

## **DIVISION 13 - SPECIAL CONSTRUCTION**

### **SECTION 13121 - PRE-ENGINEERED STEEL FIRE TRAINING TOWER**

#### **PART 1 – GENERAL**

##### **1.1 RELATED DOCUMENTS**

Drawings and general provisions of the contract, including General and Supplementary Conditions and Specification Sections, apply to this Section.

##### **1.2 SUMMARY**

This Section includes the following:  
Mobile Training Prop/Trailer.  
Design requirements.

##### **1.3 RELATED SECTIONS**

The following Sections contain requirements that relate to this section:

##### **1.4 REFERENCES**

###### **1.4.1 American Iron and Steel Institute (AISI):**

“Specification for the Design of Cold-Formed Steel Structural Members.”

###### **1.4.2 American Institute of Steel Construction (AISC):**

“Steel Construction Manual”, Allowable Stress or Load and Resistance Factor Design.

###### **1.4.3 American Society for Testing and Materials (ASTM) Publications:**

ASTM A36 “Standard Specification for Carbon Structural Steel”

ASTM A123 “Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products”

ASTM A653 “Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process”

ASTM A924 “Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process”

ASTM A992 “Standard Specification for Structural Steel Shapes”

###### **1.4.4 National Fire Protection Association (NFPA):**

NFPA 1402 – “Standard On Facilities For Fire Training And Associated Props”

NFPA 1403 – “Standard On Live Fire Training Evolutions”

###### **1.4.5 Occupational Safety and Health Standards (OSHA):**

29 CFR 1910.25 – “Stairways”

29 CFR 1910.29 – “Fall Protection Systems and Falling Object Protection”

**FIRE TRAINING TRAILER  
“MBR-25/MOBILE TRAINEE”**

**PART 2- DESCRIPTION**

**2.1 PURPOSE:**

To provide fire service instructors with the mobility to conduct live fire evolutions at multiple locations.

**2.2 DESIGN CRITERIA:**

The MBR-25 is designed to safely withstand the physical abuse imposed by live fire exercises and to accommodate the interior application of a Westec insulation system without structural damage.

**2.3 SPECIFICATIONS:**

**2.3.1 TRAILER**

Gooseneck cargo van  
21,000 lbs. GVWR  
O. A. L. 30'-8 1/4"  
O.A.W. 8'-6"  
O.A.H. 12'-8 5/8"  
Floor height from grade, 2'-11 5/8"  
3-7000# Dexter Axles  
Wheels, 6-16" Rims, 6-235/85R, 16" 10 Ply Tires  
Hitch, 2" King Pin Hitch (adjustable)  
Brakes, electric, each axle  
Levelers, 2- 50,000#, 2 speed, double leg.  
Structural steel framing, 24" on center  
Formed trailer cross members, 12" on center  
Lights: running, parking, turning & brake

**2.3.2 BODY**

16 ga. galvanized steel wall and ceiling framing  
Pre-painted, 18 ga. galvanized steel exterior wall panels  
18 ga. galvanized box ribbed steel roof, 100 psf live load  
11 ga. steel tread plate floor, painted  
3- entrance doors with hot-dipped galvanized removable stairs  
1- 4' x 4' roof chop-out curb, 12 ga. galvanized  
1- 2'-6" x 3'-0" Bilco roof steel hatch, galvanized and prime painted

5- 3' x 4' window openings with shutters  
Front storage area with cargo door

### **2.3.3 BURN ROOM**

25' length (interior)  
8'-6" width (exterior)  
8'-5" height (interior)  
Westec insulation system on walls & ceiling  
Westemp insulation system on windows & doors  
3 head sprinkler system  
Temperature monitoring system

### **2.4 ADDITIONAL FEATURES TO BE INCLUDED:**

*Add features (from a custom design or from the options spec list) to be included in base bid here.*

### **2.5 FEATURES TO BE BID AS SEPARATE OPTIONS:**

*Add features (from a custom design or from the options spec list) to be included as separate added cost options here.*

### **2.6 MATERIALS:**

All materials shall be new and shall conform to applicable ASTM specifications. All structural or nonstructural materials used, 10 gauge or less in thickness, whether exposed or not to the elements shall be **hot dipped galvanized**. **When any mention of galvanized is noted within these specifications, it shall be implied to mean hot dipped galvanized.** Any exposed material which is not galvanized, shall be given one coat of shop paint.

### **2.7 WALL PANELS:**

The exterior wall panels shall be essentially flat to allow for safe laddering and rappelling anywhere on the simulator without the requirement of additional exterior surface plates to form a flat surface. The exterior wall panels shall be of 18 ga. hot dipped galvanized steel per **ASTM A-924**, class **G-90**. Panels shall have nominal 4 ¾" flats with a maximum 1 1/8" wide recesses and shall be set in the horizontal plane. Since panels are set in the horizontal plane, sealants are not required to make this structure weather tight (sealants in extreme temperature environments will breakdown prematurely). Panels must be brake formed to provide a maximum 1/8" inside radius. All end joints of all panels must be backed by a splice panel, which extends a minimum of 12" either side of the joint (24" total). Painted wall panels shall be manufactured from coil coated steel meeting **ASTM A 924, G-90** hot dipped galvanized and painted with a **paint system on both sides** of the panel. The base coat shall be a 0.2 to 0.25 mil coat of a polyurethane primer. The topcoat shall be a 0.7 to 0.8 mil coat of silicon protected polyester on the face side.

