

MIL-H-8810B
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 SUPERSEDING
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 29 April 1964

MILITARY SPECIFICATION

HANDLES, CONTROL, AIRCRAFT

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

1. SCOPE

- * 1.1 Scope. This specification covers the design requirements for aircraft control handles.
- * 1.2 Classification. The control handles shall be of the sizes defined by the applicable Military Standards specified herein or as specified by the procuring activity. When there is a conflict between this specification and the applicable Military Standard (MS), the Military Standard shall apply.

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 this specification to the extent specified herein.

SPECIFICATIONS

- * Federal
 - PPP-B-636 Box, Shipping, Fiberboard
- * Military
 - MIL-P-116 Preservation-Packaging, Methods of
 - MIL-M-18012 Markings for Aircrew Station Displays Design and Configuration of
 - MIL-C-81774 Control Panel, Aircraft, General Requirements for

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: ENGINEERING SPECIFICATIONS AND STANDARDS DEPARTMENT (Code 93) NAVAL AIR ENGINEERING CENTER, LAKEHURST NJ 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1425) appearing at the end of this document or by letter.

FSC 1630

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STANDARDS

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Federal

FED-STD-141 Paint, Varnish, Lacquer, and Related Materials; Methods of Inspection, Sampling and Testing

FED-STD-595 Colors

Military

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

MIL-STD-129 Marking for Shipment and Storage

MIL-STD-143 Standards and Specifications, Order of Precedence for the Selection of

MIL-STD-411 Aircrew Station Signals

MIL-STD-810 Environmental Test Methods

MIL-STD-1472 Human Engineering Design Criteria for Military Systems, Equipment and Facilities

MS26517 Handle, Control, Aircraft Throttle, Large

MS26518 Handle, Control, Aircraft RPM, Large

MS26519 Handle, Control, Aircraft Mixture, Large

MS26520 Handle, Control, Aircraft Supercharger, Large

MS26521 Handle, Control, Aircraft Landing Gear

MS26522 Handle, Control, Aircraft Landing Flap, Large

MS26523 Handle, Control, Aircraft Fire Extinguisher

MS26524 Handle, Control, Aircraft Carburetor, Large

MS26525 Handle, Control, Aircraft Lift to Reverse Throttle

(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.)

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2.2 Other publications. The following document forms 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 Aerospace Standard

NAS 129

Data-Standard Knob, Engineering Reference

(Copies of NAS publications may be obtained from the National Standards Association, Inc., 1321 14th Street, N.W., Washington, D.C. 20005.)

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), the contractor shall furnish sample units for first article inspection and approval (see 4.4 and 6.3).

3.2 Data. Unless otherwise specified in the contract or order, no data (other than reports and drawings accompanying preproduction samples) are required by this specification or any of the documents referenced in Section 2 herein (see 6.2).

3.3 Materials. Materials shall conform to applicable specifications as specified herein. Materials which are not covered by applicable standards and specifications, or which are not specifically described herein, shall be of the best quality, of the lightest practicable weight, and suitable for the purpose intended.

3.3.1 The handles may be made of plastic or metal, except that control handles that are internally lighted shall be made of plastic, or the lighted section made with a plastic insert.

3.3.2 Metals. Metals used in the manufacture of handles shall be corrosion resistant or suitably treated to resist corrosion in salt spray or atmospheric conditions to which the handle may be subjected when in storage or during normal service usage.

3.3.3 Selection of materials. Specifications and standards for all materials, parts, and Government certification and approval of processes and equipment, which are not specifically designated herein and which are necessary for the execution of this specification, shall be selected in accordance with MIL-STD-143.

* 3.4 Design and construction. The handles shall conform to the applicable MS listed in 2.1. The lever slots for nonlighted handles shall be designed to accommodate levers having end dimensions conforming to NAS 129. The requirements of MIL-STD-1472 covering Cranks, Handwheels and Levers shall apply. The size, resistance, and limb support requirements for hand controllers shall be in accordance with MIL-C-81774.

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* 3.4.1 Lighted handles. Handles shall be provided with internal lights as warning, caution, or advisory lights in accordance with MIL-STD-411 when specified on the applicable MS. In addition, handle legend lights shall meet the requirements for Legend Lights specified in MIL-C-81774. When a legend is marked on a lighted handle, the legend shall not be readable when the handle is not lighted.

3.4.2 Inserts. Handles made of plastic material shall be provided with knurled metal inserts which shall be molded or pressed into the handles. The inserts for each handle shall be threaded in accordance with the applicable MS. The inserts shall be large enough to accommodate a minimum of four threads for attachment of the lever to the handle.

