

INCH-POUND

MIL-M-16034A(SH)
INTERIM AMENDMENT 11
23 April 1991
SUPERSEDING
INTERIM AMENDMENT 10
20 October 1978
USED IN LIEU OF
AMENDMENT 6
19 June 1967

MILITARY SPECIFICATION

METERS, ELECTRICAL-INDICATING (SWITCHBOARD
AND PORTABLE TYPES)

This interim amendment is approved for use within
Department of the Navy, Naval Sea Systems Command,
with MIL-M-16034A dated 2 January 1953.

PAGE 1

1.2.1.2.1.1; Add: "9-8-3/4 inch rectangular flange."

PAGES 2 AND 3

1.2.1.8: Delete and substitute:

"1.2.1.8 Special meters. Meters having special
characteristics such as adjusted resistance, special scale marks,
and so forth shall be identified by a National Stock number."

PAGES 3 AND 4

2.1: Delete reference to Military Specification "MIL-N-2716" and
add the following specification and standard:

SPECIFICATION

MILITARY

"MIL-E-15090 - Enamel Equipment, Light Gray
(Formula No. 111)."

AMSC N/A

FSC 6625

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MIL-M-16034A(SH)
INTERIM AMENDMENT 11

PAGE 4

STANDARDS

MILITARY

"MIL-STD-130 - Identification Marking of
Military Property."

* 2.1: Under "STANDARDS, FEDERAL": Add the following:

"FED-STD-191 - Textile Test Methods"

* 2.1: Delete "JAN-P-80 - Plastic-Materials, Anti-Electrostatic,
Clear, Transparent (for Indicating-Instrument Windows)" and
substitute:

"MIL-W-80 - Window, Observation, Acrylic Base,
Antielectrostatic, Transparent (For Indicating Instrument)"

* 2.1: Under "SPECIFICATIONS, MILITARY" add the following:

"MIL-C-14806 - Coating, Reflection Reducing, For
Instrument Cover Glasses and Lighting
Wedges"

* 2.2: Add the following:

"AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D1003 - Standard Test Method for Haze and Luminous
Transmittance of Transparent Plastics
(DoD adopted)

D1044 - Standard Test Method for Resistance of Transparent
Plastics to Surface Abrasion (DoD adopted)

D3935 - Standard Specification for Polycarbonate (PC)
Unfilled and Reinforced Material

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

MIL-M-16034A(SH)
INTERIM AMENDMENT 11

PAGE 7

- * 3.3.1.3: Delete and substitute:

"3.3.1.3 Plastic windows. Plastic material used for windows shall conform either to MIL-W-80 or ASTM D3935. Windows manufactured from material per ASTM D3935 shall be tested per Table VII and shall have a scratch resistant coating applied to the exterior surface. When specified (see 6.2), anti-glare coating shall conform to MIL-C-14806."

PAGE 8

3.5.1.2.1, first sentence: Delete and substitute: "The portion of the case exposed to view from the front of the panel shall have a light gray finish in accordance with formula number 111, class 2 of MIL-E-15090."

PAGE 9

- * 3.5.1.4: Delete and substitute:

"3.5.1.4 Window. Meters shall be provided with a window of glass or other transparent material (see 3.3.1.3) and, when specified (see 6.2), exterior surfaces of windows shall be treated or coated to reduce glare. Windows shall be secured by clamps or other means, or cover and window may be one homogeneous unit."

- * 3.5.1.4.1.3: Add as new paragraph:

"3.5.1.4.1.3 Electrostatic influence. Windows manufactured from material in accordance with ASTM D3935 shall meet the electrostatic influence tests as specified in paragraph 4.5.20."

- * 3.5.1.4.1.4: Add as new paragraph and Table VII:

"3.5.1.4.1.4 Optical Properties. Optical properties of windows manufactured out of material in accordance with ASTM D3935 shall be as specified below:

MIL-M-16034A(SH)
INTERIM AMENDMENT 11

TABLE VII - Optical Properties

Property	Requirement	Test Reference
Light transmittance, percent, minimum		
Initial measurement	87.0	4.5.21.1
Post humidity	86.0	4.5.21.2
Post aging	85.0	4.5.21.3
Haze, Percent, maximum		
Initial measurement	3.0	4.5.21.1
Post humidity	3.5	4.5.21.2
Post aging	4.0	4.5.21.3

* 3.5.1.4.1.5: Add as new paragraph:

"3.5.1.4.1.5 Window visual properties. When subjected to the visual inspection test (see 4.5.24), windows shall exhibit no detrimental visual effect which will unduly interfere with the reading of the scale or legend under normal lighting conditions."

