
USACE / NAVFAC / AFCEA / NASA UFGS-12 65 00 (August 2008)

Preparing Activity: USACE Superseding
UFGS-12 65 00 (April 2006)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated April 2012

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SECTION 12 65 00

FIXED SEATING 08/08

NOTE: This guide specification covers the requirements for upholstered fixed seating.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

PART 1 GENERAL

NOTE: On the drawings, show: (1) Seating layout, including row length and locations for wheelchair seating and ADA armrests as required by Architectural & Transportation Barriers Compliance Board, "ADA Title III, Americans with Disabilities Act - Buildings and Facilities"; and (2) Row and seat number identification.

Design must comply with all applicable fire and electrical codes, to include NFPA Life Safety Codes.

Coordinate aisle lighting, communication and electrical requirements with Electrical Engineer. Add requirements as appropriate for the project.

1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A1011/A1011M	(2010) Standard Specification for Steel, Sheet, and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability and Ultra-High Strength
ASTM A48/A48M	(2003; R 2008) Standard Specification for Gray Iron Castings
ASTM A513	(2008a) Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
ASTM D4157	(2010) Standard Test Method for Abrasion Resistance of Textile Fabrics (Oscillatory Cylinder Method)
ASTM F851	(1987; R 2005) Standard Test Method for Self-Rising Seat Mechanisms

HARDWOOD PLYWOOD AND VENEER ASSOCIATION (HPVA)

HPVA HP-1	(2009) American National Standard for Hardwood and Decorative Plywood
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NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA LD 3	(2005) Standard for High-Pressure Decorative Laminates
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U.S. GREEN BUILDING COUNCIL (USGBC)

LEED GBDC	(2009) LEED Reference Guide for Green Building Design and Construction
LEED NC	(2009) Leadership in Energy and Environmental Design(tm) New Construction Rating System

1.2 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project.

The Guide Specification technical editors have designated those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.][information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detailed Drawings[; G][; G, [_____]]

SD-03 Product Data

Seating System[; G][; G, [_____]]
Installation[; G][; G, [_____]]

[Local/Regional Materials]

SD-04 Samples

Seating System[; G][; G, [_____]]

SD-06 Test Reports

Fire Safety[; G][; G, [_____]]
Tests[; G][; G, [_____]]

SD-07 Certificates

Seating System
Recyclable Materials[; G][; G, [_____]]
Recycle Efforts

SD-10 Operation and Maintenance Data

Assembly Manuals[; G][; G, [_____]]
Maintenance Manuals[; G][; G, [_____]]

SD-11 Closeout Submittals

Seating System
Adhesives
Fresh Paint

1.3 QUALITY ASSURANCE

When recommended by the manufacturer, seating shall be delivered and installed by an authorized dealer with a certified installation crew. All hardwiring shall be completed by a licensed electrician; the certified installers shall be onsite when questions arise.

1.4 DELIVERY, STORAGE, AND HANDLING

NOTE: Seating components can adsorb VOCs emitted from other sources and be a home for a variety of bacteria, microbes, dust mites, etc. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paint, wood preservatives, and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders.

Deliver components to the site in unopened containers clearly labeled with the manufacturer's name and container contents. Store materials in a safe, dry, and clean, well ventilated area (100 percent outside air supply, minimum of 1.5 air changes per hour, and no recirculation), protected from damage, soiling, and moisture, and strong contaminant sources and residues, maintained at a temperature above 16 degrees C 60 degrees F for 2 days prior to installation. Seating shall not be stored with materials which

have high emissions of volatile organic compounds (VOC's) or other contaminants, including [____]. Do not store seating near materials that may offgas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives; submit LEED NC documentation relative to low-emitting materials credit in accordance with LEED GBDC. Include in LEED NC Documentation Notebook.. Handle the items in a manner that will protect the materials from damage.