3.5 Finish and color. Except as otherwise specified herein or on the applicable MS, the handles shall be light gray, Color Number 36440 in accordance with FED-STD-595. Lighted handles shall be translucent plastic material (the translucent part shall be a neutral color but need not conform to Color No. 36440) which shall not appear lighted under direct sunlight when the lamp is not energized. The area to be lighted and the color of the light shall be as specified on the applicable MS, except for Army helicopters. Control handles procured for Army helicopters shall be opaque black Color Number 37038 in accordance with FED-STD-595.

* 3.5.1 Immediate action controls. When a control handle is intended for immediate action, the handle or panel shall be striped in accordance with MIL-M-18012.

3.5.2 Brightness. Where a handle is lighted, the brightness of the light or markings provided shall conform to MIL-STD-411. In addition, handle legend light brightness shall be in accordance with MIL-C-81774 (Legend Lights) and as specified herein.

3.5.3 Adhesion. When tested as specified in 4.6.4, the coatings of the handles shall not separate from the base material.

3.6 Performance. The handles shall satisfy the performance requirements specified in Section 4, when subjected to the following tests:

Compression stress at room temperature	(4.6.5)
Compression stress at low temperature	(4.6.6)
Compression stress at high temperature	(4.6.7)
Humidity	(4.6.8)
Salt Fog	(4.6.9)
Shock	(4.6.10)
Fungus resistance	(4.6.11)
Vibration	(4.6.12)
Solar Radiation	(4.6.13)

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* 3.7 Markings Legend. Where a legend is specified on the handle, it shall be marked in accordance with MIL-M-18012, except that markings shall be the maximum size practicable in the space available. When a legend is marked on a lighted handle, the legend shall not be readable when the handle is not lighted.

* 3.7.1 When practicable, all handles shall be labeled as to function and direction of motion and shall be indicated on the handle or immediately adjacent thereto by means of an arrow and appropriate legends.

3.8 Identification of product. The underside of the handle shall be permanently and legibly marked with the MS number and manufacturer's name and trademark.

3.9 Mounting screws. Unless otherwise specified, mounting screws shall be furnished in an envelope marked "Mounting Screws".

3.10 Workmanship. Workmanship shall be in accordance with high-grade manufacturing practice. Particular attention shall be given to neatness in finish and elimination of burrs and sharp edges.

4. QUALITY ASSURANCE PROVISIONS

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

4.2 Classification of inspections. The inspection requirements for handles shall be classified as follows:

First article inspection	(4.4)
Quality conformance inspection	(4.5)

4.3 Inspection condition.

4.3.1 Unless otherwise specified, the tests shall be conducted at atmospheric pressure (approximately 30 inches Hg) and at room temperature (approximately 25°C). When tests are made with atmospheric pressure or room temperature differing materially from above values, proper allowance shall be made for the difference from the specified condition.

4.3.2 The test handle shall be mounted on a lever conforming to NAS 129 for all tests specified herein.

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4.4 First article inspection. First article inspection, when required, shall consist of all methods of inspection specified under 4.6. First article inspection shall be performed at the place specified in the procurement document (see 6.2). First article inspection shall be performed on sample units which have been produced with equipment and procedures normally used in production. First article approval is valid only on the contract under which it is granted, unless extended by the Government to other contracts.

4.4.1 Sample size. Two handles of each MS part number shall be subjected to first article inspection.

4.5 Quality conformance inspection.

4.5.1 Inspection of product for delivery. Inspection of product for delivery shall consist of groups A and B inspection.

4.5.1.1 Inspection lot. An inspection lot shall consist of all handles completed in a 1-day production and submitted for acceptance at the same time.

4.5.1.2 Group A inspection. The units selected in accordance with sampling plan A shall be subjected to visual examination and measurement (4.6.1).

4.5.1.2.1 Sampling Plan A. The unit for visual examination and measurement purposes shall be defined as one handle and shall be representative of the production item. Samples of handles shall be selected at random in such numbers from the lot submitted for acceptance that the total number of handles inspected and tested shall be equal to that required by Inspection Level S-1 of Table I of MIL-STD-105. The acceptable quality level (AQL) for major and minor defects shall be as follows:

Major defects

1.5 per 100 units

Minor defects

4.0 per 100 units

Nonconformance to the above AQL shall be cause for rejection of the lot represented. The classification of defects, Table I, shall be used to determine the major and minor defects, which shall be the basis of acceptance or rejection of lots submitted.

