



INTERNAL VISUAL INSPECTION OF ELECTROMECHANICAL SWITCHES

ESCC Basic Specification No. 2043701

Issue 3	February 2014
---------	---------------



LEGAL DISCLAIMER AND COPYRIGHT

European Space Agency, Copyright © 2014. 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
838	Specification upissued to incorporate editorial changes per DCR.

TABLE OF CONTENTS

1	GENERAL	5
2	GENERAL REQUIREMENTS	5
2.1	APPLICABILITY	5
2.2	PROCEDURES	5
2.3	MAGNIFICATION	5
2.4	MOUNTING FIXTURES	5
3	DETAILED REQUIREMENTS	5
3.1	GENERAL	5
3.2	TOGGLE SWITCHES	6
3.2.1	Moveable Contacts	6
3.2.2	Contact on Terminal	6
3.2.3	Terminal Assembly	6
3.2.4	Housing	6
3.3	SENSITIVE SWITCHES	6
3.3.1	Contacts	6
3.3.2	Contacts to Terminal Assembly	6
3.3.3	Contact Alignment	6
3.3.4	Header	7
3.3.5	Housing	7
4	FIGURES	8
4.1	FIGURE 1: TOOL MARKS	8
4.2	FIGURE 2: CONTACT POSITION	8
4.3	FIGURE 3: MISALIGNMENT OF HEADER ASSEMBLY	9
4.4	FIGURE 4: HOUSING: CRACKS IN CRIMPING OF BUSHING	9
4.5	FIGURE 5: HOUSING: INSULATOR ON INTERNAL LEVER	10
4.6	FIGURE 6: CONTACT ALIGNMENT	10
4.7	FIGURE 7: HEADER: BUBBLES	11
4.8	FIGURE 8: ECCENTRICITY	11
4.9	FIGURE 9: GLASS SEAL PROTUBERANCE	12
4.10	FIGURE 10: SPRING POSITION	12
4.11	FIGURE 11: LEVER MISALIGNMENT IN SENSITIVE SWITCH HOUSINGS	13

1 GENERAL

This specification, to be read in conjunction with ESCC Basic Specification No. 20400, Internal Visual Inspection, contains additional requirements for Electromechanical Switches. They shall apply to each device inspected.

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 PROCEDURES

All components shall be submitted to examination immediately prior to sealing or encapsulation, or immediately after decapping, in an area where the standard of cleanliness is not less than that of the assembly area.

All items shall be examined in such a manner that a minimum of handling and movement of the component is involved. During handling of components, lint free gloves/finger cots shall be used.

2.3 MAGNIFICATION

All items shall be examined with a binocular or stereoscopic microscope under a magnification of x1 to x10.

2.4 MOUNTING FIXTURES

Suitable fixtures may be used to assist in the inspection process. They must not themselves cause damage to the device.

3 DETAILED REQUIREMENTS

3.1 GENERAL

A component shall be rejected if it exhibits one or more of the defects listed in any of the following paragraphs of this specification. Where applicable, drawings are included to provide additional explanatory material, but they shall be considered as examples only.

The lot inspected shall be homogeneous. A component shall therefore also be rejected if it exhibits a significant deviation, within the limits of this specification, from the rest of the lot. However, such components shall not be counted as a failure in any other lot definition.

3.2 TOGGLE SWITCHES

3.2.1 Moveable Contacts

- (a) Tool marks on the active area of the contact (see Figure 1).
- (b) Scratches or visible damage.
- (c) Corrosion.
- (d) Loosening of contact rivet.
- (e) Contact position (see Figure 2).

3.2.2 Contact on Terminal

- (a) Tool marks.
- (b) Scratches or visible damage.
- (c) Corrosion.
- (d) Loosening of contact rivet,
- (e) Contact position (see Figure 2).
- (f) Excessive deformation of terminals.

3.2.3 Terminal Assembly

- (a) Internal misalignment of terminals greater than 1mm (see Figure 3).

3.2.4 Housing

- (a) Uncleanliness of housing.
- (b) Dust or rust particles on inside surfaces.
- (c) Marks, burrs on edges.
- (d) Deformation by dents.
- (e) Incorrect position of mounting bushing.
- (f) Incorrect crimping of bushing (see Figure 4).
- (g) Incorrect assembly of insulator on lever (see Figure 5).