* 3.5.1.4.1.6: Add as new paragraph:

"3.5.1.4.1.6 Abrasion haze properties. When subjected to the abrasion qualifications tests (see 4.5.23), windows made from material as specified in ASTM D3935 shall not exceed the maximum optical haze requirements as specified below:

Transparent windows: 4 percent maximum increase in haze.

Anti-glare windows: 4 percent maximum decrease in haze.

MIL-M-16034A(SH)
INTERIM AMENDMENT 11

PAGE 10

3.5.3.2: Delete and substitute:

"3.5.3.2 Zero adjustment. Meters shall have a zero adjusting device accessible from the front of the case. The device shall be capable of being rotated through 360 degrees, without damage to the device or any part of the meter and without becoming inoperative or any parts becoming adrift or shall withstand 10 inch-ounces of torque without damage, distortion or jamming. A device capable of being rotated through 360 degrees is preferred. Zero adjustment devices shall provide a range of adjustment above and below the zero mark on the scale of not less than 3 percent of the scale length (see 4.5.2)."

PAGE 12

3.24: Delete and substitute:

"3.24 Shock (high impact). When high impact-shock resistant meters are tested in accordance with 4.5.1.9, no screws, bearings pivots, windows or other parts shall become loosened, cracked (except as specified hereinafter) or unduly damaged. Minor cracking or distortion of pivots will be permissible only when conformance to the post shock performance has been demonstrated. Cracking of glass windows will be permissible only when readability of the complete scale is retained and no fragment has become dislodged. The permanent change in the indication based on calibration made after resetting the pointer to zero shall not exceed the value specified (see 3.27)."

PAGE 13

3.25.2, line 12: Delete "Specification MIL-N-2716" and substitute "Standard MIL-STD-130".

MIL-M-16034A(SH)
INTERIM AMENDMENT 11

PAGE 15

Table I, opposite 4-1/2 inch, high impact shock resistant: Add as the second item:

Kind of meter	Specimens		Ranges covered (end scale)
	Type designation	Number required	
"D.C. microammeter	MR49W050DCUAH	2	50 microamperes to 500 microamperes

Table I: Add the following 8-3/4 inch meters:

Kind of meter	Specimens		Ranges covered (end scale)	
	Type designation	Number required		
"8-3/4 inch 250° nominal scale, high-impact-shock resistant	D.C. voltmeters	MR99W300DCVVH	3	5- 800 volts 200 microamperes to 1 milliamperes
	D.C. microammeter	MR99W200DCUAH	3	
	D.C. ammeters, self-contained	MR99W030DCAAH	3	1 milliamperes to 50 amperes Above 50 amperes"
	D.C. ammeters extent shunt	MR99W100DCAAN	3	

PAGE 16

Table II: Under type designation for 0.5 percent accuracy class, delete "MR50W010DCAA" and "MR50W300DCAA" and substitute "MR51W010DCAA" and "MR53W300DCAA".

**MIL-M-16034A(SH)
INTERIM AMENDMENT 11**

PAGE 18

* Table V: Modify the case requirement as follows:

"Requirement	Paragraph	Defect Classification
Cases	3.5.1 to 3.5.1.3 incl.	Major
Window	3.5.1.4	Major
Scale visibility	3.5.1.4.1	Major"

4.5.2: Delete and substitute:

"4.5.2 Zero adjustment. The range of zero adjustment above and below the zero mark shall be determined. A determination shall also be made as to whether the zero adjuster can be rotated through 360 degrees without damage to the device or any part of the meter or without becoming inoperative or any part becoming adrift. Zero adjustment devices not capable of rotation through 360 degrees shall be tested as follows: A screwdriver or similarly shaped tool shall be prepared by shaping the point for maximum snug engagement with the zero adjust device. This tool shall be mounted in a torque wrench which indicates torque of 10 inch ounces. Ten ounces of torque shall be applied in both clockwise and counter-clockwise direction. Distortion, damage or jamming in either direction shall be cause for rejection."

PAGE 22

* 4.5.20: Add as new paragraph:

"4.5.20 Electrostatic influence."

* 4.5.20.1: Add as new paragraph:

"4.5.20.1 Electrostatic influence procedure. Window shall be tested as follows:

a. Using a pad of clean, white, folded cheesecloth saturated with distilled water, clean the outside surface of the window. Remove all excess moisture with another pad of clean, folded cheesecloth. Do not touch the clean window with the bare skin. Allow the window to dry for at least 4 hours.

b. Set the indicating pointer to zero. Do not touch the window with bare hands.

