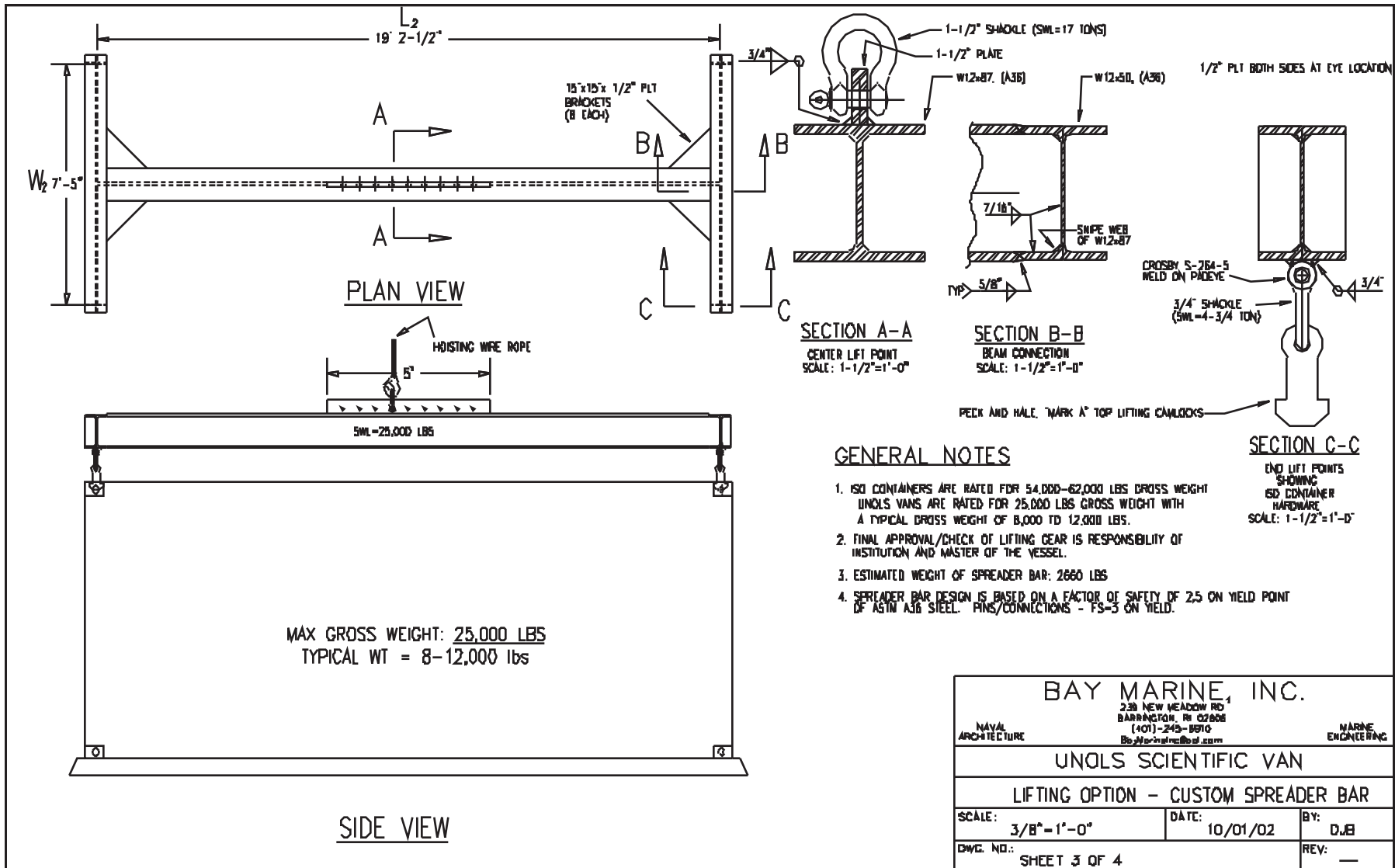
<b>BAY MARINE, INC.</b> <small>239 NEW MEADOW RD          BARRINGTON, RI 02806          (401)-245-6910          BayMarineInc@aol.com</small>		
NAVAL ARCHITECTURE	MARINE ENGINEERING	
<b>UNOLS PORTABLE VAN</b>		
<b>LIFTING OPTION - ISO CONTAINER LIFTING HARNESS</b>		
SCALE: 3/8" = 1'-0"	DATE: 10/01/02	BY: DJB
DWG. NO.: SHEET 1 OF 4		REV: —