1.5 WARRANTY

Warrant the fixed seating for a period of 5 years with the following exceptions: one year for fabric and two years for tablet arms. Provide manufacturer's standard performance guarantees or warranties that extend beyond the periods listed.

PART 2 PRODUCTS

NOTE: Consider manufacturers whose products contribute to LEED NC. LEED NC is addressed in this specification. If project consists of renovating existing space LEED-CI may also apply; modify spec as appropriate.

2.1 MATERIALS

Recyclable materials (seat padding, plastics, etc.) shall conform to EPA requirements in accordance with Section 01 62 35 RECYCLED / RECOVERED MATERIALS. Favor the use of local/regional materials to comply with LEED NC requirements. Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

2.1.1 Upholstery Fabric

NOTE: Consider the following when selecting upholstery fabric:
- frequency of use
- length of use
- double rub testing
- pilling
- are food and drink to be allowed

Add information on recycled material or natural fibers as applicable for the project.

Provide fabric which is a [plain] [decorative] [____] weave, fiber content of [100 percent polypropylene] [100 percent polyester] [100 percent nylon] [____] treated to resist staining and soiling. Fabric upholstery for seating shall comply with a minimum of [55,000] [75,000] [____] double rubs when submitted to the tests required by ASTM D4157. Submit complete set of test reports for the fire safety and other testing.

2.1.1.2 Polyurethane Foam

Polyurethane foam shall be fire retardant, nonhardening and non-oxidizing and shall have a high resistance to alkalies, oils, grease, soaps, abrasions, moisture, mildew, and tearing. Handling of this foam shall conform to the requirements of fire safety as specified in the Submittals paragraph.

2.1.1.3 Plywood

Provide plywood conforming to HPVA HP-1, made of hardwood and of crossbanded construction. Face veneers, for exposed surfaces, shall be of Grade A hardwood, vertical grain, [maple] [oak] [cherry] [_____] with manufacturer's standard finish. Unexposed veneers shall be sound grade hardwood or Grade A fir.

2.1.1.4 Solid Hardwood and Wood Veneer

Solid hardwood and wood veneer shall be first grade [maple] [oak] [cherry] [_____]. Finish exposed wood with manufacturers standard finish.

2.1.1.5 Plastic Laminate

Plastic laminate shall conform to ANSI/NEMA LD 3, Horizontal General Purpose Standard (HGS) Grade, 1.22 mm (plus or minus 0.127 mm) 0.048 inches (plus or minus 0.005 inches) in thickness.

2.1.1.6 Plastic

Plastic shall have built-in inhibitors to retard fading and anti-static compounds to retard dirt attraction. Pigment quality shall eliminate need to paint plastic parts. Component surfaces shall have a textured finish. Color shall be integral to the plastic.

2.1.1.7 Cast Iron

Cast iron shall comply with ASTM A48/A48M. Finish shall be [powder coat] [_____].

2.1.1.8 Steel

Steel shall comply with ASTM A513 or ASTM A1011/A1011M. Finish shall be [powder coat] [_____].

2.1.1.9 Recycle Efforts

Use materials with recycled content consisting of: [[_____] percent steel] [, [_____] percent plastic] [, [_____] percent plastic laminate] [, [_____] percent fabric] [and] [[_____] percent wood]. Submit report stating that the seating system contains recycled materials and indicating the actual percentage of recycled material, to include percent of post consumer and post industrial, and relative dollar value of recycled content products to total dollar value of products included in project.

2.2 SEATING SYSTEM

NOTE: Determine on project by project basis if sample chair is required.

