MILITARY SPECIFICATION

FLOORING, RAISED; GENERAL SPECIFICATION FOR

This specification has been approved by the Naval Training Equipment Center, Department of the Navy.

1. SCOPE

1.1 This specification covers the general requirements for raised floor systems for trainer device installations.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on the date of invitation for bids or request for proposal form a part of this specification to the extent specified herein.

SPECIFICATIONS

Federal

NN-P-530	Plywood, Flat Panel
QQ-A-200/9C	Aluminum Alloy Bar, Rod, Shapes, Tube, and Wire, Extruded, 6063
QQ-A-591	Aluminum Alloy Die Castings
QQ-S-741D	Steel, Carbon, Structural Shape, Plate and Bar
QQ-S-775D	Steel Sheet, Carbon, Zinc-Coated
SS-T-312	Tile, Floor, Asphalt, Rubber, Vinyl, Vinyl-Asbestos
ZZ-R-765	Rubber, Silicone
DDD-C-1799	Carpet, Squares, Pile Surface, Tile Type, With or Without Attached Cushion

Military

MIL-E-480A	Enamel, Baking, Phenol- or Urea-Formaldehyde
MIL-R-3065	Rubber, Fabricated Parts

MIL-C-3133B	Cellular Elastameric Materials, Fabricated Parts
MIL-R-6855	Rubber, Synthetic, Sheets, Strips, Molded or Extruded Shape
MIL-P-8053	Plywood, Metal Faced
MIL-W-18142	Wood Preservative Solutions, Oil-Soluble, Ship and Boat Use
MIL-P-21035	Paint, High Zinc Dust Content, Galvanizing Repair
MIL-T-23991	Training Devices, Military, General Specification for

STANDARDS

Federal

FED-STD-66	Steel, Chemical Composition and Hardenability

Military

MIL-STD-454	Standard General Requirements for Electronic Equipment

PUBLICATIONS

Department of Commerce, Product and Commercial Standards

CS 236	Mat-Formed Wood Particle Board

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the Contracting Officer)

2.2 Other Publications - The following documents form a part of this specification to the extent specified herein Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply

NATIONAL BUREAU OF STANDARDS

Handbook H-28	Screw-Thread Standards for Federal Services

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D C 20402)

AMERICAN NATIONAL STANDARDS INSTITUTE, INC (ANSI)

ANS A2 5-1970	Surface Burning Characteristics of Building Materials, Method of Test for

(Application for copies should be addressed to American National Standards Institute, Inc., 1430 Broadway, New York, New York 10018.)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

LD 1-1971	Laminated Thermosetting Decorative Sheets

(Application for copies should be addressed to National Electric Manufacturers' Association, 155 East 44th Street, New York, N.Y. 10017.)

(Technical society and technical association specifications and standards are generally available for reference from libraries They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 General.- The raised floor system shall consist of pedestals, stringers, floor panels with covering and accessories including cove base, fascia plates, ramps, steps, railings, lifting devices, registers, grilles, and plenum dividers as required to meet detailed specifications. (See 6.2)

3.2 Material and process.- Materials and processes used in the design and construction of raised floors shall conform to specifications and standards as specified herein

3.2 1 Material.-

3.2.1.1 Metals.- Metal parts shall be in accordance with the following requirements

3.2 1.1.1 Aluminum.- Aluminum alloys, except castings, shall conform to or exceed American Society for Testing and Materials (ASTM) standards and QQ-A-200/9C. Aluminum alloy castings shall conform to QQ-A-591, alloy A380.

3.2 1.1 2 Iron and steel.- Cast iron shall not be used. Steel material shall be rolled or formed Zinc coated carbon steel sheets shall conform to QQ-S-775, class d Steel plates shall conform to QQ-S-741D.

3.2.1 1 3 Corrosion-resistant metals - The following are considered corrosion-resistant metals which can be utilized in end application in normal process state Examples are.

(a) Copper

(b) Brass

(c) Bronze

(d) Copper-nickel alloy

(e) Nickel-copper alloy

(f) Copper-beryllium alloy

(g) Copper-nickel-zinc alloy

(h) Nickel-copper-silicon alloy

(i) Nickel-copper-aluminum alloy

(j) Austenitic corrosion-resistant steels 302, 303, 304, 304L, 309, 310, 316, 316L, 321, 322, 322A, and 347 as defined in FED-STD-66.

