

PERFORMANCE SPECIFICATION

RESISTORS, VARIABLE, NONWIRE-WOUND, PRECISION,  
STYLE RQ051

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

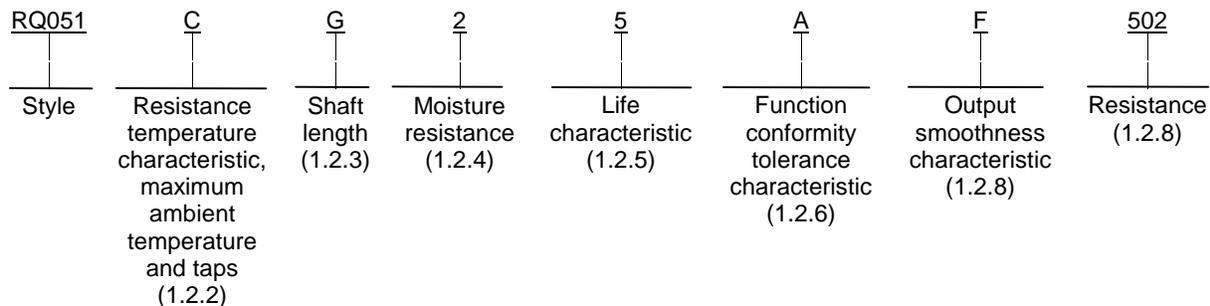
1. SCOPE

1.1 Scope. This specification covers the requirements for style RQ051, variable, nonwire-wound, precision resistors.

1.2 Classification.

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

Single-section (cup) resistors



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 ( $1.125 \pm 0.0156$ )

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).

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Supply Center, Columbus, ATTN: DSCC/VAM, 3990 East Broad Street, Columbus, OH 43213-1199 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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 shall be 5 Kilohms (5k $\Omega$ ) 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, documents 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 part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

## SPECIFICATION

### DEPARTMENT OF DEFENSE

MIL-W-81044/12 - Wire, Electric, Crosslinked Polyalkene Insulated, Tin Coated Copper, Light Weight, 600volt, 150 Degree C.

MIL-PRF-39023 - Resistors, Variable, Nonwire-Wound, Precision, General Specification for.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Defense Automated Printing Service, Building 4D (DPM-DODSSP), 800 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, 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  $\pm$  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 ( $\pm$  3 degrees).

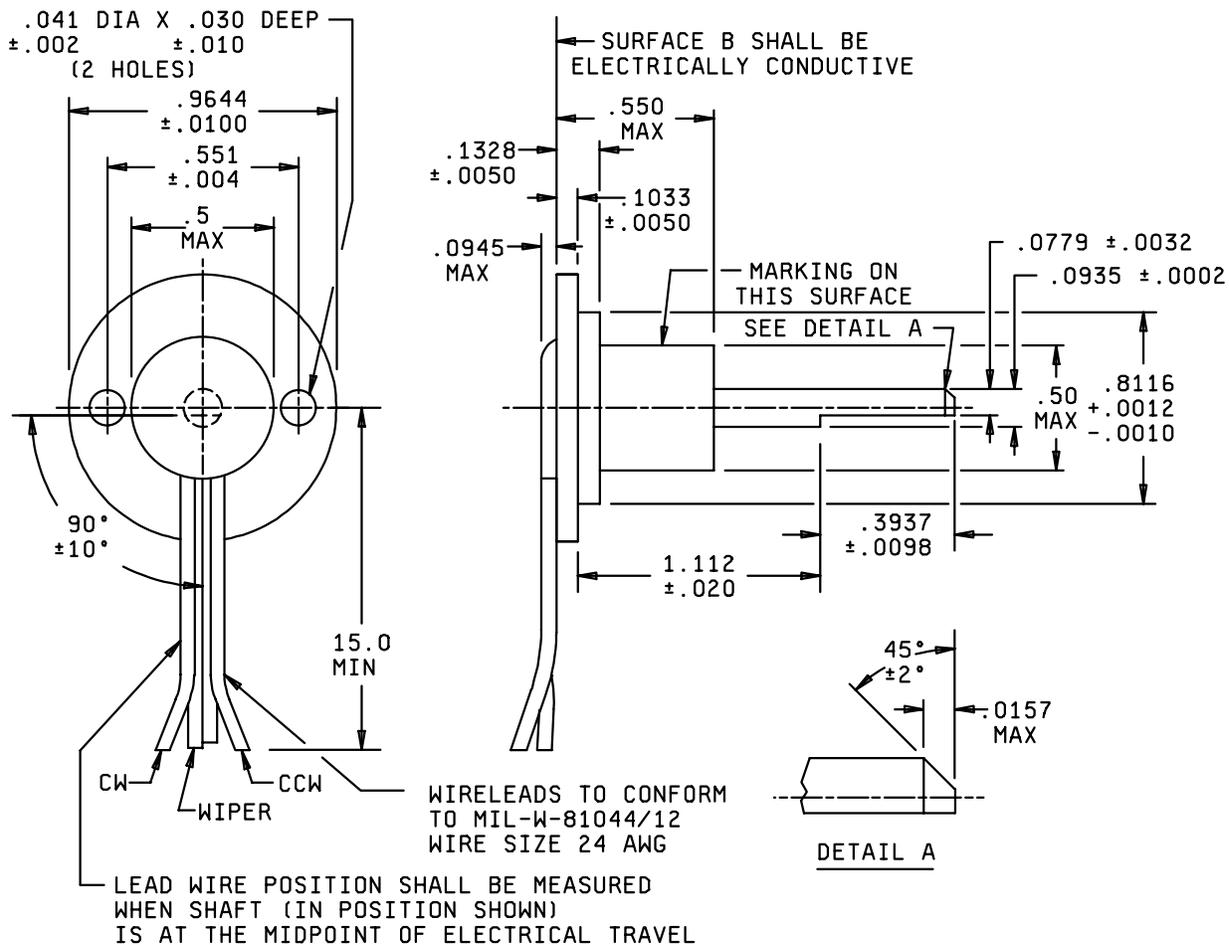
3.6 Electrical overtravel. The electrical overtravel shall be 125 degrees at each end.