Construct components and assembly free from objectionable projections or irregularities. Make corners and edges smooth and rounded. Unless otherwise noted, bolts, nuts, and other fastenings shall be concealed where possible. Steel shall be well-formed to shape and size required. Jointing of members shall be welded, riveted, or interlocked. Casting shall be fine textured, sound, and free of pits, blow holes, and fins. Lines shall be true, accurate, and true-to-pattern with excess metal or imperfections removed. Submit [Assembly Manuals](#), manufacturer's descriptive data, catalog cuts, installation instructions and the following:

- a. Minimum 150 by 150mm 6 by 6 inches samples of upholstery, exposed plywood, plastic laminate, wood, identification plate, paint, armrest and plastic finish materials. Furnish fabric samples of sufficient size to show color range, pattern, and finish.
- b. Two complete sets of certificates attesting that the proposed seating system meets specified requirements. Date the certificate after the award of contract, include name of the project and a list of specific requirements being certified. Three sets of assembly manuals describing assembly procedures.
- c. One complete chair that meets requirements specified. Chair sample may be incorporated into the installation, provided the sample is approved and it's location is noted.
- d. [LEED NC](#) documentation relative to recycled content credit in accordance with [LEED GBDC](#). Include in [LEED NC](#) Documentation Notebook.

2.2.1 Backs

NOTE: The option of an upholstered steel, plywood or polypropylene inner panel should remain since manufacturers use such a variety of materials for the inner panel.

Specification of hard surface backs is recommended for durability and maintenance reasons. Although, fully upholstered backs are available and may be substituted as appropriate to meet project requirements.

To achieve a certain aesthetic it may be determined that hardware be visible. Edit to meet desired appearance. Example: It may be desired or acceptable that screws and bolts be visible on units composed of seat backs with exposed plywood.

Rocker type mechanism is an option but not available from all manufacturers. If required, research availability.

Provide back assembly of the fixed type and consisting of [a hard surface rear panel with an upholstered inner panel] [an exposed plywood front and

rear panel]. Attach back assembly to standards with 14 gauge steel wings/back brackets; wings/back brackets shall have back pitch adjustability option, back assembly length shall be between [500] [_____] and [725] [_____] mm [20] [_____] and [28-1/2] [_____] inches for a total height of [760] [_____] to [910] [_____] mm [30] [_____] to [36] [_____] inches above the floor measured parallel to the back. Rear panel shall extend below the seat unit to completely conceal and protect the seat assembly.

2.2.1.1 Plastic Rear Panels

Panels shall be one-piece injection molded high impact resistant polypropylene or polyethylene with textured outer surface. Panel shall be formed to enclose and protect the edges of the inner upholstery panel at the top and sides.

2.2.1.2 [Plastic Laminate Finish] [Wood] Rear Panels

Panels shall be fabricated from minimum [5 ply, 11 mm 5/16 inch] [7-ply, 11 mm 5/8 inch] thick plywood. [Exposed back surface shall be plastic laminate.] Rear panel shall be formed on the same radius as the upholstered inner panel. Sand smooth exposed wood edges.[There shall be no exposed bolts or other hardware.]

2.2.1.3 Upholstered Inner Panels

Fabricate upholstered inner panels from 5 ply, 11 mm 7/16 inch minimum thick plywood, compound steel or compound curved 20 percent glass filled polypropylene with deep web reinforcing. Cushion shall consist of [50 mm 2 inch] [_____] thick polyurethane foam padding and have an upholstery cover. Padding shall be cemented to plywood inner panel. Upholstery cover shall be securely stapled to the inner plywood panel or held in place with draw strings for ease of re-upholstering. Upholstery cover shall not be attached with the use of nails, tacks, or screws.

2.2.1.4 Exposed Plywood Front & Rear Panel [Plastic Laminate Finish]

Back shall be fabricated from minimum [5-ply, 11 mm 7/16 inch] [7-ply, 19 mm 3/4 inch] thick contour molded plywood. [Exposed back and front surfaces shall be finished with plastic laminate.] Smoothly sand and finish all exposed edges.

2.2.2 Seats

NOTE: To achieve a certain aesthetic it may be determined that hardware be visible. Edit to meet desired appearance. Example: It may be desired or acceptable that screws and bolts be visible on units composed of seats with exposed plywood.