3.3 SENSITIVE SWITCHES

3.3.1 Contacts

- (a) Tool marks on the active area of the contact (see Figure 1).
- (b) Scratches or visible damage.
- (c) Corrosion.
- (d) Loosening of contact rivet.
- (e) Contact position (see Figure 2).

3.3.2 Contacts to Terminal Assembly

- (a) Unflattened weld projections.
- (b) Burnt weld.
- (c) Weld flash.
- (d) Excessive deformation of contacts.
- (e) Excessive deformation of terminal.

3.3.3 Contact Alignment

- (a) Incorrect contact alignment (see Figure 6).

3.3.4 Header

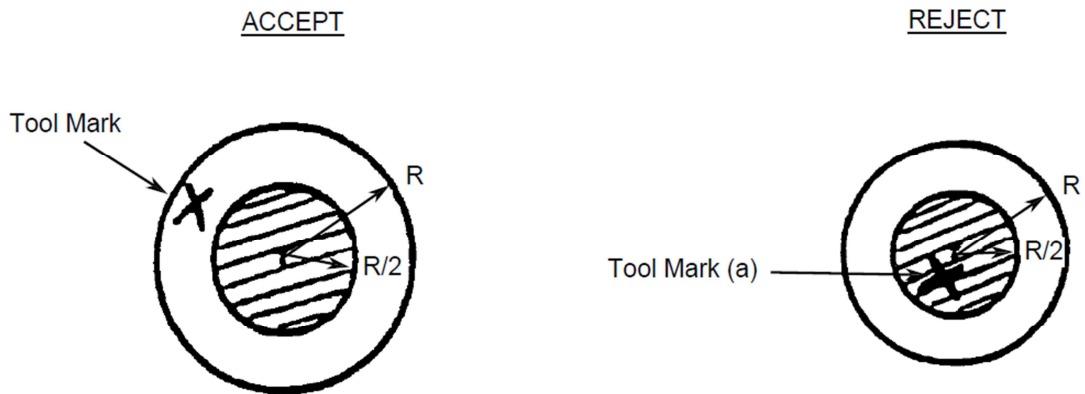
- (a) Wicks, dents on periphery of header, where the can is tungsten-inert gas, electron beam, laser beam or spot-welded.
- (b) Blistering or flaking of gold or nickel plating.
- (c) Metal shavings on the flange or side of the header longer than the width of the flange.
- (d) Bent or deformed flanges.
- (e) Grease, varnish, ink or similar stain on the flange or side of the header.
- (f) Any conductive material overlapping the glass seal.
- (g) Cracked or chipped glass seal, except meniscus cracks located within one-half of the distance between the lead and the header.
- (h) Non-uniformity of finish of lead or pillar, particularly at the glass seal.
- (i) Nicks or bulges in the wire diameter outside stated lead tolerance.
- (j) Bubbles or an area of adjacent bubbles in the seal area larger than 12.5% of the seal area (see Figure 7).
- (k) Foreign particles embedded in the glass seal.
- (l) Eccentricity of lead passing through the centre of the glass-to-metal seal greater than 10% of the seal diameter (see Figure 8).
- (m) Terminal bent by more than 5°.
- (n) Glass seal, or other non-conducting material, protruding above header along terminal by more than 0.5mm (see Figure 9).
- (o) Incorrect spring position (see Figure 10).
- (p) Re-entrant seals which exhibit nonuniform wicking (negative meniscus) at the lead or header interface, or both.
- (q) Evidence of corrosion.

3.3.5 Housing

- (a) Uncleanliness of housing.
- (b) Dust or rust particles on inside surfaces.
- (c) Marks, burrs on edges.
- (d) Dents.
- (e) Deformation exceeding 0.2mm, except on membranes.
- (f) Any deformation by shock on the membranes.
- (g) Granular brazing alloy.
- (h) Internal lever misalignment, if applicable (see Figure 11).
- (i) Evidence of corrosion.

