

MIL-S-17917A(AS)

9 July 1969

SUPERSEDING

MIL-S-17917(Aer)

25 March 1954

MILITARY SPECIFICATION

SANDWICH CONSTRUCTION; ALUMINUM ALLOY
FACINGS, Balsa WOOD CORE

This specification has been approved by the Naval
Air Systems Command, Department of the Navy.

1. SCOPE

1.1 Scope - This specification covers the requirements for structural sandwich composites consisting of aluminum alloy facings and balsa wood cores for aircraft structural application.

1.2 Classification - This specification covers one type and grade of sandwich construction.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

Federal

QQ-A-250	Aluminum Alloy, Plate and Sheet, General Specification for
QQ-A-250/5	Aluminum Alloy Alclad 2024, Plate and Sheet
QQ-A-250/13	Aluminum Alloy Alclad 7075, Plate and Sheet
MMM-A-132	Adhesive, Heat Resistant, Airframe Structural, Metal to Metal
MMM-A-138	Adhesive, Metal to Wood, Structural

FSC 5680

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SPECIFICATIONS (Continued)

Military

MIL-S-7998	Sandwich Construction Core Material, Balsa Wood
MIL-A-9067	Adhesive Bonding, Process and Inspection Requirements for
MIL-A-22397	Adhesive, Phenol and Resorcinol Resin Base; for Marine Service Use

STANDARDS

Federal

Fed. Test Method Std. No. 141	Paint, Varnish, Lacquer and Related Materials, Methods of Inspection, Sampling and Testing
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Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-401	Sandwich Construction and Core Materials, General Test Methods

HANDBOOKS

MIL-HDBK-23	Structural Sandwich Composites
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(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.)

3. REQUIREMENTS

* 3.1 Design - The design of the sandwich construction assemblies shall be as specified in the contract or applicable manufacturing drawing for the part concerned. Design criteria shall be in accordance with MIL-HDBK-23.

3.1.1 Inserts, reinforcements and attachments shall be in accordance with the applicable specification and manufacturing drawings for the parts.

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3.2 Sandwich construction - The sandwich construction shall consist of aluminum alloy facings bonded to a core of end grain balsa wood.

3.3 Material -

* 3.3.1 Facing material - The facing material shall be clad aluminum alloy conforming to QQ-A-250/5 or QQ-A-250/13 in the temper and thickness specified in the contract or applicable drawing. The material shall be free of wrinkles, dents, and halfmoons.

* 3.3.2 Core material - The balsa wood core material shall conform to the requirements of MIL-S-7998. Unless otherwise specified the density of the balsa wood shall be 7 to 10 pounds per cubic foot.

* 3.3.3 Bonding material - The adhesive used to bond the faces to the core shall conform to the requirements of MMM-A-138, for thermosetting liquid form, vinyl phenolic. The adhesive used to bond metal inserts, reinforcement attachments, and other metal to metal fittings shall conform to the requirements of MMM-A-132. The adhesive used to bond balsa to balsa core joints shall be a waterproof adhesive in accordance with MIL-A-22397.

* 3.4 Size - The dimension and dimensional tolerances shall be as specified in the contract or manufacturing drawing.

* 3.4.1 Weight - The weight of the sandwich construction shall be as specified in the contract or manufacturing drawing.

3.5 Mechanical properties -

* 3.5.1 Strength - Compression strength and shear strength properties shall conform to the requirements of Table I.

TABLE I

STRENGTH OF SANDWICH (MINIMUM)

Core Density Average PCF	Pounds Per Square Inch			
	Flatwise Tensile Strength	Compression Strength	Shear Strength	
			TL	TW
7	920	920	130	100
8	1130	1130	170	110
9	1330	1330	180	120
10	1540	1540	200	150

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* 3.5.2 Peel strength - The peel strength of facing to core shall be no less than 23 inch-pounds per inch of width.

* 3.5.3 Flatwise tensile strength - The flatwise tensile strength shall be as required in Table I when tested in accordance with Section 4.

3.5.4 Corrosion resistance - The sandwich shall show no corrosion when tested as specified in 4.5.5.

* 3.6 Process - The contractor shall submit a detailed description of the manufacturing process methods of control of manufacturing variables and inspection in accordance with the provisions of MIL-A-9067 to the procuring activity for approval. The process specification shall include the sealing procedure that will be used by the contractor. The contractor shall be notified upon approval of the process specification. The approved process shall form a part of this specification, and copies shall be made available by the contractor for use at the contractor's plant by authorized Government representatives. The materials and processes used in production shall conform to the requirements of the process specification and shall not be changed in production without obtaining approval of a new superseding process specification.

3.7 Workmanship - The sandwich construction material shall be fabricated as required in accordance with the best commercial practice for a high quality aluminum alloy skin and balsa wood core material, and shall be entirely suitable for the intended use. The sandwich construction shall be smooth and free of scratches and dents.

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 prescribed requirements.

4.1.1 Classification of tests - All tests required for the testing of sandwich material are classified as quality conformance tests.