TABLE I. CLASSIFICATION OF DEFECTS

Major	Minor
Location of mounting holes and slot out of tolerance	Surface scratches
Mounting holes and slot out of size	Sharp edges
Improper, or no mounting screws furnished	Unmatched colors
Loose inserts	Overall dimensions out of tolerance as specified on the MS
Crack around mounting holes and slots	

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4.5.1.2.2 Rejected lots. Instructions for resubmission of rejected lots shall be as specified in the contract or order.

4.5.1.3 Group B inspection. The units selected in accordance with sampling plan B shall be subjected to the following methods of inspection:

Color	(4.6.1)
Specular gloss	(4.6.2)
Light transmission	(4.6.3)
Adhesion	(4.6.4)

4.5.1.3.1 Sampling Plan B. Sampling plan B inspection samples shall consist of at least one handle selected at random from each group of sampling plan A samples.

4.5.1.3.2 Rejected lots. Instructions for resubmission of rejected lots shall be as specified in the contract or order.

4.5.1.3.3 Disposition of sample units. Handles which have been subjected to group B inspection shall not be delivered on the contract.

4.5.2 Periodic inspection.

4.5.3 Inspection of packaging. Preparation for delivery shall be examined for conformance to Section 5.

4.6 Methods of inspection.

4.6.1 Visual examination and measurement. Each sample shall be thoroughly examined to determine conformance to the color specified in 3.5.

4.6.2 Specular gloss. The specular gloss value of colors shall be determined by Method 6101 of FED-STD-141.

4.6.3 Light transmission (Lighted Handles Only). The handle shall be tested using the integral handle lights operating in accordance with MIL-STD-411. With the lighting operating as specified, the lighting brightness shall be within ± 10 percent of the rated brightness. The brightness shall be uniform over the lighted portion of handle within a tolerance of 10 percent of the measured peak brightness. When the lights are dimmed, the dimming shall be uniform over the lighted portion of the handle. The measuring apparatus shall consist of a brightness meter (6.5.1) mounted sufficiently far from the handle to focus upon the portion of the handle to be measured. The handle being measured shall be perpendicular to the axis of the brightness meter. The tests shall be made in a dark room.

4.6.4 Adhesion. The handle shall be immersed in distilled water for a period of 16 hours. It shall be wiped dry and immediately (within 1 minute) scratched with a stylus until penetrated to the base material.

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A $\frac{1}{2}$ -inch strip of masking tape taken from a fresh sample of Minnesota Mining and Manufacturing Company Code No. 250 masking tape, or equivalent, shall be applied across the scratch, adhesive side down. The tape shall be firmly pressed down with the thumb. The tape shall be removed in one abrupt motion immediately after application.

4.6.5 Compression stress at room temperature. A compression testing machine capable of producing a uniform load over the entire surface of the test handle that will be in contact with the compression head of the testing machine shall be employed. The handle assembly shall be mounted on a supporting jig to allow testing of the handle assembly with an introduction of minimum torque conditions. There shall be a maximum distance of 2 inches between the center of the handle and the point on the shaft supporting the test jig. The handle shall be tested in two positions as follows:

- (a) The handle assembly shall be supported in the test jig in such a manner that a constant load is applied in a direction parallel to the handle actuation in the aircraft application.
- (b) The handle assembly shall be supported in the test jig in such a manner that a constant load is applied on the top of the handle in a direction parallel to the mounting shaft.

With the handle assembly properly positioned in the test machine, a constant load at a maximum rate of 0.015 inch per minute shall be applied in the directions specified above until a load of 100 pounds is attained. The load shall then be removed and the handle shall be carefully examined for evidence of cracking, fracture, or distortion which shall be cause for rejection.

4.6.6 Compression stress at low temperature. The handle assembly shall be subjected to $-65^{\circ} \pm 2^{\circ}\text{C}$ for 48 hours. The temperature shall then be raised to $-55^{\circ} \pm 2^{\circ}\text{C}$ for 48 hours. While at this temperature, the handle assembly shall be subjected to the compression stress at room temperature test (4.6.5)

4.6.7 Compression stress at high temperature. The handle assembly shall be subjected to $70^{\circ} \pm 2^{\circ}\text{C}$ for 4 hours. While at this temperature the handle assembly shall be subjected to the compression stress at room temperature test (4.6.5).

4.6.8 Humidity. The handle assembly shall be subjected to Humidity Test, Method 507.1, Procedure I of MIL-STD-810. Within 1 hour after the completion of the test, the handle shall be subjected to the compression stress at room temperature test (4.6.5).

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4.6.9 Salt fog. The handle shall be subjected to Salt Fog testing, Method 509.1, Procedure I of MIL-STD-810. The handle shall be inspected at the completion of this test for evidence of corrosion or deterioration and handles provided with internal lights shall be operated. No damage shall result from this test.