The paint, on both sides of the panel, is to be baked on. The finished surfaces are to have a light wax coating applied after painting.

## **2.8 SHUTTERS:**

All window openings shall be provided with a swinging shutter of the proper size for the opening. Framed opening studs/jamb shall be 16 ga. galvanized steel. Shutters for all areas shall be made with double skins of 18 ga. galvanized steel per ASTM A-924. Shutters will be provided as a 1-3/8" thick factory welded hollow metal assembly with a minimum of 3 vertical interior hat channel stiffeners and a 14 ga. hinge reinforcement. The hinges shall be ball-bearing swaged mortise mount, 4" x 4" x 5/32" thick stainless steel, commercial grade, and provided with the appropriate quantities per shutter (see paragraph below). A hollow metal welded assembly shall be used to prevent premature temperature warping that occurs on single panel/sheet shutters. Galvanized shutters are required to prevent premature rusting. All shutters shall be provided with a galvanized hold open and an operating lever latch with handles on both the inside and outside of the shutter. This latch shall have a padlocking handle and its case shall be 1/8" thick zinc plated steel with a black powder coated finish.

Shutters for all areas except the burn room shall have two heavy-duty hinges. Shutters for the burn room areas shall have three heavy-duty hinges. In addition, burn room shutters shall be protected with a 1" thick Westemp insulation panel mounted on the inside of the burn room.

## **2.9 DOORS:**

Doors for the burn areas shall be made with double skins of 18 ga. galvanized steel per ASTM A-924 with four heavy-duty hinges. The hinges shall be ball-bearing swaged mortise mount, 4" x 4" x 5/32" thick stainless steel, commercial grade. Doors will be provided as a 1-3/8" thick factory welded hollow metal assembly with a minimum of 3 vertical interior hat channel stiffeners and a 14 ga. hinge reinforcement. A hollow metal welded assembly shall be used to prevent premature temperature warping that occurs on single sheet doors. Galvanized doors are required to prevent premature rusting. Framed opening studs/jamb shall be 16 ga. galvanized steel. Doors shall be provided with a galvanized hold open, a 6 1/2" door pull, an adjustable spring closure, and an operating lever latch. This operating lever latch shall have handles on both the inside and outside of the door, a padlocking handle, and its case shall be 1/8" thick zinc plated steel with a black powder coated finish. A door sweep is to be provided to allow hose advancement even when door is closed to exterior of burn room. In addition, burn room doors shall be protected with 1" thick Westemp insulation panels mounted on the inside of the burn room.

## **3.0 STAINLESS STEEL BURN ROOM INSULATING SYSTEM:**

Two-inch thick insulating blankets with a protective skin of stainless steel face panels are to be provided for the interior walls and ceiling for the burn areas (precut to length - field cut at door and window openings). The doors and window shutters shall be protected with a minimum of

one-inch thick burn room insulating panels (precut to fit).

The insulating blankets shall be rated for 2300 degrees F. and shall be unaffected by the application of water. The insulation blankets shall not crack or break, shall be free from asbestos, and shall not produce toxic byproducts in the course of the intended use. The two-inch thick insulation blankets shall have a maximum K value of 0.74 at 1200 degrees F and 0.48 at 800 degrees F (please note – smaller K values denote better insulating values of the system).

The face panels shall have a ¼” maximum corrugation at 3 ½” on center to allow for lateral expansion when exposed to high temperatures. The base material, of the face panels, shall consist of type 304 stainless steel for corrosion protection and thermal performance at high temperatures. These panels shall attach to thermally protected channels with stainless steel screws. Stainless steel trims (type 304) shall protect all wall and door/shutter opening corners. All face screws exposed to fire shall be stainless steel and these screws shall not protrude through the backside of the insulating blanket (through screws are not permitted for maximum thermal protection).

The stainless steel face panels shall not be restrained from expanding at high temperatures, but rather the integral system shall be designed to accommodate the panel movements without creating any buckling or warping of the panels. All panels and trims shall be screw attached to allow for easy maintenance or inspection without disrupting the systems ability to move; welded panels are not allowed. Trims are to be designed to accommodate thermal expansion either through the use of slip connections or planned deformations.

Doors and window shutter insulation panels shall be pre treated water resistant, free from asbestos and shall not produce toxic byproducts in the course of the intended use. Insulation panels shall withstand a constant temperature of 1200 degrees F. and shall be unaffected by the application of water.

