INCH-POUND
MIL-PRF-39023/10C
w/Amendment 2
1 December 2015
SUPERSEDING
MIL-PRF-39023/10C
w/Amendment 1
31 May 2011

PERFORMANCE SPECIFICATION SHEET

RESISTOR, VARIABLE, NONWIREWOUND, PRECISION, STYLE RQ051

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

The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-PRF-39023.

1. SCOPE

1.1 Scope. This specification covers the requirements for style RQ051, variable, nonwirewound, precision resistors.

1.2 Classification.

1.2.1 Part or Identifying Number (PIN). The PIN is in the following form:

Single-section (cup) resistors

RQ051	C	G	2	5	A	F	502
Style	Resistance temperature characteristic, maximum ambient temperature and taps (1.2.2)	Shaft length (1.2.3)	Moisture resistance (1.2.4)	Life characteristic (1.2.5)	Function conformity tolerance characteristic (1.2.6)	Output smoothness characteristic (1.2.7)	Resistance (1.2.8)

1.2.2 Resistance temperature characteristic, maximum ambient temperature and taps. The resistance temperature characteristic, maximum ambient temperature and taps applicable to this specification will be symbol C (full rated power at 60°C derated to zero power at 125°C).

1.2.3 Shaft length. The shaft length applicable to this specification will be symbol G (1.125 ± 0.0156)

1.2.4 Moisture resistance. The moisture resistance applicable to this specification will be symbol 2.

1.2.5 Life Characteristic. The life characteristic applicable to this specification will be symbol 5, (25,000 cycles and 1.0 hour dither) (see 4.1.3).

Comments, suggestions, or questions on this document should be addressed to: DLA Land and Maritime, ATTN: VAT, Post Office Box 3990, Columbus, Ohio 43218-3990 or by email resistor@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.dla.mil/

AMSC N/A FSC 5905

1.2.6 Function conformity tolerance characteristic. The function conformity tolerance characteristic applicable to this specification are symbols A to D, inclusive.

1.2.7 Output smoothness characteristic. The output smoothness characteristic applicable to this specification will be symbol F (1.0 percent degraded to 1.4 percent) (see 4.1.1).

1.2.8 Resistance. The nominal total resistance value will be 5 Kilohms (5kΩ) and maximum end voltage will be 2.0 percent of total applied voltage.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-PRF-39023	-	Resistor, Variable, Nonwirewound, Precision, General Specification for.

(Copies of these documents are available online at http://quicksearch.dla.mil).

2.3 Order of precedence. Unless otherwise noted herein or in the event of a conflict between the text of this document and the references cited herein (except for related specifications), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 General. The requirements for acquiring the product described herein shall consist of this document and MIL-PRF-39023.

3.2 Interface and physical dimensions. The resistors shall meet the interface and physical dimension specified in figure 1.

3.3 Total resistance. The total resistance value shall be 5,000 ohms ± 20 percent.

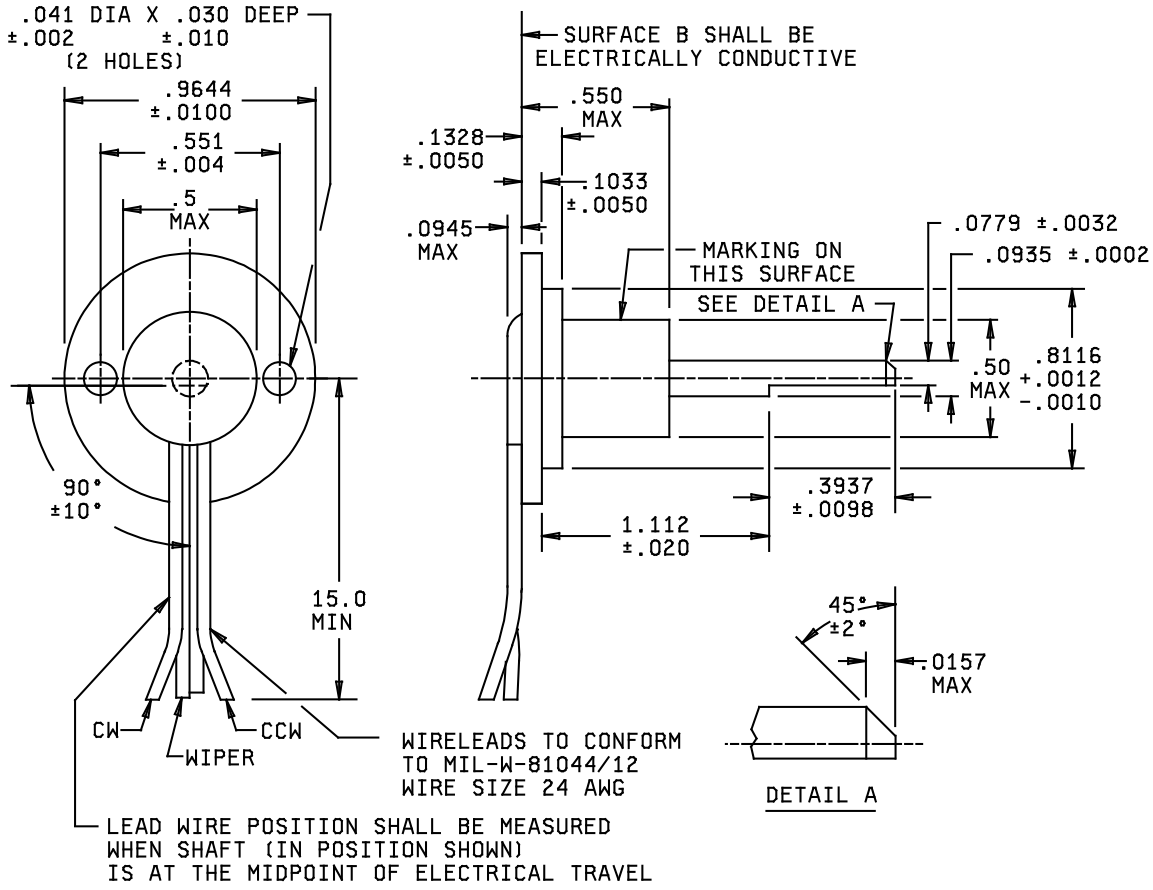
3.4 Mechanical travel. The mechanical travel shall be 360 degrees continuous.