3.2.1.1.4 Dissimilar metals - The selection and protection of dissimilar metal combinations shall be in accordance with requirement 16 of MIL-STD-454.

3.2.1.1.5 Copper.- Copper shall be in accordance with MIL-T-23991.

3.2.1.2 Rubber - Except for the cellular rubber types of 3.2.1.2.1 rubber materials used for the absorption of noise, shock, vibration or for application where resiliency is required, shall be in accordance with MIL-R-3065.

3.2.1.2.1 Cellular rubber.- Cellular rubber used for the absorption of noise, shock, vibration or where resiliency is required shall be in accordance with MIL-C-3133

3.2.1.2.2 Synthetic rubber - Where resistance to oil and fuel is required, general-purpose synthetic rubber conforming to MIL-R-6855 shall be used. Where resistance to low or high temperatures or tear resistance is required, silicone rubber conforming to ZZ-R-765 shall be used.

3.2.1.3 Adhesives.- Adhesive materials shall be in accordance with requirement 23 of MIL-STD-454.

3.2.1.4 Wood products - Wood products shall be treated for preservation, fire-retardation, and termite protection, and shall conform to Commercial Grade B or better. Plywood shall conform to NN-P-530 or MIL-P-8053, as applicable, and shall be treated for moisture and fungus protection in accordance with MIL-W-18142. Particleboard (See 6.2.1.10) shall conform to Commercial Standard CS 236

3.2.1.5 Floor covering - Floor coverings are made of the following

types of material and processes:

(a) Vinyl Vinyl shall conform to Type III of SS-T-312

(b) Vinyl asbestos Vinyl asbestos shall conform to Type IV of SS-T-312

(c) High pressure laminates. High pressure laminates shall conform to NEMA LD 1-1971

(d) Carpet Carpet shall conform to DDD-C-1799.

Selection of the desired floor covering to be provided in the trainer installation shall be as specified in the basic equipment specification.

3.2.2 Processes - Processes shall be as specified in 3.2.2.1 through 3.2.2.3.

3.2.2.1 Metals (coating, plating and treatment).- The finishes and coatings on raised floor components shall conform to requirement 15 of MIL-STD-454. Enamel coating shall conform to MIL-E-480A.

3.2.2.1.1 Zinc coating.- All zinc coating that has been damaged by welding, installation, or cut edges shall be repaired by the application of a galvanizing repair paint conforming to MIL-P-21035. Areas to be repaired shall be thoroughly cleaned and slag removed from welds to form non-abrasive finish prior to application of the paint.

3.2.2.2 Bonding adhesive.- Adhesive bonding shall be in accordance with requirement 23 of MIL-STD-454 Adhesive used for bonding shall develop the required strength needed for the application and shall meet the environmental requirements of the raised floor. Adhesives that give off volatile by-products, or vapors harmful to human health, or contain corrosive substances, shall not be used.

3.2.2.3 Welding.- Structural welding shall conform to requirement 13 of MIL-STD-454.

3.3 Design.-

3.3.1 General.- The raised floor system shall include one size modular prefabricated structural floor panels supported by a rigid pedestal-stringer system. The system shall be designed to permit self-alignment of floor panels. The pedestals shall be adjustable. The floor panels shall be readily removed and covered with either homogeneous vinyl, vinyl asbestos, high pressure laminate, or a carpeted tile wearing surface When the finished raised floor is more than 16 inches above the subfloor, the raised floor system shall be designed to meet horizontal loading and horizontal deflection requirements as are determined to exist for the installation in addition to design loads herein specified When the finished floor is less than 6 inches above the subfloor, an approved

stringerless floor system of equivalent design load capabilities (See 3.3 2) may be provided in lieu of rigid stringer system. Raised floor design shall be in accordance with the applicable requirements of 3.3.1 1 through 3.3 5 1 of this specification and the design requirements of the detail specification

3.3.1.1 Safety.- A disciplined approach to control personnel safety aspects, evaluate the raised floor system's design, identify hazards and prescribe corrective action with regard to ramps, steps, railings and good commercial work processes shall be incorporated.