MIL-M-16034A(SH)
INTERIM AMENDMENT 11

c. Take a piece of clean, untreated, white cheesecloth approximately 18 inches square and form it into a wad.

d. Without touching the window with bare hands and using the wad described in step c, rub the viewing area of the window briskly for one minute minimum, about 100 strokes.

e. Measure and record the time required for the pointer to return to zero to within 1 percent of full scale deflection.

* 4.5.20.2: Add as new paragraph:

"4.5.20.2 Requirement. The time required in step (e) shall not exceed 30 seconds."

* 4.5.21: Add as new paragraph:

"4.5.21 Optical properties."

* 4.5.21.1: Add as new paragraph:

"4.5.21.1 Initial properties

- (a) Condition window as specified in MIL-W-80 (1 hour).
- (b) Gently blot test area of specimen with a non-abrasive, clean cloth or sponge moistened with distilled water.
- (c) Take initial haze and transmittance measurements in accordance with ASTM D1003."

* 4.5.21.2: Add as new paragraph:

"4.5.21.2 Post humidity properties.

- (a) Cycle specimen as specified in MIL-W-80.
- (b) Condition as specified in MIL-W-80 (1 hour).
- (c) Gently blot test area of specimen with a non-abrasive, clean cloth or sponge moistened with distilled water.
- (d) Take haze and transmittance measurements in accordance with ASTM D1003."

MIL-M-16034A(SH)
INTERIM AMENDMENT 11

- * 4.5.21.3: Add as new paragraph:

"4.5.21.3 Post aging properties.

- (a) Age specimen as specified in FED-STD-191, method 5660, for 75 fading hours.
- (b) Condition as specified in MIL-W-80 (1 hour).
- (c) Gently blot test area of specimen with a non-abrasive clean cloth, or sponge moistened distilled water.
- (d) Take haze and transmittance readings in accordance with of ASTM D1003."

- * 4.5.22: Add as new paragraph:

"4.5.22 Window abrasion resistance (inspection test). Meter windows shall be rubbed on the external surface using moderate hand pressure with a pad of 0000 grade steel wool for 50 strokes and the visual effect on scale and legend readability determined (3.5.1.4.1.5)."

- * 4.5.23: Add as new paragraph:

"4.5.23 Window abrasion test (Qualifications Test). Windows shall be tested for abrasion resistance of the exterior surface as specified in the following sequence:

ASTM D1003	Initial haze measurement
ASTM D1044	Abrasion of exterior
ASTM D1033	Post abrasion haze measurement

- * 4.5.24: Add as new paragraph:

"4.5.24 Visual inspection of windows. Meters dials shall be inspected through the installed window with the observer's line-of-sight on the centerline axis of the dial, between 18 and 24 inches from the dial. The illumination source shall be the diffused light from two 60 watt incandescent lamps placed behind and on either side of the observer, but no more than 3 feet from the meter dial. The sources shall be placed so as to eliminate shadows on the dial. For transparent windows, placement of light sources should minimize reflected glare. For anti-glare windows, placement of light sources should maximize reflected glare."

**MIL-M-16034A(SH)
INTERIM AMENDMENT 11**

Table VIII: Add as new Table VIII.

**TABLE VIII - Testing for windows manufactured from material per
ASTM D3935**

Test	Specimens Per Test	Qualification Tests		Inspection Tests	
		Requirement Paragraph	Test Paragraph	Requirement Paragraph	Test Paragraph
Electrostatic Influence	3	3.5.1.4.1.3	4.5.20	3.5.1.4.1.3	4.5.20
Optical/Visual Properties	3	3.5.1.4.1.4	4.5.21	3.5.1.4.1.5	4.5.24
Abrasion Resistance	3	3.5.1.4.1.6	4.5.23	3.5.1.4.1.5	4.5.22

6.2, item (b): Delete and substitute:

"(b) Complete type designation or National stock number (see 1.2.1.8) and title, number, and date of applicable specification sheet (see 1.2.1 and 3.27)."

PAGE 23

* 6.3: Delete and substitute:

"6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL No. 16034 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Sea Systems Command, SEA 55Z3, Department of the Navy, Washington, DC 20362-5101 and information pertaining to qualification of products may be obtained from that activity."

MIL-M-16034A(SH)
INTERIM AMENDMENT 11

* 6.3.1: Add as new paragraph:

"6.3.1 Copies of "Provision Governing Qualification SD-6" may be obtained upon application to Commanding Officer Naval Publication and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120-5099."

NOTE: The margins of this amendment are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous amendment were made. This was done as a convenience only and 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 amendment.

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