#### Temperature Summary

1. Maximum safe training temperature for life safety is 1200 degrees F (continuous)
2. Maximum service temperature for the insulation panels (doors and window shutters) is 1200 degrees F (continuous)
3. Maximum service temperature of the wall and ceiling insulating system is 1850 degrees F (continuous)
4. Maximum insulating blanket service temperature is 2300 degrees F (continuous)

### **3.1 INTEGRATED TEMPERATURE MONITORING SYSTEM:**

Three temperature sensing devices/thermocouples are to be provided for the interior of each burn room. The thermocouples shall be isolated and consist of fiberglass insulated wiring with sealed stainless steel probes. The fiberglass insulated wires shall be further protected by a stainless steel overbraid for increased durability and protection. Ceiling thermocouples shall protrude into the area perpendicular to the ceiling while all stainless steel encased wall thermocouples shall

only run parallel to the walls for safety concerns.

Temperature monitoring shall be sustained with a multiple input, LCD display pyrometer. The pyrometer shall be connected to thermocouples, which are located within the burn areas for temperature reading, and mounted in a lockable NEMA 3R weatherproof box. This pyrometer shall display all attached thermocouple temperatures simultaneously, continually display the maximum peak temperature, have touch sensitive buttons, include a backlight, and have an onscreen programming menu. The pyrometer shall have an internal audio alarm and the ability to connect external devices (i.e., external audio/ visual alarms or texting alarms). Temperature limits shall be user programmable to enable alarms. The pyrometer shall also be capable of data logging which shall include: 90 hour training memory with time and date stamp, onscreen viewing of data, download capabilities of data via infrared interfacing to handheld module. This handheld data acquisition module's data can then be brought to an offsite Windows based computer for download via the SD/SDHC data storage card provided. A visual basic program shall be provided that allows for the user's custom input and also automatically converts the temperature data to both an electronic datasheet and a graph via the user's own Microsoft Excel software.

The pyrometer shall also include Bluetooth connectivity direct to a customer provided Android phone or iPhone device (Bluetooth range is approximately 270 feet without obstructions). Via a supplied app, the device shall display the pyrometer's real time temperatures for up to 9 thermocouples, maximum temperature reached, battery life, current time, if logging is enabled, visual and audio alarms, and if the memory is full. The display will also notify the user, if you are disconnected from the pyrometer. This unique application allows the training and safety officers to be away from the area where the pyrometer is installed, while still being able to monitor the temperatures within the burn rooms, and ensure that the operation of the burn room is conducted within a safe and controlled environment.

## **3.2 WARRANTY**

### **3.2.1 Trailer Warranty**

The trailer supplier shall certify that the trailer and its components have been designed to meet the contract specifications. The trailer supplier shall warrant the structure and components to be free of fabricating defects for a period of **one year** from the date of shipment. This warranty is limited to the replacement of defective parts, or at the building supplier's option, authorization may be given to the PURCHASER to charge back to the supplier an agreed upon amount for extra fieldwork. The supplier will not ship replacement parts nor authorize extra work to any party other than the ORIGINAL PURCHASER. Any pre-engineered structure will require the erector to furnish a certain amount of field fabrication and / or modifications as stated in the manufacturer's handbook. Sections of work requiring field cutting or drilling are indicated on the drawings or in the assembly manual. Other field modifications may be necessitated by site conditions beyond the manufacturer's control. The foregoing are not subject to

warranty.

### **3.2.2 Burn Room Insulation Warranty**

The burn room wall and ceiling insulation system shall be covered by a **15 year** limited warranty that provides coverage against a break in the thermal barrier caused by cracking, breaking, and spalling. This warranty is to apply to products under normal use and recommended service temperatures - but shall also include damage that has been caused by thermal expansion, thermal contraction, impact load, and thermal shock. This warranty is to be limited to component replacement or repair of defective components at the manufacturer's option. The replacement cost of the materials shall not be prorated over the warranty period itself (i.e., the supplier shall bear 100% of the material replacement cost for the duration of the warranty).

### **3.2.3 Paint Warranty**

The paint system shall provide a 30/25 year limited warranty on paint finish, which includes chalking and breakdown of film integrity.

## **3.3 SUPPLIERS/SYSTEMS:**

**3.3.1 Acceptable Suppliers/Systems:** Fire Facilities, Inc.<sup>®</sup>, 314 Wilburn Road, Sun Prairie, WI, 53590, Phone: 800/929-3726 or 608/327-4100, Fax: 866/639-7012 or 608/834-1843, E-mail: [info@firefacilities.com](mailto:info@firefacilities.com), Website: [www.firefacilities.com](http://www.firefacilities.com)

**3.3.2 Alternate Suppliers/Systems:** Any systems/materials not explicitly meeting the specifications stated herein, shall be pre-approved fourteen days prior to the bid due date. For all systems/materials in question, the supplier/contractor shall provide samples, written specifications, burn room insulation thermal performance values, warranties, full set of drawings, and MSDS. An itemized list must be provided that specifically references each item that deviates from this specification. In any case, all performance and warranty criteria stated herein must be met without exception.