3.3 1.2 Fasteners and fastenings.- The application of fasteners and fastenings for pedestals and stringers as applicable shall be in accordance with requirement 12 of MIL-STD-454

3 3.2 Design loads.- The floor system shall be designed to carry a concentrated maximum live load of 1000 pounds applied on one square inch of panel surface at any location on the raised floor or a uniformly distributed maximum live load of 250 pounds per square foot at any location on the raised floor. Design stresses shall provide a safety factor of not less than 3 based on the yield strength of the material being used. Maximum deflection under concentrated live load shall be 0.080 inches and the maximum deflection under uniformly distributed live load shall be 0.040 inches Maximum span between pedestals in either direction shall not exceed two feet. The applied load(s) shall not leave any permanent surface deformation or indentation. The pedestal assembly shall be capable of supporting a maximum 5,000-pound axial load.

3 3.3 Pedestals.- Pedestals (See 6 2 1 1) shall be steel or aluminum or a combination thereof. The base plate shall be not less than 4 inches by 4 inches by 1/8 inch thick, and shall be welded to the shaft of the pedestal Approved die-formed bases of equivalent load spreading capacity and bearing area may be provided in lieu of flat base plates. Rod shafts shall not be less than 7/8 inch in diameter, pipe shafts shall not be less than one inch in diameter, square shafts shall not be less than one inch square Pedestals shall be provided with adjusting threads, or other devices which will permit leveling of the raised floor system. Threaded devices used for adjustment purposes shall conform to either the unified or fine thread series in accordance with National Bureau of Standards, Handbook H-28. Lock nuts, set screws, or other locking devices shall be provided to positively lock the final pedestal vertical adjustments in place. The locking device shall be a type that is effective whether floor panels are or are not in place. Unobstructed vertical space between the subfloor and bottom of lowest member of the raised floor system shall not be less than 9 inches but may include pedestals and stringers as required. Pedestal caps shall be designed to fit precisely over pedestal shafts by welding and shall interlock with panels and stringers (See 3 3 4) in order to preclude tilting, rocking, or vibrating of panels when a live load is applied

3.3 4 Stringers - Stringers (See 6 2 1.2) shall be fabricated from rolled or formed steel or rolled or extruded aluminum sections. The

pedestal-stringer system shall incorporate a bolted or clamped means of interlocking pedestal and stringers. Stringers shall provide seating of panels in order to preclude tilting, rocking, or vibrating of panels when a live load is applied

3.3.5 Floor panel - The maximum size of floor panels shall be 24 inches by 24 inches (See 6.2.1.3.) Metal shall not be exposed on the finished top surface of the panels Vinyl trim or vinyl end bars shall be provided along the four edges of the panels Cutouts and cutout closures shall be provided to accommodate utility systems and equipment intercabling. The cutouts shall be reinforced to meet design load requirements The floor panels shall be one of the following types

(a) Steel panels: Steel panels shall be of die-formed construction. A flat steel top sheet shall be welded to one or more die-formed stiffener sheets

(b) Steel-clad plywood or particleboard floor panels· The core of the panels shall be constructed of particleboard not less than 1 inch thick Both sides of the particleboard shall be structurally bonded with thermosetting adhesive under pressure to zinc-coated steel sheets and sealed on all four edges with zinc-coated steel. Steel sheets shall be no lighter than 26 gauge. The completed panels shall have a flame spread rating of 25 or less when tested in accordance with ANS A2.5-1970.

3.3.5 1 Floor covering.- Floor covering (See 6.2 1 4) shall be of size to fit the module of the floor panels The covering shall be factory-bonded to the floor panels with a waterproof adhesive to a type standard with the floor covering industry. The adhesive shall be strong enough to withstand an upward pull from the face of covering by the lifting device in order to permit removal of floor panels without damaging or separating the covering from the floor panel for normal wear life. A layer of approved sound-dampening or vibration-dampening material may be provided under the covering as part of the floor panel, if such practice is standard with the manufacturer. Floor covering material shall be one of the following types.

(a) Vinyl: Vinyl shall be a minimum 1/8 inch thick

(b) Vinyl asbestos· Vinyl asbestos shall be a minimum 1/8 inch thick

(c) High pressure laminates High pressure laminate shall be a minimum 1/16 inch thick

(d) Carpet Carpet shall have flame spread rating of 75 or less when tested in accordance with ANS A2.5-1970 Static control shall be less than 1 kv at 20% Relative Humidity and 70°F

3.4 Installation.- The area in which the floor system is to be installed shall be cleared of all debris; subfloor surfaces shall be thoroughly cleaned and all dust shall be removed before the work is started. Concrete floors that will be used as air plenum surfaces beneath raised floors shall be sealed with a liquid chemical sealer-hardener compound as recommended and applied in accordance with the compound manufacturer's printed instructions The top surface of the raised floor shall be levelled to ± 0.10 inch in 10 feet of run. Free ends of floor (where the floor system does not abut wall or other construction) shall have positive anchorage and rigid support through pedestals and stringers.