3.5 Theoretical electrical travel. The theoretical electrical travel shall be 50 degrees (± 3 degrees).

3.6 Electrical overtravel. The electrical overtravel shall be 125 degrees at each end.

3.7 Maximum continuous working voltage. The maximum continuous working voltage shall be 50 volts.

3.8 Power rating. The power rating shall be 0.5 watts at 60°C derated to 0 at 125°C.



Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
0.0002	0.01	0.004	0.10	0.020	0.51	0.0945	2.40	0.550	13.97
0.001	0.03	0.005	0.13	0.030	0.76	0.1 33	2.62	0.551	14.00
0.0012	0.03	0.0098	0.25	0.041	1.04	0.1328	3.37	0.8116	20.61
0.002	0.05	0.100	0.25	0.0770	1.98	0.3937	10.10	1.112	28.24
0.0032	0.08	0.0157	0.40	0.0935	2.37	0.500	12.70	15.000	381.00

NOTE: Dimensions are in inches. Metric equivalents are given for general information only.

FIGURE 1. Style RQ051

3.9 Torque. The starting torque shall be 2.0 ounce-inches and the running torque shall be 1.7 ounce-inches.

3.10 Housing. The resistor housing shall be metal.

3.11 Terminal identification. The insulation of the flexible leads shall be colored as shown on figure 2

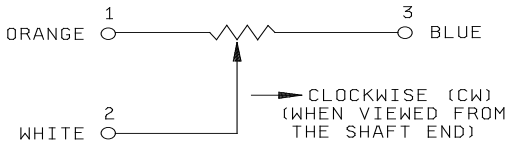


FIGURE 2. Circuit diagram

3.12 Weight. The maximum weight shall be 0.9 ounces.

3.13 Function conformity. The type of conformity shall be independent linearity.

3.14 Operating temperature range. The operating temperature range shall be -45°C to +125°C.

3.15 Static contact resistance. When the resistors are tested as specified in 4.1.3, the static contact resistance shall not exceed 2,000 ohms (2.0 volts).

3.16 Marking. The resistor shall be marked with type designation and the manufacturers source code number. Where required, the type designation may appear on two lines as shown in the following: Location of the marking shall be located as shown on figure 1.

RQ051CG
25AF502

3.17 Pure tin. The use of pure tin, as an underplate or final finish, is prohibited both internally and externally. Tin content of resistor components and solder shall not exceed 97 percent, by mass. Tin shall be alloyed with a minimum of 3 percent lead, by mass (see 6.5).

4. VERIFICATION

4.1 Sampling and inspection. Sampling for delivery shall be in accordance with MIL-PRF-39023, except static contact resistance shall be added prior to output smoothness in table XI group A inspection.

4.1.1 Output smoothness. Output smoothness shall be as specified in 4.7.17 of MIL-PRF-39023, except run at 0.5 RPM instead of 4 RPM.

4.1.2 Static contact resistance. This test shall be performed in accordance with figure 3. Make the measurements with the resistor mounted firmly in the holding fixture and with the shaft axis in the vertical position. Firmly clamp a suitable collar to the end of the shaft. This collar shall provide for the application of a load both towards the resistor body and away from it, applied at an angle of 45 degrees from the resistor center line. Rotate the shaft so that the wiper is at the approximate midpoint of the theoretical electrical travel and connect the resistor as shown in the wiring diagram (see figure 3). Apply a 5-pound load, alternately towards and away form the resistor body, at 90 degree intervals around the shaft. Measure and record the static contact resistance (8 measurements).