An acoustical or perforated seat bottom is available from some manufacturers. If needed to meet project requirements, research availability and add requirement to specification.

Provide foundation for upholstered seats free from visible screws, bolts, open holes, and projections on the bottom, front, and sides. [The front

center edge of each seat shall have an identification plate. The area to receive the plate shall be recessed to prevent wear and abrasion. Method of attachment shall be tamper-resistant.] The seat unit shall be removable without disturbing the standards, the upholstered seat cover shall be easily removable without removing the seat unit; and the fabric covering shall be fastened to the frame in a manner that will permit easy reupholstering.

2.2.2.1 Steel Seat Units

NOTE: If an exposed plywood underside is desired, it will be necessary to add a sentence to the steel and/or polypropylene seat unit paragraph that the seat unit shall have a wood seat bottom attached with exposed fasteners. The seat bottom shall be constructed of minimum 5-ply, 19 mm (5/16 inch) thick, hardwood veneers and formed with the same radius as the front of the steel seat unit. (AS 35-216)

Form steel foundation of not less than 1 mm (20 gauge) 20 gauge steel and roll it inward around entire perimeter for rigidity. Upholstered steel seat unit shall be nonsag construction. Nonsag spring units shall contain at least five serpentine design springs suspended under tension; cross bracing, if required by manufacturer, shall be welded to frame so as not to interfere with spring action. Cushions shall be polyurethane foam; shall have a minimum thickness of 75 mm 3 inches at front edge, 44 mm 1-1/2 inches at rear edge, and 50 mm 2 inch throughout the other portions for nonsag spring units. Frame and spring assembly shall be covered with a chafing barrier to protect foam padding from abrasion. [Upholstery cover shall [be of panel side construction without welts, fastened to the frame without the use of nails, tacks, or screws, and shall be easily reupholstered] [enclose entire seat unit, seat pan and cushion assembly] [,and have a zippered closure for easy re-upholstering]].

2.2.2.2 Polypropylene Seat Unit

Provide foundation consisting of a one-piece, injection molded polypropylene foundation fabricated with a minimum 25 percent glass-filled polypropylene or an inner structural panel constructed of 20 percent glass-filled polypropylene with deep web reinforcing and a wrap around polypropylene shell outer panel. Polypropylene foundation seat shall be serpentine spring or ergonomic seat cushion. Serpentine spring cushion shall contain at least five serpentine design springs spanning an injection molded plastic frame with molded polyurethane foam padding fitting firmly on springs. Frame and spring assembly shall be covered with a chafing barrier to protect foam padding from abrasion. Ergonomic seat cushion shall consist of a 4.5 mm 3/16 inch thick contoured polypropylene substrate supporting a polyurethane foam pad. Seat unit consisting of an inner structural panel shall have padding that is a molded polyurethane foam pad and have a minimum thickness of 75 mm 3 inches at the center, 44 mm 1-1/2 inches at the front with an overall thickness of 50 mm 2 inches. Upholstery cover shall fit the cushion size, be fastened with drawstring closure or staples for ease of re-upholstering and not have welts. Upholstery cover shall not be attached with the use of nails, tacks, or screws.

2.2.2.3 Exposed Plywood Seat Units

Seat unit shall be fabricated from plywood, minimum [5-ply, 11 mm 7/16 inch thick] [7-ply, 19 mm 3/4 inch thick]. Seat unit shall be supported by sturdy formed steel arms that are bolted to the seat. Bolts shall have decorative heads. [Exposed back and front surfaces shall be finished with plastic laminate.] Sand smooth all exposed edges. Seat hinges shall be securely attached. Form seat to fit the contour of a seated person.

2.2.3 Hinges

NOTE: Three quarter fold is recommended for safety reasons, it is easier to open when hands are full and opens to 100 percent when additional pressure is applied to seat.