3.4.1 Pedestal.- Pedestal bases shall be secured to the structural subfloor with an adhesive, and shall be in full and firm contact with the subfloor. The subfloor shall be ground or rubbed to a flat plane. All pedestals shall be set plumb.

3.4.2 Stringers.- The stringers and other framing members shall be anchored, braced, and strutted in such a manner as to provide a rigid structure to preclude lateral movement.

3.4 2.1 Auxiliary framing.- Auxiliary framing (See 6.2 1.5) shall be provided around columns and other permanent structures, at sides of ramps, at free ends of floor, and beneath floor panels that are substantially cut to accommodate utility systems and provisions for equipment mounting, air and cable entry. Auxiliary framing shall consist of additional pedestals and stringers designed to specific heights and lengths to meet structural irregularities and design loads Auxiliary framing shall be connected to main framing.

3.4.3 Floor panels.- Floor panels shall lie flat with square corners without warp or twist, and shall bear uniformly on all four sides without rocking and without edges projecting above the floor plane The floor panels shall be interlocked with pedestals in a manner that will preclude lateral movement. Only perimeter floor panels, cutout floor panels, and floor panels adjoining columns, stairs, ramps, and the like, shall be fastened to the floor stringer system.

3.5 Accessories.-

3.5.1 Lifting devices.- Two lifting devices (See 6 2.1 6) for removing floor panels shall be provided. The lifting devices shall be of a type standard with the raised floor industry for the selected floor covering used.

3.5.2 Fascia plates - Aluminum fascia plates (See 6.2 1 7) shall be provided at open ends of floor, at sides of ramps, at sides of steps, and elsewhere as necessary to enclose the area under the raised floor The plates shall have a satin aluminum finish. All appurtenances including angles, trim and fasteners shall be provided with the plates and installed according to raised floor manufacturer's recommended procedures

3.5.3 Ramps.- Ramps shall include supports, brackets, clamps, plates, edging, closures, nose pieces, fasteners, and other appurtenances. Slope

of ramps shall not exceed 1 inch rise to 10 inches of run. Non-slip inserts shall be provided on all ramps The ramps shall be fabricated of the same materials as the floor panels and securely fastened to the raised floor system and subfloor. Ramps shall be installed according to the manufacturer's recommended procedure.

3.5.4 Steps.- Steps shall include supports, brackets, clamps, plates, edging, threads, non-slip nosing, risers, closures, fasteners, and other appurtenances. Height of risers shall not exceed 7 1/2 inches. Steps shall be fabricated of the same material as the floor panels and securely fastened to the raised floor system and subfloor Steps shall be installed according to the manufacturer's recommended procedure.

3.5 5 Railing.- Railing shall be provided to assure the safety of personnel. The railing shall be provided complete with posts, flanges, sleeves, wall plates, fasteners and other appurtenances. Railings at stairs and ramps shall be sloped from the horizontal rail and parallel to the incline of stairs and ramps. The railing shall be of 1 1/4 inch aluminum pipe, 1 1/4 inch steel pipe or of an equivalent design Railing shall have top and intermediate rails supported by posts spaced not over 6 feet on center. Minimum height of railing on flat surfaces shall be 3 feet, minimum height of railing on steps or ramps shall be 2 feet 6 inches. Railings shall be securely fastened to the raised floor system and subfloor to preclude tilting or rocking of railings. Railings shall be installed according to raised floor manufacturer's recommended procedures.

3.5.6 Registers, grilles and plenum dividers - Registers, grilles and plenum dividers (See 6.2.1.8) shall be the raised floor industry's standard type. If exposed to foot traffic or the weight of equipment, the registers and grilles shall be designed to meet required weight support requirements. (See 3 3 2) Isolation pads from steel and floor may be provided under registers and grilles if such practice is standard with the manufacturer