GENERAL NOTES

1. ISO CONTAINERS ARE RATED FOR 54,000-62,000 GROSS WEIGHT UNOLS VANS ARE RATED FOR 25,000 GROSS WEIGHT WITH A TYPICAL GROSS WEIGHT OF 8,000 TO 12,000 LBS.
2. FINAL APPROVAL/CHECK OF LIFTING GEAR IS RESPONSIBILITY OF INSTITUTION AND MASTER OF THE VESSEL.

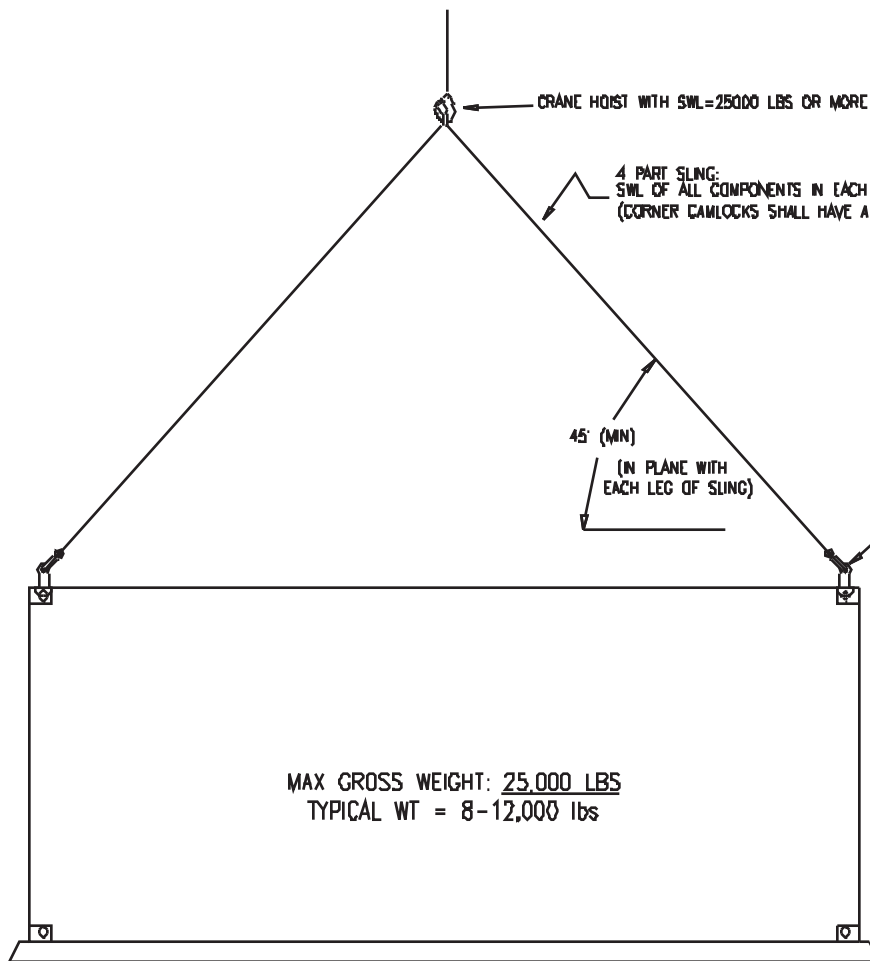
<b>BAY MARINE, INC.</b> <small>238 NEW MEADOW RD          BARTONSTON, RI 02809          (401)-245-8910          BayMarine@bnet.com</small>		
<small>NAVAL ARCHITECTURE</small>	<small>NAVAL ENGINEERING</small>	
<b>UNOLS SCIENTIFIC VAN</b>		
<b>LIFTING OPTION - ISO CONTAINER SPREADER</b>		
SCALE: 3/8" = 1' - 0"	DATE: 10/01/02	BY: DJB
DWG. NO.: SHEET 2 OF 4		REV: —



