

INCH-POUND

MIL-B-29194A
24 June 1988
SUPERSEDING
MIL-B-29194(YD)
30 April 1979

MILITARY SPECIFICATION

BUILDING ADDITION, PREFABRICATED, READY-CUT, METAL RIGID FRAME, FOR 40 BY 100 FOOT BUILDING

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers one size of prefabricated, metal building addition of the lean-to type, having one vertical side wall, vertical end walls, and sloping roof, suitable for attaching to a 40 by 100 foot (ft) rigid frame building as specified in MIL-B-28536, type I.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATION

MILITARY

MIL-B-28536 - Building, Prefabricated, Ready-Cut, Metal,
Rigid Frame, 40 x 100 feet.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer (Code 156), Naval Construction Battalion Center, Port Hueneme, CA 93043-5000, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N4427

FSC 5410

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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STANDARD

FEDERAL

MIL-STD-595A - Colors

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

CIVIL ENGINEER SUPPORT OFFICE, NAVY (YD)

889741 - Lean-To For 40 feet x 100 feet Rigid Frame Building

(Copies of specifications, standards, drawings, publications, and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other Government documents and publications. The following other Government documents and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (ANSI)

A156.2 - Locks and Lock Trim.

A156.4 - Door Controls-Closers.

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A194 - Carbon and Alloy Steel Nuts for Bolts for High Pressure and High.

Temperature Service.

A307 - Carbon Steel Externally and Internally Threaded Fasteners.

A325 - High Strength Bolts for Structural Steel Joints Including Suitable Nuts and Plain Hardened Washers.

A490 - Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints.

A563 - Carbon Steel Nuts.

B209 - Aluminum Alloy Steel and Plate.

E84 - Surface Burning Characteristics of Materials, Test for.

E136 - Noncombustibility of Elementary Materials, Test for.

F436 - Hardened Steel Washers for use with High Strength Bolts.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

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METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

Recommended Design Practice Manual.

(Application for copies should be addressed to the Metal Building Manufacturers Association, 1230 Keith Building, Cleveland, OH 44115.)

(Non-Government standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Description. Building additions shall be of the general configuration indicated in Drawing No. 889741 and shall be suitable for attaching to a 40 by 100 ft rigid frame building as specified in MIL-B-28536. The building additions shall be unassembled, prefabricated, metal structures. The building addition shall be clad with sheets of painted corrosion-inhibitive coated steel or painted aluminum and shall have a clear interior floor area free of supports. Roof slope shall be 1 in 12. The manufacturer's standard bracing shall be used to withstand the design loadings except that bracing shall not interfere with the clear height from the underside of the framing to the floor. Each building shall include all prefabricated components, doors, accessories, fasteners, and other materials as specified herein and required for a complete building addition ready for erection.

3.2 First article. When specified (see 6.2.1), the contractor shall furnish a complete building addition for first article inspection and approval. The first article shall be tested and approved under the appropriate provisions of paragraph 7-104.55 of the Federal Acquisition Regulation (FAR). The first article should be a preproduction sample or it may be a standard production item from the contractor's current inventory as specified in 4.3. The first article should include specific instructions in all procurement instruments, regarding arrangements for examinations, test, and approval of the first article. Since the first article is an addition, an existing 40 by 100 ft building or dummy wall shall be required for erection and testing of the first article.

3.3 Materials. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated

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in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products are allowed under this specification unless otherwise specified.

3.3.1 Steel.

3.3.1.1 Structural steel. Steel for structural and framing members shall be a structural steel alloy having a yield strength and section modulus to meet the required design and load criteria. Structural steel which is exposed to weather shall be provided with an integral corrosion-inhibited coating or shall be treated and painted in a color matching the sheeting finish.

3.3.1.2 Steel sheeting. Steel sheeting for flashing, roof, and sides shall be a commercial alloy having a yield strength and section modulus to meet the required design criteria. The sheeting shall be provided with an integral corrosion-inhibitive coating and primed and finished on both sides with an oven-dried finish in accordance with the manufacturer's standard process.

