



Pages 1 to 7

# INTERNAL VISUAL INSPECTION OF RESISTORS

**ESCC Basic Specification No. 2044000**

Issue 1	October 2002
---------	--------------



Document Custodian: European Space Agency - see <https://escies.org>

**LEGAL DISCLAIMER AND COPYRIGHT**

European Space Agency, Copyright © 2003. All rights reserved.

The European Space Agency disclaims any liability or responsibility, to any person or entity, with respect to any loss or damage caused, or alleged to be caused, directly or indirectly by the use and application of this ESCC publication.

This publication, without the prior permission of the European Space Agency and provided that it is not used for a commercial purpose, may be:

- copied in whole, in any medium, without alteration or modification.
- copied in part, in any medium, provided that the ESCC document identification, comprising the ESCC symbol, document number and document issue, is removed.



**DOCUMENTATION CHANGE NOTICE**

(Refer to <https://escies.org> for ESCC DCR content)

DCR No.	CHANGE DESCRIPTION

**TABLE OF CONTENTS**

<b>1.</b>	<b><u>SCOPE</u></b>	<b>5</b>
<b>2.</b>	<b><u>GENERAL REQUIREMENTS</u></b>	<b>5</b>
2.1	Applicability	5
2.2	Procedure	5
<b>3.</b>	<b><u>EQUIPMENT REQUIRED</u></b>	<b>5</b>
3.1	Magnification	5
3.2	Mounting Fixtures	5
<b>4.</b>	<b><u>DETAILED REQUIREMENTS</u></b>	<b>5</b>
4.1	General	5
4.2	Fixed Wirewound Resistors	5
4.2.1	Resistance Body	5
4.2.2	Resistance Wire (see Figure 1)	5
4.2.3	Winding	6
4.2.4	Wire Welding	6
4.2.5	Winding-Cap Connection (see Figure 2)	6
4.2.6	Caps and Leads (see Figure 3)	6
<b>5.</b>	<b><u>FIGURES</u></b>	<b>6</b>
5.1	Figure 1: Resistance Wire	6
5.2	Figure 2: Winding-Cap Connection	7
5.3	Figure 3: Caps and Leads	7

## 1. **SCOPE**

This specification, to be read in conjunction with ESCC Basic Specification No. 20400 Internal Visual Inspection, contains additional specific requirements for Resistors.

## 2. **GENERAL REQUIREMENTS**

### 2.1 **APPLICABILITY**

The following criteria may not be varied or modified after commencing any inspection stage. Any ambiguity, or proposed minor deviation, shall be referred to the ESCC Executive for resolution and approval.

### 2.2 **PROCEDURE**

All items shall be examined in such a manner that a minimum of handling and movement of the component is involved.

## 3. **EQUIPMENT REQUIRED**

### 3.1 **MAGNIFICATION**

All items shall be examined with a binocular or stereoscopic microscope adjusted to 4 power (X4) or 5 power (X5) for fixed resistors, wirewound.

### 3.2 **MOUNTING FIXTURES**

Suitable fixtures may be used to assist in the inspection process provided they do not of themselves cause damage to the device.

## 4. **DETAILED REQUIREMENTS**

### 4.1 **GENERAL**

All components shall be inspected prior to any application of coating or moulding. A component shall be rejected if it exhibits one or more of the defects listed in any of the following paragraphs of this Section. Where applicable, drawings have been included to provide additional explanatory material, but they shall be considered as examples only.

### 4.2 **FIXED WIREWOUND RESISTORS**

#### 4.2.1 **Resistance Body**

Holes or cracks in the resistance body.

#### 4.2.2 **Resistance Wire (see Figure 1)**

- (a) Bond or joint in winding,
- (b) Deformations, nicks, cracks,
- (c) Loose wire,
- (d) Broken wire,
- (e) Any abrasion not authorized by the appropriate approved design.

#### 4.2.3 Winding

- (a) Loose winding,
- (b) Uneven spacing between turns of the winding,
- (c) Average winding pitch exceeding five (5) times the wire diameter,
- (d) Effective wire coverage (see Note 1) such that more than 20% of the overall winding area remains uncovered.

#### **NOTES:**

1. The effective wire coverage is the winding length on the body between the points of departure from the normal winding pitch.

#### 4.2.4 Wire Welding

- (a) Length of the welding area (dimension B of Figure 2) less than 1.5 times the wire diameter (ultrasonic bond).
- (b) Lead wire deformed by more than 50% and less than 25% (electrical weld).

#### 4.2.5 Winding-Cap Connection (see Figure 2)

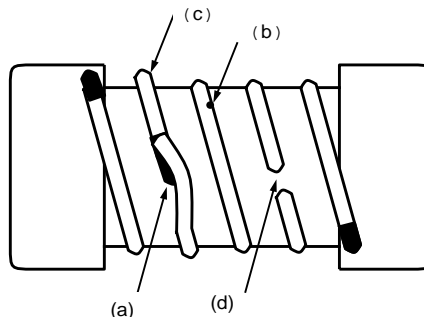
- (a) Changes in direction of wire before or within the welding area.

#### 4.2.6 Caps and Leads (see Figure 3)

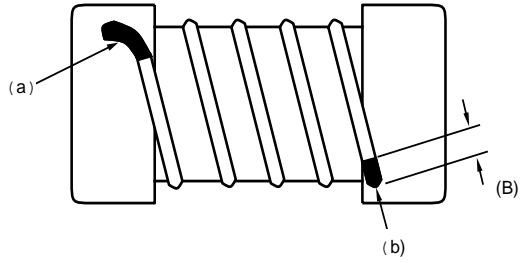
- (a) Burrs on the edges of the caps,
- (b) Either of the cap edges (K) deviating by more than  $5^\circ$  from the edge (B) of the resistance body,
- (c) Any damage to the thermal lead reducing its diameter by more than 10%.

### 5. **FIGURES**

#### 5.1 FIGURE 1: RESISTANCE WIRE



5.2 FIGURE 2: WINDING-CAP CONNECTION



5.3 FIGURE 3: CAPS AND LEADS