4.2 Sampling -

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4.2.1 Lot - Unless otherwise specified in the contract or order, a lot shall consist of not more than 100 cubic feet of sandwich construction of the same face material and core density manufactured under the same conditions and submitted for acceptance at the same time.

4.2.2 Sampling plans - Unless otherwise specified in the contract, purchase order or drawing information, sampling plans and procedures in the determination of the acceptability of products submitted by a supplier shall be in accordance with the provisions set forth in MIL-STD-105.

4.2.2.1 Visual and dimensional examination - A random sample of sandwich material shall be selected from each lot in accordance with procedures of MIL-STD-105, Inspection Level II, Acceptable Quality Level 2.5 percent defective for test of 4.3.

4.2.2.2 Physical and mechanical properties - A random sample shall be selected from each lot in accordance with MIL-STD-401.

* 4.2.2.3 Corrosion resistance - A random sample of sandwich material shall be selected for each 500 pound lot of adhesive used to bond the faces to the core.

4.3 Examination - The sample material selected in accordance with 4.2.2.1 shall be visually and dimensionally examined to determine compliance with the requirements of this specification for configuration, size, identification, bond defects and workmanship.

4.4 Preservation, packaging, packing and marking - The preservation, packaging, packing and marking of items furnished under this specification shall be in accordance with the applicable requirements of Section 5.

4.5 Test methods -

4.5.1 Weight -

* 4.5.1.1 Specimen - The test specimens may be any convenient size or shape of sandwich construction that can be accurately measured. Representative specimen size shall be approximately 4 square feet or larger.

4.5.1.2 Procedure - Test specimens shall be weighed to an accuracy of at least 1 percent. Dimensions shall be measured to the nearest 0.01 inch. Calculate the weight per square foot from the weight and dimensions of the specimen.

* 4.5.2 Shear strength - Five specimens in the "TL" and five specimens in the TW directions shall be prepared and tested in accordance with MIL-STD-401, Sandwich Shear.

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4.5.3 Flatwise tensile strength - Five specimens shall be prepared and tested in accordance with MIL-STD-401.

* 4.5.4 Sandwich peel - Specimens shall be prepared and tested in accordance with MIL-STD-401.

* 4.5.5 Corrosion resistance -

* 4.5.5.1 Specimens - Five 2 x 4-inch (approximate) specimens shall be cut from the sample selected in 4.2.2.3. Strip one face from each specimen. As an alternate, facings removed in the Sandwich peel test (4.5.4) may be used.

* 4.5.5.2 Procedure - Expose the stripped facing prepared in 4.5.5.1 in a 5 percent salt spray for 336 hours in accordance with Method 6061 of Fed. Test Method Std. No. 141. At the end of the exposure period, the specimens shall be rinsed in clear water and examined for evidence of corrosion.

4.6 Rejection - When a sample, selected as representative of a lot, fails to meet the requirements of this specification, the lot shall be rejected.

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, and packing - Preservation, packaging, and packing shall be as specified in the applicable contract or drawing.

5.2 Marking - In addition to any special marking required by the contract or order, interior and exterior containers shall be marked in accordance with the requirements of MIL-STD-129.

6. NOTES

6.1 Intended use - The sandwich constructions covered by this specification are intended for use in the manufacture of aircraft structural parts.

6.2 Ordering data - Procurement documents should specify the following:

- (a) Title, number, and date of this document.
- (b) Core density in accordance with MIL-S-7998.
- (c) Face material, type, temper, thickness.
- (d) Applicable level of packaging, packing and preservation.

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* 6.3 Suggested procedures for improving corrosion resistance of the sandwich construction -

* 6.3.1 Core - The balsa wood core should contain no more than 5 percent moisture after bonding with the facing.

* 6.3.2 Facing material - Prior to bonding, the facing material should be given a dichromate treatment as detailed in MIL-HDBK-23. Bonding of the core to facing should begin immediately after treatment in order to avoid any possibility of contamination. Surface must be kept absolutely clean at all times.

* 6.3.3 Edge seal - The balsa core edges of the completed sandwich should be given a fungicidal treatment and overcoated with an aluminized spar varnish. The fungicide must be compatible with the bonding system.

6.4 Changes from previous issue - The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Preparing activity:
Navy - AS
Project No. 5680-0044

SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No. 119-R004
INSTRUCTIONS		
This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity (as indicated on reverse hereof).		
SPECIFICATION MIL-S-17917A(AS)		SANDWICH CONSTRUCTION; ALUMINUM ALLOY FACINGS, Balsa WOOD CORE
ORGANIZATION (Of submitter)		CITY AND STATE
CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT
MATERIAL PROCURED UNDER A		
<input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPH NUMBER AND WORDING.		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.		
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3. IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO IF "YES", IN WHAT WAY?		
4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
SUBMITTED (Printed or typed name and activity)		DATE

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DEPARTMENT OF THE NAVY
Naval Air Engineering Center
Philadelphia, Pennsylvania 19112

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