3.3.2 Aluminum.

3.3.2.1 Structural aluminum. Aluminum for structural and framing members shall be a structural aluminum alloy having a yield strength and section modulus to meet the required design criteria. Structural aluminum shall be treated and finished in a color matching the sheeting finish.

3.3.2.2 Aluminum sheeting. Aluminum sheeting for flashing, roof, and sides shall be a commercial alloy conforming to ASTM B209 having a yield strength and section modulus to meet the required design criteria. The sheeting shall be primed and finished on both sides as standard with the manufacturer.

3.4 Design.

3.4.1 General. Unless otherwise specified (see 6.2.1), the design of the building addition shall conform to the applicable requirements of the MBMA, the latest issue in effect at the time of the proposal and other codes as referenced therein. Siesmic loadings shall be considered.

3.4.2 Structural loads. The building addition shall be designed for the following loads as a minimum:

Wind load:	(100 miles per hour).
Snow load:	30 pounds per square foot (psf).
Roof live load:	5 psf + snow load.

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3.4.3 Thermal loads. The building addition with all of its component parts and accessories shall be capable of functional operation in all weather conditions encountered in -30 degrees Fahrenheit (°F) to +120°F.

3.4.4 Fasteners.

3.4.4.1 Bolts. Bolts for joining main structural frame members and column base clips shall be high-strength bolts conforming to ASTM A325 or A490 and shall be furnished with nuts and plain washers which conform to ASTM A325 for ASTM A325 bolts and to A194 grade 2H or A563 grade H and F436 for A490 bolts. Anchor bolts shall be standard commercial anchor bolts. All other bolts and nuts shall conform to ASTM A307. Washers and screws not otherwise specified shall be commercial grade. All bolts, nuts, and washers shall be provided with an integral corrosion-inhibitive coating. All nuts and bolts shall be hexagonal head, except that anchor bolts may be the bent type.

3.4.4.2 Sheet-to-sheet fasteners. Fasteners for attaching sheet-to-sheet or sheet-to-flashing shall be a blind rivet having serrated aluminum alloy stem, and aluminum alloy body. The blind side of the hollow sleeve rivet body, when the stem is pulled, shall upset or split into three or more segmented petals for clamping the sheets together. The blind rivets supplied with the building shall have sufficient shear and tension capability to withstand all design loadings. The rivets shall function in a 5/16-inch diameter hole. The rivet body or sleeve diameter shall be not less than 0.260 inch and not greater than 0.304 inch. Each rivet shall have a synthetic resilient washer. Protection from electrolytic action of the dissimilar metals shall be provided by a surface or chemical treatment of the aluminum rivet for that portion contacting steel sheeting.

3.4.4.3 Sheet-to-structural fasteners. Screws for fastening sheets and flashing to framing or structural members shall be a self-drilling and self-tapping type, No. 10 screw size, by 0.750-inch long, hexagon washer head, having 16 threads per inch on the threaded portion of the screw above the drill shank. The drill shank diameter shall be not less than 0.151 inch nor greater than 0.155 inch. The screws shall be capable of drilling and tapping, without prepunched or predrilled guide holes, 0.175-inch thick structural grade steel having a yield point of 50,000 pounds per square inch. Each fastener shall have an integral combination washer. The combination washer shall consist of a cupped washer, with corrosion-inhibitive coating, and a synthetic resilient washer, not less than 0.042-inch thick, capable of providing a weather tight seal. The hexagon head of the screw shall fit a 5/16-inch nominal opening 6 or 12 point socket wrench. The screws shall be fabricated from a metal alloy which is both compatible with the other structural components and of adequate strength. Exposed fasteners shall be provided with a prime coat and a finish that matches the exterior color.

3.4.5 Fire hazard class. All material, including but not limited to the finish, shall be noncombustible when tested in accordance with 4.6.2. All material shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less when tested in accordance with 4.6.2.