**GENERAL NOTES**

1. ISO CONTAINERS ARE RATED FOR 54,000-62,000 LBS GROSS WEIGHT. UNOLS VANS ARE RATED FOR 25,000 LBS GROSS WEIGHT WITH A TYPICAL GROSS WEIGHT OF 8,000 TO 12,000 LBS.
2. FINAL APPROVAL/CHECK OF LIFTING GEAR IS RESPONSIBILITY OF INSTITUTION AND MASTER OF THE VESSEL.
3. ESTIMATED WEIGHT OF SPREADER BAR: 2660 LBS
4. SPREADER BAR DESIGN IS BASED ON A FACTOR OF SAFETY OF 2.5 ON YIELD POINT OF ASTM A36 STEEL. PINS/CONNECTIONS - FS=3 ON YIELD.

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NAVAL ARCHITECTURE	MARINE ENGINEERING	
<b>UNOLS SCIENTIFIC VAN</b> <b>LIFTING OPTION - CUSTOM SPREADER BAR</b>		
SCALE: 3/8" = 1'-0"	DATE: 10/01/02	BY: DJB
DWG. NO.: SHEET 3 OF 4		REV: —



CRANE HOIST WITH SWL=25000 LBS OR MORE (FOR 25,000 LB VAN)

4 PART SLING:  
SWL OF ALL COMPONENTS IN EACH PART SHALL BE 8800 LBS OR MORE FOR 25,000 LB VAN (3600 LB SWL FOR 10,000 LB VAN)  
(CORNER CAMLOCKS SHALL HAVE APPROPRIATE SWL WITH 45 DEGREE ANGLE TAKEN INTO ACCOUNT)

45° (MIN)  
(IN PLANE WITH EACH LEG OF SLING)

PECK AND HALL "MARK A" TOP LIFTING CAMLOCK

MAX GROSS WEIGHT: 25,000 LBS  
TYPICAL WT = 8-12,000 lbs

SIDE VIEW

GENERAL NOTES

1. ISO CONTAINERS ARE RATED FOR 54,000-62,000 GROSS WEIGHT UNOLS VANS ARE RATED FOR 25,000 LBS GROSS WEIGHT WITH A TYPICAL GROSS WEIGHT OF 8,000 TO 12,000 LBS.
2. FINAL APPROVAL/CHECK OF LIFTING GEAR IS RESPONSIBILITY OF INSTITUTION AND MASTER OF THE VESSEL.
3. WARNING  
PECK AND HALL DOES NOT APPROVE THE "MARK A" TOP LIFTING CAMLOCK FOR BRIDLE LIFTING OF CONTAINERS WITHOUT A SPREADER BAR NOR DO THEY RECOMMEND EVER LIFTING AN ISO CONTAINER FROM THE TOP WITH A LOOSE BRIDLE. UNOLS VANS ARE MUCH LIGHTER THAN YOUR AVERAGE FULLY LOADED CONTAINER. NONETHELESS, THE LIFTING METHOD SHOWN ON THIS SHEET IS DONE AT YOUR SHIP OPERATOR'S RISK. BAY MARINE DOES NOT CURRENTLY SANCTION THIS LIFTING METHOD.

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NAVAL ARCHITECTURE	MARINE ENGINEERING	
<b>UNOLS SCIENTIFIC VAN</b> <b>LIFTING OPTION - SLINGS</b>		
SCALE: 3/8" = 1'-0"	DATE: 10/01/02	BY: D.J.B.
DWG. NO.: SHEET 4 OF 4		REV: —

## **Securing Options (TABLE 2)**

**This section is under construction!**