4.6.10 Shock. The handle shall be subjected to the Shock Test, Method 516.2, Procedure III, of MIL-STD-810. The shock pulse shall be in accordance with Figure 516.2-1 having a peak amplitude of 40 g's and timeduration of 11 milliseconds.

* 4.6.11 Fungus resistance. The handle shall be subjected to Fungus Resistance, Method 508.1, Procedure I of MIL-STD-810. At the end of the test period, the handle shall be carefully examined to ascertain that no fungus growth has occurred that would affect subsequent operation.

4.6.12 Vibration. The handle shall be subjected to Vibration testing, Method 514.2, Procedure I, of MIL-STD-810. The time schedule shall be in accordance with Table 514.2-II and test level Curve J of Figure 514.2-2. The handle shall be inspected at the completion of this test for evidence of damage to threads, loosened inserts, and inoperative lighting when provided. No damage shall result from this test.

4.6.13 Solar radiation. The handle shall be subjected to the Solar Radiation Test, Method 505.1, Procedure I, of MIL-STD-810. Lighted handles shall be operating at maximum brightness during this test. The handles shall not distort, fracture, discolor, or produce toxic fumes.

* 5. PACKAGING

5.1 Preservation and packaging. Preservation and packaging shall be Level A or C, as specified (see 6.2).

5.1.1 Cleaning. Handles shall be cleaned in accordance with appropriate cleaning procedure specified in MIL-P-116.

5.1.2 Level A. Each handle, cleaned as specified in 5.1.1, shall be preserved and packaged in accordance with MIL-P-116, Method IC-1.

5.1.3 Level C. Each handle, cleaned as specified in 5.1.1, shall be preserved and packaged in a manner which will afford adequate protection against corrosion, deterioration and physical damage during shipment from supply source to the first receiving activity. The supplier may use his commercial practice providing it meets this requirement.

5.2 Packing. Packing shall be Level A, B or C, as specified (see 6.2).

5.2.1 Level A. Handles preserved and packaged as specified in 5.1.2 shall be packed in weather-resistant shipping containers conforming to PPP-B-636. The grade of each shipping container, determined by the

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gross weight and size, shall be limited to the applicable special requirements table of the specification. Where practicable the exterior shipping containers shall be of uniform shape and size and a minimum cube and tare. Closure and strapping shall be in accordance with the appendix of PPP-B-636.

5.2.2 Level B. Same as Level A except class domestic shipping containers may be used.

5.2.3 Level C. The handles shall be packed in a shipping container which will be acceptable to the carrier at lowest rates and insure safe transportation to the point of delivery. Containers shall comply with Uniform Freight Classification Rules and Regulations, or regulations of other carriers as applicable to the mode of transportation.

5.3 Marking. Interior and exterior containers shall be marked in accordance with MIL-STD-129 and as specified in order or contract.

6. NOTES

- * 6.1 Intended use. Control handles are intended for use on aircraft control systems which require manual actuation.
- * 6.2 Ordering data. Procurement documents should specify:
 - (a) Title, number, and date of this specification
 - (b) MS Part Number
 - (c) Quantity
 - (d) Data requirements (see 3.2)
 - (e) Where the first article test samples should be sent and instructions concerning submittal of test reports, if any (see 4.4).
 - (f) Levels of preservation, packaging and packing required (See Section 5).
- * 6.3 When a first article is required for inspection and approval (see 3.1, 4.4, and 6.4).
- * 6.4 First article. When a first article is required, it shall be tested and approved under the appropriate provisions of 7-104.55 of the Armed Services Procurement Regulation. The first article should be a pre-production sample. The first article should consist of two units. The contracting officer should include specific instructions in all procurement instructions regarding arrangements for examinations, tests and approval of the first article.
- 6.5 Test equipment source.
 - 6.5.1 Brightness meter. Luckiesh-Taylor brightness meter, described in Section 4-14 of the second edition of the Illuminating Engineering Lighting Handbook, is one type of brightness meter which may be employed for brightness tests included in this specification.

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6.5.2 Reflectometer. A suitable reflectometer is the Priest-Lang reflectometer. Its use is described by I.G. Priest in "Priest-Lang Reflectometer Applied to Nearly White Porcelain Enamels," Journal of Research NBS 15.529 (1935) RP847.

* 6.6 Changes from previous issue. The margins of this specification are marked with an asterisk to indicate where changes, deletions, and additions from the previous issue have been 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.

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Navy - AS
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Review/user information is current as of the date of this document. For future coordination of changes to this document, draft circulation should be based on the information in the current DOD Index of Specifications and Standards.

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