Hinges shall be a counterweight mechanism using gravity to return to the upright position, compensating type or spring lift mechanism, completely enclosed in the seat assembly, totally independent, free and easy in operation, and capable of compensating for circular installation, variation in installation conditions, and unevenness of floors. Each hinge shall have a noiseless, self-rising seat device, shall rise automatically to a uniform safety position of 3/4 fold at all times, and shall fold 100 percent when additional pressure is applied, to provide additional clearance. Seat hinge mechanism shall comply with ASTM F851 and require no adjustment after installation. The compensating type and spring lift mechanism hinge shall be self-lubricating requiring no maintenance. Cushion both the up and down stops on the seat to reduce noise.

2.2.4 Standards

Provide standards which are minimum 14 gauge tubular or sheet steel or one integral piece of cast iron. Steel standards shall be welded. Standards with ADA hinged armrests shall be provided with a label displaying the handicapped symbol and shall be located as shown on drawings.[Install standards on a radius, see drawings for layout.]

2.2.4.1 Floor Standards

NOTE: Not all manufacturers produce both steel and cast iron standards; it is recommended that both options be left in the specification.

Form floor standards to fit the floor incline so that the standards will be vertical and the hinge point will be at a height that will maintain proper relation of seat to floor. Form the feet to eliminate tripping hazards, with a minimum of two holes for bolt attachment to the floor.

2.2.4.2 Riser Standards

Form riser standards to approach the riser face at an angle to allow maximum clearance, formed to fit the riser so that the standards will be vertical and the hinge point will be at a height that will maintain proper relation of seat to floor. There shall be no projection of the standard to create a stumbling hazard or interfere with sweeping and cleaning. Riser

attachment shall be made through a 6 mm 1/4 inch steel plate welded to the standard or on an integrally cast foundation, standard shall be securely attached to the riser without the use of shims or filler strips and shall be attached at a minimum of 2 points.

2.2.4.3 [Aisle] [and] [End] Standards

[Aisle] [and] [end] standard shall comply with standard specifications and have a [molded plastic] [plastic laminate] [upholstered] [solid hardwood or wood veneer] [_____] decorator panel. [Shape of decorator panel shall be [tapered] [rectangular] [radius on lower edge] [_____] .] Decorator panels are not required for standards that have the ADA armrest.

2.2.5 Armrests

NOTE: Specification of hard surface armrests are recommended for durability and maintenance reasons.

Armrests shall be [solid hardwood with [rounded corners] [_____] and manufacturer's standard finish] [with cupholder] [solid hardwood or plastic with foam padding and upholstered cover] [wood with laminated plastic] [plastic] [plastic with cupholder] [_____] . ADA Armrest shall be provided in locations as shown on drawings. ADA armrest shall be hinged at rear to allow easy access for limited mobility occupants.

2.2.6 Tablet Arm

NOTE: There are varying sizes of tablet arms, but not all manufacturers offer all sizes. Some only have one size. If size other than standard is required, add requirements to paragraph. Note some manufacturer have a size that accommodates a laptop computer.

Equip each chair with a fold-away tablet arm assembly. Tablet arm shall automatically return to the stored position when raised manually to a vertical position in one motion and fall to the stored position by force of gravity, fold smoothly and quietly, store completely out of the way and be easily accessible when needed by the occupant without bending or reaching. Tablet arm shall be fabricated using balanced construction and be composed of manufacturer's standard core material faced with plastic laminate on the writing surface. All edges shall be rounded. When in a writing position, the arm shall lock firmly in place so that it cannot be accidentally disengaged. Both left and right handed tablet arms shall be provided as shown on drawings.

2.2.7 Identification Plates

NOTE: Identify row and seat numbering system on drawings.

Address placement of identification plates when seat unit is fully upholstered.

Delete paragraph if not required.

Seating shall have number and letter plates for seat and row designations. Plates shall be constructed of manufacturer's standard [brass or bronze finish or satin finished anodized aluminum] [_____] and have black letters and numbers. Attaching hardware shall [be tamper resistant and]have a finish compatible with plates.