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3.5 Construction. All members of the building addition shall be constructed by methods normally preferenced by the manufacturer. All pieces of the building addition shall fit together as required and the building addition/building juncture shall be a water-tight joint. Dimensions and tolerances shall be strictly controlled to insure proper operation of all components and interchangeability of all parts bearing the same assembly mark. The building shall be designed and constructed to facilitate field maintenance. All adjustments and replaceable accessories shall be readily accessible.

3.5.1 Closures. The manufacturer's standard closures matching the sheet profile (ribs) shall be provided for installation along the eave, rake, and at all accessory openings as required to achieve weathertight integrity. Other methods standard to the manufacturer for achieving the preceding effect are acceptable. A 2 percent excess of closure parts shall be furnished with each building.

3.5.2 Calking compound. The calking compound or sealant for making the side laps and end laps of wall and roof sheets weathertight, shall be the manufacturer's standard for the specified environmental conditions.

3.6 Cleaning, treatment and painting. Surfaces normally painted in good commercial practice shall be cleaned, treated, and painted as specified herein. Surfaces to be painted shall be cleaned and dried to insure that they are free from contaminants such as oil, grease, welding slag and spatter, loose mill scale, water, dirt, corrosion products, or any other interfering substances. As soon as practicable, after cleaning, and before any corrosion product or other coating interfering material can result, the surface shall be prepared or treated to insure the adhesion of the coating system. The painting shall consist of at least one coat of primer and one finish coat. The primer shall be applied to a clean, dry surface as soon as practicable after cleaning and treating. Painting shall be with manufacturer's current materials according to manufacturer's current processes and the total dry film thickness shall be not less than 2.5 Mils over the entire surface. The paint shall be free from runs, sags, orange peel, or other defects. Color of the finish coat shall be desert beige, light brown or tan, conforming to Federal Standard 595A 'Colors', or other manufacturer's color as specified (see 6.2.1). The end item, allied equipment, and attachments shall be the same color."

3.7 Exterior openings.

3.7.1 Personnel doors. Each building addition shall have two heavy-duty, bottom-half louvered, personnel doors. Both doors shall be enclosed in one frame and shall swing outward. The louvered portion of the doors shall be fitted with insect screening and an outside vertical closing panel. Each personnel door shall be provided with a traditional or modern surface closer, size IV, grade 1 in accordance with ANSI A156.4. Personnel doors and door frames shall be steel or aluminum. The personnel doors shall each be 3-ft 0 inches by 6-ft 8 inches to 7-ft 0 inches by 1-3/4 inches thick. The personnel doors shall be provided with one centrally mounted lockset conforming to ANSI A156.2 Function F81, US 10 finish, plain trim.

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3.7.2 Windows. Each building addition shall be provided with two windows, as standard with the manufacturer and nominally 9 square feet per window. Windows shall be self-flashing aluminum, horizontal sliding. Windows shall be provided with spring-loaded locking handles to lock automatically upon closing, plastic glazing cushioned in the frame so as to be weathertight, and easily replaceable plastic insect screening (see 3.7.5). Window shall be break-resistant, clear, acrylic glazing, and hot-stamped. Means shall be provided for replacement of broken glazing with the window assembly in place. Aluminum windows shall be fabricated from alloy not less than 0.062-inch thick and with a commercial mill finish. Screens shall be of the exterior type.

3.7.3 Glazing. Glazing for all windows shall be transparent, colorless, cast acrylic sheets of not less than 0.125 inch. Sheets shall be masked or shall have protective plastic separation sheet.

3.7.4 Louver. Each building addition shall be provided with an end wall louver. The louver shall be positive closing and manually adjustable from the floor of the building. The louver shall have a nominal opening area of 4 square feet.

3.7.5 Insect screening. Screening for the windows shall be aluminum or plastic coated continuous glass filament. The plastic screening shall be heat, flame, and mildew resistant. Screening for the louver shall be aluminum, bronze, or copper wire. The filament diameter shall be not less than 0.011 inch. The mesh size shall be not less than 18 by 18 nor more than 14 by 14 for both plastic and metal screening.