4 **FIGURES**

4.1 **FIGURE 1: TOOL MARKS**



Cause for rejection

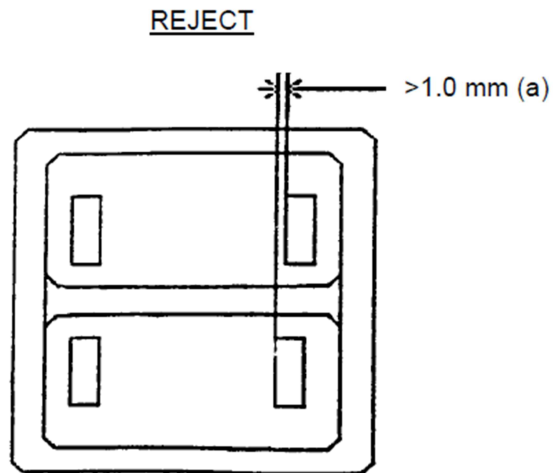
(a) Tool marks on the active (shaded) area of the contact.

4.2 **FIGURE 2: CONTACT POSITION**



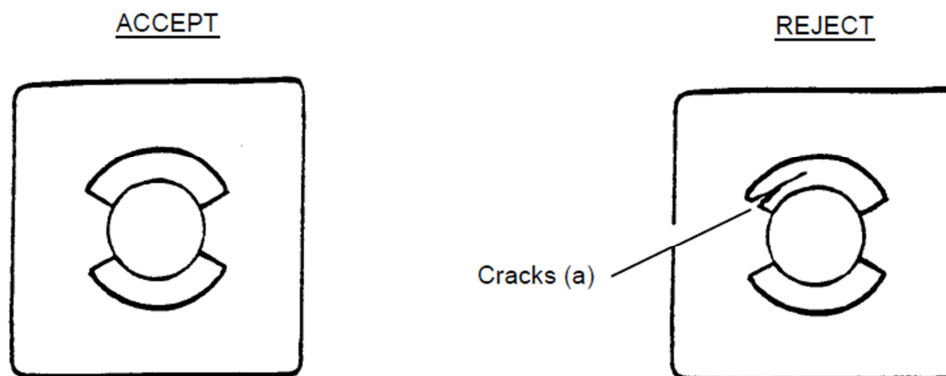
Cause for rejection

(a) Inadequate contact setting.

4.3 FIGURE 3: MISALIGNMENT OF HEADER ASSEMBLY

Cause for rejection

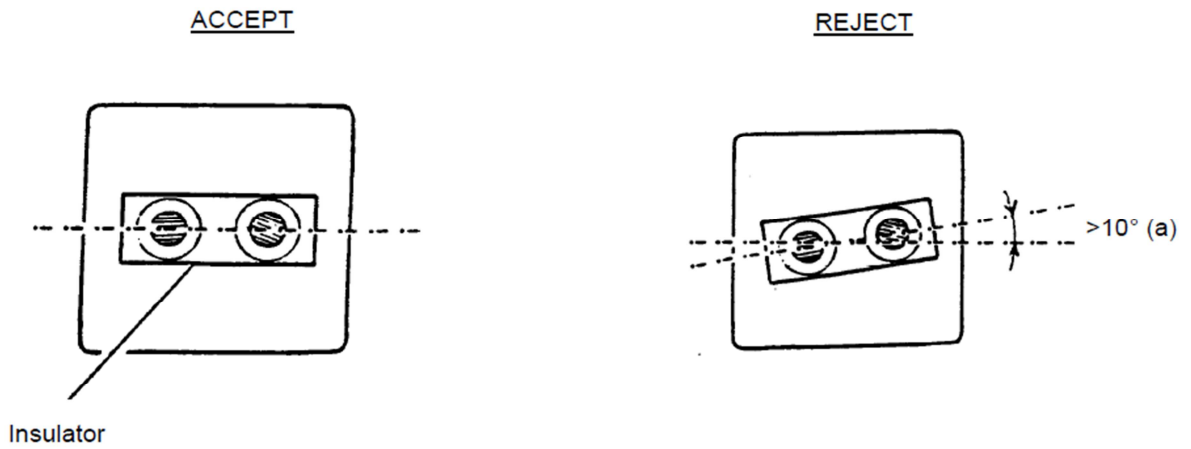
- (a) Internal misalignment of terminals.