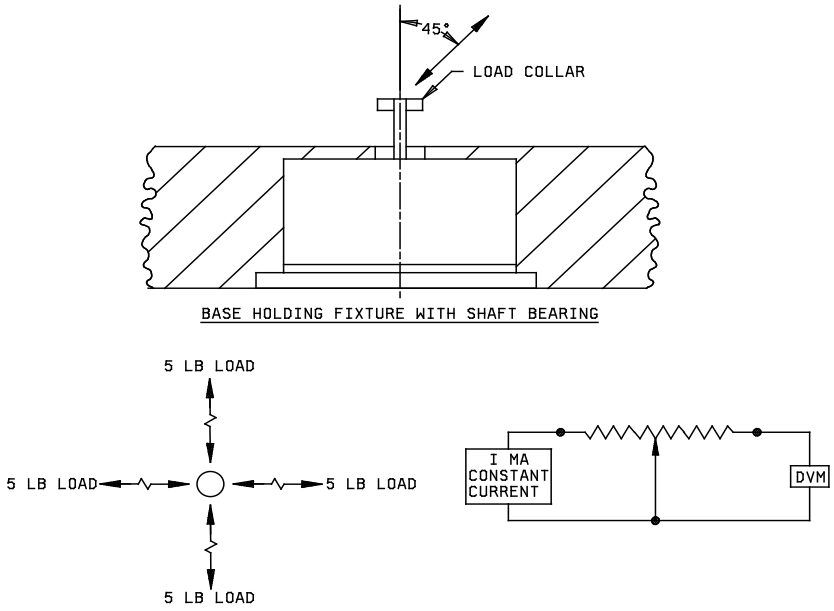


FIGURE 3. Measurement of static contact resistance.

4.1.3 Life. The rotational life test shall be as specified in 4.7.21.1.3 of MIL-PRF-39023, except the operating shaft shall be continuously cycled through not less that 5 percent or more that 95 percent of the electrical travel at an average of 120 RPM ± 20 RPM. The total number of cycles to be performed for qualification shall be 25,000 cycles.

4.1.3.1 Mounting. The resistor shall be mounted as specified in figure 4.

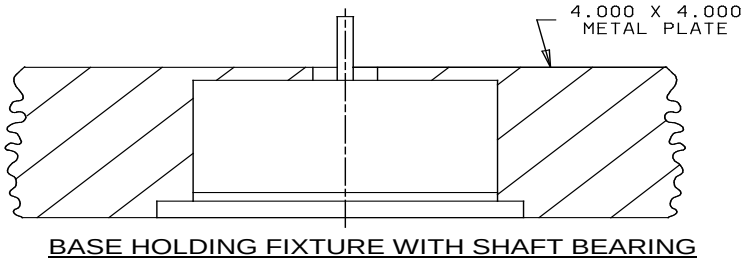


FIGURE 4 Life test mounting fixture.

4.1.3.2 Dither. The dither test shall be specified in 4.7.21.2 of MIL-PRF-39023, with a dither life of 1.0 hour.

4.1.3.4 Mounting. The resistor shall be mounted as specified in figure 4.

4.1.4 Integrity of shaft.

4.1.4.1 Mounting. The resistor shall be mounted as specified in figure 4.

4.1.4.2 Pull force. A force of 2 pounds shall be applied along the axis of the operating shaft away from the body of the resistor. The force shall be maintained for a minimum of 1 minute.

4.1.4.3 Examination after test. Resistors shall be examined for evidence of mechanical damage and tested for electrical continuity.

4.1.5 Exclusions. The following tests are not applicable to this specification:

4.7.3	-	Lateral runout
4.7.4	-	Shaft runout
4.7.5	-	Pilot diameter runout
4.7.6	-	Shaft radial play
4.7.9.3	-	Torque (stop)
4.7.10	-	Taps
4.7.15	-	Minimum voltage
4.7.24	-	High temperature exposure

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the military system commands Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Notes. The notes specified in MIL-PRF-39023 will be applicable to this specification.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of this specification, and the complete PIN (see 1.2).

b. Unless otherwise specified (see 2.1), the versions of the individual documents referenced will be those in effect on the date of release of the solicitation.

c. Packaging requirements (see 5.1).

6.3 PIN. This specification requires a PIN that describes technology and appropriate references to associated documents (see 1.2 and 3.1).

6.4 Extension of qualification. Qualification to style RQ051 will qualify style RQ051 with the following additional tests: fourteen units will be subjected to the inspection of group I of Table X in MIL-PRF-39023. After the inspection of group I, the 14 units will then be divided into three groups; six units will be subjected to the inspection of group III, six units to group IV, and two units to the static resistance test.

6.5 Tin whisker growth. The use of alloys with tin content greater than 97 percent, by mass, may exhibit tin whisker growth problems after manufacture. Tin whiskers may occur anytime from a day to years after manufacture and can develop under typical operating conditions, on products that use such materials. Conformal coatings applied over top of a whisker-prone surface will not prevent the formation of tin whiskers. Alloys of 3 percent lead, by mass, have shown to inhibit the growth of tin whiskers. For additional information on this matter, refer to ASTM-B545 (Standard Specification for Electrodeposited Coatings of Tin).

6.6 Amendment notations. The margins of this specification are marked with vertical lines to indicate modification generated by this amendment. 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.

Custodians:
Army - CR
Navy - EC
DLA - CC

Preparing activity:
DLA - CC

Review activities
Army - AR, MI
Navy - AS, CG, MC, OS

(Project 5905-2015-064)

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