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.

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.



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	0.133	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	2.54	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

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

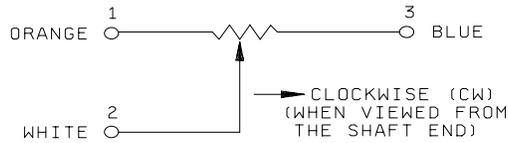


Figure 2. Circuit diagram

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  $-45^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .

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

#### 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 from the resistor body, at 90 degree intervals around the shaft. Measure and record the static contact resistance (8 measurements).

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 than 5 percent or more than 95 percent of the electrical travel at an average of  $120\text{ RPM} \pm 20\text{ RPM}$ . 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.

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 - 4.7.6, 4.7.9.3, 4.7.10, 4.7.15, and 4.7.24.

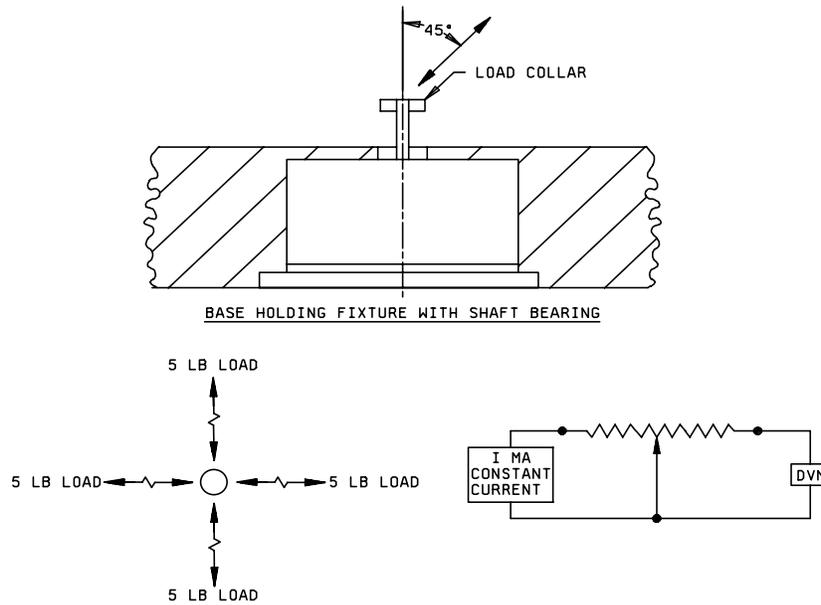


FIGURE 3. Measurement of static contact resistance.

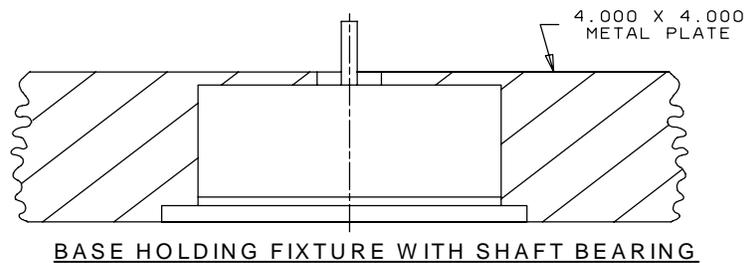


FIGURE 4 Life test mounting fixture.

## 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD 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 Department's System Command. 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 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. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of the individual documents referenced (see 2.1).
- 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 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the change.

### Custodians:

Army - CR  
Navy - EC

### Preparing activity:

DLA - CC

### Review activities

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

(Project 5905-1506-10)