2.2.8 Aisle Lighting

NOTE: Determine if aisle lighting is required to meet project requirements. Delete paragraph if not required.

Coordinate design requirements with electrical engineer.

[Aisle] [and] [end] standard panels shall have [concealed] [surface mounted] [_____] aisle lights. Aisle lighting shall be prewired, UL approved and wiring shall be routed through concealed casing into floor. Bulbs shall be provided and shall be easily accessible for replacement. Heat generated by bulb shall not be sufficient to be uncomfortable if accidentally touched. Aisle light wiring shall be hardwired to the building by a certified electrician.

2.2.9 Electrical Work

Provide electrical materials conforming to the requirements of Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

2.3 COLOR

NOTE: Editing of color reference sentence(s) must be coordinated with the Government. Generally Section 09 06 90 COLOR SCHEDULE or drawing is used when the project is designed by an Architect or Interior designer. Color should be selected from manufacturer's standard colors or identified as a manufacturer's color in this specification only when the project is very simple and has minimal finishes.

When the Government directs that color be located in the drawings, a note must be added that states: "Where color is shown as being specific to one manufacturer, an equivalent color by another manufacturer may be submitted for approval. Manufacturers and materials specified are not intended to limit the selection of equal colors from other manufacturers. The word "color" as used herein includes surface color and pattern."

Prior to specifying a custom color finish, research to determine if additional cost and lead time is feasible. Note there is often a minimum order requirement; this requirement will also affect

future orders.

As directed above, Section 09 06 90 COLOR SCHEDULE or drawings must include color for all items with a finish: fabric upholstery, armrest, standards, decorator panels, trim and tablet arms if required, etc. When a manufacturer's name, stock number, pattern, and color is used, be certain that the product conforms to this specification, as edited.

Color shall be [in accordance with Section 09 06 90 COLOR SCHEDULE.] [as indicated on the drawings.] [selected from manufacturers standard colors.] [[_____] Color listed is not intended to limit the selection of equal colors from other manufacturers.]

PART 3 EXECUTION

3.1 PLACEMENT OF STANDARDS

NOTE: Generally, the width of seat units should be 525 or 550 mm with 500 mm (21 or 22 inches with 20 inch) wide units restricted to the exit seat location if needed to meet specific dimension requirements.

The system shall permit the standards to be installed on radial lines from a common center for which concentric circles are determined with each row of units utilizing common middle standards. Standards in each row shall be placed laterally so the aisle-end standards will be in alignment as indicated on seating layout drawing. The angle of inclination of backs shall be adjusted for variations in sightlines. Mechanical attachment of components shall be of sufficient flexibility so that when permanently assembled they will compensate for the changing dimensions laterally between standards caused by convergence toward the center. Seat and back attachments shall absorb inaccuracies in lateral spacing of standards at point of attachment caused by unevenness of floor. Varying lateral dimensions of backs and seats shall be in accordance with approved seating layout. Minimum width of seating unit shall be 500 mm 20 inch and may be used only to complete a specific row dimension.

3.2 INSTALLATION

Installation of the seating system shall be in accordance with the approved detailed drawings and manufacturer's recommended installation instructions. Submit seating plans dimensioned and showing row spacing, row lengths, the varying lateral spacing at backs and seats, back pitch, and seat widths for the various section lengths, placement of standards, floor pitch, and riser height, where applicable. Submit drawings indicating metal thickness, fastenings, details of hinge mechanism, seat and back dimensions, and proposed finish.

3.3 CLEANING

Upon completion of installation, all products shall be cleaned and polished and the area shall be left in a clean and neat condition. Any defects in material and installation shall be repaired, and damaged products that

cannot be satisfactorily repaired shall be replaced. Submit three sets of [Maintenance Manuals](#) describing routine maintenance and inspection, proper cleaning and minor repair procedures.

-- End of Section --