3.8 Extra materials. The contractor shall furnish not less than an additional 5 percent of bolts, nuts, washers, screws, blind rivets, other fasteners, calking compound, and 4 quarts of paint. This additional material shall be of the same type and character supplied for the assembly of the building in the field.

3.9 Dissimilar metals. Intimate contact which can be expected to cause galvanic corrosion shall be avoided. When such contact cannot be avoided, an interposing insulating material shall be provided to minimize the corrosive effect.

3.10 Erection marks. The erection mark of each component, structural member, or piece shall be placed on the item in the manner standard with the manufacturer.

3.11 Erection/assembly manual. When specified (see 6.2.1) erection/assembly manual (see 6.3) shall be provided.

3.12 Design data and calculations. When specified (see 6.2.1) design data and calculations (see 6.3) shall be provided.

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3.13 Workmanship.

3.13.1 Metal fabrication. The metal used in fabrication shall be free from kinks, sharp bends, and other conditions which would be deleterious to the finished product. Manufacturing processes shall not reduce the strength of the metal to a value less than intended by the design. Manufacturing processes shall be done neatly and accurately. All bends shall be made by controlled means to insure uniformity of size and shape.

3.13.2 Bolted connections. Boltholes shall be accurately punched or drilled and shall have the burrs removed. Washers or lockwashers shall be provided in accordance with good commercial practice, and all bolts, nuts, and screws shall be sufficiently tightened to withstand all conditions specified.

3.13.3 Welding. Welding procedures shall be in accordance with a nationally recognized welding code. The surface of parts to be welded shall be free from rust, scale, paint, grease, or other foreign matter. Welds shall be of sufficient size and shape to develop the full strength of the parts connected by the welds. Welds shall transmit stress without permanent deformation or failure when the parts connected by the weld are subjected to proof and service loadings.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor 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 prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

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4.3 First article inspection. The first article inspection shall be performed on one complete building addition when a first article is required (see 3.2 and 6.2.1). This inspection shall include the examination of 4.5 and the tests of 4.6. The first article may be either a first production item or a standard production item from the supplier's current inventory provided the item meets the requirements of the specification and is representative of the design, construction, and manufacturing technique applicable to the remaining items to be furnished under the contract.

4.4 Quality conformance inspection. The quality conformance inspection shall include the examination of 4.5, the tests of 4.6, and the packaging inspection of 4.7. This inspection shall be performed on the samples selected in accordance with 4.4.1.

4.4.1 Sampling for lot acceptance.

4.4.1.1 Inspection lot. All complete building additions offered for delivery at one time shall be considered a lot for purposes of inspection.

4.4.1.2 Sampling for examination. Random samples of complete building addition shall be selected from each lot in accordance with MIL-STD-105. The inspection level shall be S-2 and the Acceptable Quality Level (AQL) shall be 4.0 defects per hundred units. The inspection level and AQL shall be based on each component (i.e., door, window, roof beam, and girt).

4.5 Examination. The test erection unit and each sample selected in accordance with 4.4.1 shall be examined for compliance with the requirements of this specification. Any necessary correction or modification following failure to meet specified requirements shall receive particular attention for adequacy and suitability. This element of inspection shall encompass all visual examinations and dimensional measurements, with particular emphasis on tolerances, fits, and interchangeability of like parts. Noncompliance with any specified requirement or presence of one or more defects preventing interchangeability or lessening performance of intended function of any component shall constitute cause for rejection of all such components from the sample lot.

4.6 Tests. Tests shall be conducted as specified herein. Specification of the test requirements does not preclude the use of other test fixtures if the mechanics of the systems are duplicated for similar tests. Any failure of welds or mechanical joints or any permanent distortions in excess of that specified, or any other damage to any part of the item that would affect serviceability will be considered as failing to comply with the requirements of this specification. Certified evidence of compliance with all applicable tests must be available upon request. Items used in the tests must be available for examination by the inspector.