3.5.7 Vinyl or rubber cove base - Cove base (See 6.2 1.9) shall be provided at all intersections of raised floor and vertical structure. The cove shall be 4 inches high and shall be applied after the floor system has been completely installed. All cracks and voids in walls and other vertical surfaces to receive cove base shall be filled with a suitable crack filler. Cove base adhesive, as recommended by raised floor manufacturers, shall be applied to the back of the base with a notched trowel, leaving approximately 1/4 inch base space along the top edge of the base The cove base shall immediately be pressed firmly against the wall and moved gently into place, making sure that the toe is in contact with the raised floor The entire surface of the cove base shall be rolled with a hand roller, and ther the toe or the base shall be pressed firmly against the wall with a straight piece of wood Corners shall be formed by use of factory-fabricated corner sections or by mitering the cove base

3.6 Cleaning.- All debris, including dust accumulated during

installation, shall be removed from under the raised floor system. Immediately after completion of the raised floor installation, the raised floor system shall be cleaned in accordance with good commercial raised flooring cleaning practice Any cleaner applied shall be the type recommended by the floor covering manufacturer and shall be applied in accordance with the floor covering manufacturer's instructions Seepage of cleaner between individual floor panels shall be avoided. Carpeted panels shall be cleaned in accordance with the carpet manufacturer's recommended procedure.

3.7 Electrical resistance.- The electrical resistance between an individual stringer and pedestal shall be less than 5 milliohms. The electrical resistance between stringer and floor panel as mounted in normal use shall be less than one ohm

3.8 Color - Selection of colors for floor covering, trim edge or cove base shall be selected from the raised floor industry's standard colors and shall be subject to approval by the Contracting Officer.

3.9 Workmanship.- Workmanship shall be in accordance with requirement 9 of MIL-STD-454.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection.- Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to specified requirements.

4.2 Load test reports.- Certified copies of test reports from a commercial testing laboratory indicating conformance with the design load requirements specified herein shall be submitted to the Contracting Officer. If floor panels are composed of more than one structural material, the certification shall indicate that the bonding strength of the adhesive(s) used is adequate for the intended purpose. All test loads on panels shall be applied through a one-inch by one-inch testing block and the panels shall be supported by the manufacturer's standard supporting system

4 3 Flame spread test reports.- Certified copies of test reports from a commercial testing laboratory indicating conformance with the flame spread requirement specified herein shall be submitted to the Contracting Officer Panels bearing the Underwriters' Laboratories label and listed by Underwriters' Laboratories, Inc as having a flame spread rating of 25 or less will be accepted in lieu of certified copies of test reports.

5. PREPARATION FOR DELIVERY

5.1 General.- Since final inspection will take place at the installation site, there are no specific preparation for delivery requirements. The raised floor system shall be packaged, packed, and marked in a manner that will ensure acceptance by common carrier and safe delivery at destination.

6 NOTES

6 1 Intended use.- The raised floor system included in this specification is intended for use where removable flooring may be necessary to accommodate utility systems or equipment intercabling or to provide an air plenum or equal distribution of loads for training installations.

6.2 Definitions.- Definitions of any words in this specification other than those listed in MIL-HDBK-220 or listed in 6 2 1 1 through 6.2 1.9 of this specification will be furnished upon written request to the Contracting Officer.

6.2.1 Terms used - The following definitions of terms as used in this standard.

6.2.1.1 Pedestal - Pedestal is the vertical support member that is secured by the base plate to the subfloor with an adhesive and by the pedestal head to the stringers with fasteners

6.2.1.2 Stringer.- Stringer is the horizontal support member that rigidly connects two pedestal heads and is the prime support for the floor panel along the floor panel's perimeter

6 2.1.3 Floor panel - Floor panel is the horizontal square removable assembly that provides the main walking surface.

6 2 1.4 Floor covering - Floor covering is the material that is bonded to the top surface of the floor panel

6.2.1.5 Auxiliary framing - Auxiliary framing is the additional pedestals and stringers that are designed to specific heights and lengths to meet structural irregularities and design loads.

6.2.1.6 Lifting device.- Lifting device is a tool that is used to remove floor panels from their raised floor framework

6.2 1.7 Fascia plate.- Fascia plate is a metal frame that is vertically secured to the open ends of the floor system to form a closed raised floor unit

6 2 1.8 Plenum dividers - Plenum divider is a structure used to seal the area beneath the raised floor system for use as an air plenum chamber

6.2.1.9 Cove base.- Cove base is a vinyl or rubber edging that is installed at the intersection of the raised flooring and wall or column.

6.2.1.10 Particleboard - Particleboard is the inner core of one type floor panel made of flakes, chips, splinters or particles of wood bonded with synthetic resin or other binder

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