4.6.1 Test erection unit. A complete building addition shall be selected for the test erection unit. The building addition shall be erected on a

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foundation or slab with appropriate anchor devices in place. The foundation shall be level or capable of being leveled by shims at anchor bolt points so that a total horizontal deviation between any two anchor bolt points shall be not greater than 1/8 inch. The calking compound is not required for the test erection. The building addition test erection unit shall be erected adjacent to an existing 40 by 100 ft building as specified in MIL-B-28536, or it may be erected adjacent to a testing jig which duplicates the mechanics and configuration of a building side wall. The building addition shall be erected using the standard tools for this type of work. The components shall fit together to form the building addition without any abnormal racking, blowing, bending, or deformation of parts. Bolt holes shall aline properly to receive the fasteners, using drift pins to aid final alignment. Ease of assembly, fit and alinement of parts and bolt hole are essential requirements. Failure of any component to comply with these requirements shall be cause for rejection of all such components. Any necessary correction or modification following failure to meet specified requirements shall require reinspection and shall receive particular attention for adequacy and suitability. The contractor shall provide all labor, facilities, and supplies necessary for test erection assembly and disassembly; touch-up painting where the protective coating has been damaged; and repair or replacement of damaged or unrepairable parts are fasteners. Reusable, repaired, and replaced components of the test erection unit may be submitted as part of a completed production unit. All flashing, side sheeting, and roof sheeting used in the test erection unit shall be replaced with new sheets.

4.6.2 Fire hazard test. Building materials shall have a fire hazard classification established in accordance with ASTM E84 for surface burning characteristics. Additionally, materials shall be rated noncombustible in accordance with ASTM E136 (see 3.4.5).

4.7 Packaging inspection. The preservation, packing, and marking of the item shall be inspected to verify conformance to the requirements of section 5.

5. PACKAGING

5.1 Preservation, packaging, packing, and marking. Preservation, packaging, packing, and marking of the building additions shall be as specified in MIL-B-28536 for the same or similar components. The level of preservation-packaging and level of packing shall be as specified (see 6.2.1).

6. NOTES

6.1 Intended use. The building addition covered by this specification is intended for use in conjunction with a 40 x 100 ft rigid frame building as specified in MIL-B-28536.

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6.2 Ordering data.

6.2.1 Procurement requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. When the first article is required for inspection and approval (see 3.2, 4.3, 6.4).
- c. When structural design is to be other than as specified (see 3.4.1).
- d. When cleaning, treatment, and painting is to be other than as specified (see 3.6).
- e. Desired finish color (see 3.6).
- f. When erection/assembly manual are required (see 3.11).
- g. When design data and calculations are required (see 3.12).
- h. Level of preservation-packaging, and level of packing required (see 5.1).

6.3 Data requirements. When this specification is used in an acquisition and data are required to be delivered, the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the Contract Data Requirements List (CDRL), incorporated into the contract. When the provisions of DOD FAR Supplement, Part 27, Sub-Part 27.475-1 (DD Form 1423) are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification are cited in the following paragraphs:

<u>Paragraph</u>	<u>Data requirements</u>	<u>Applicable</u>
3.11	Erection and Assembly Manual.	DI-FACR-80404
3.12	Design Data and Calculations.	DI-MISC-80296

(DIDs related to this specification, and identified in section 6 will be approved and listed as such in DOD 5010.12-L, Acquisition Management Systems and Data Requirements Control List. Copies of DIDs required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.4 First article. When a first article inspection is required, the item will be tested and should be a first article sample or it may be a standard production item from the contractor's current inventory as specified in 4.2.1. The first article should consist of one unit. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, test, and approval of the first article.

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6.5 Subject term (key word) listing.

Building Addition
Lean-To-Type Building
Metal Steel Building
Prefabricated Buildings
Rigid Frame Building
Sloping Roof
Vertical Side/End Walls

6.6 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:

Army - GL
Navy - YD
Air Force - 99

Preparing activity:

Navy - YD

(Project 5410-N319)

Review activities:

Army - ME
DLA - CS
Air Force - 84

User activities:

Army - CE
Navy - MC