4.4 FIGURE 4: HOUSING: CRACKS IN CRIMPING OF BUSHING

Cause for rejection

- (a) Cracks - it should be noted that tool marks are acceptable.

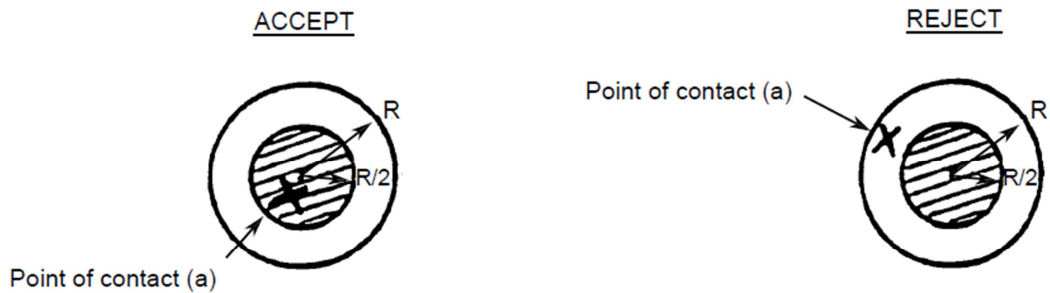
4.5 FIGURE 5: HOUSING: INSULATOR ON INTERNAL LEVER



Cause for rejection

- (a) Incorrect assembly of insulator on internal lever.

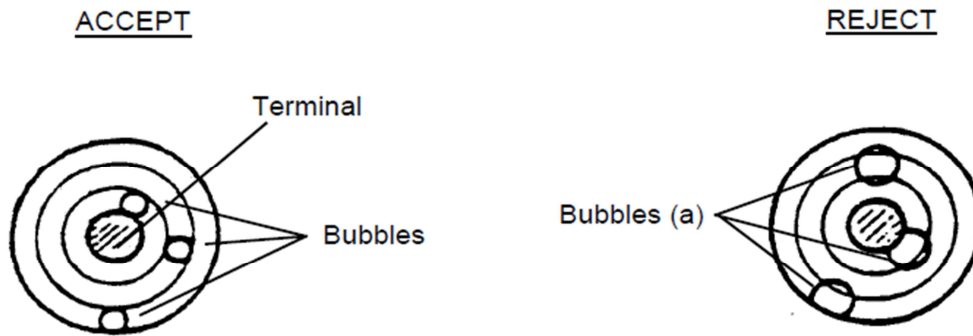
4.6 FIGURE 6: CONTACT ALIGNMENT



Cause for rejection

- (a) Point of contact out of the active area.

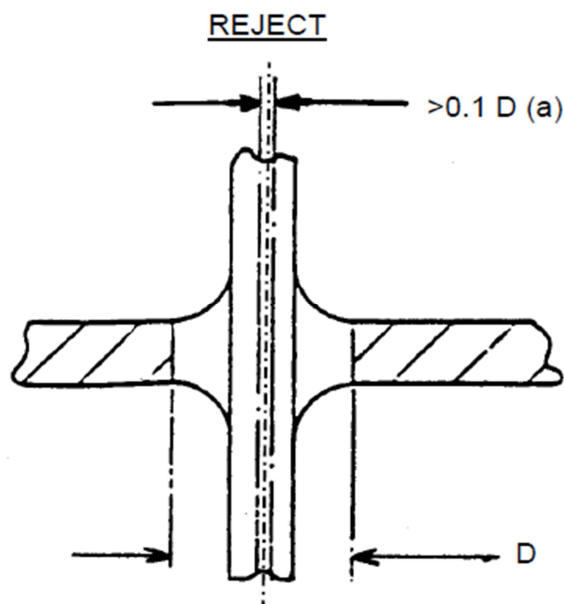
4.7 FIGURE 7: HEADER: BUBBLES



Cause for rejection

- (a) Bubbles or an area of adjacent bubbles in a glass seal whose area exceeds 12.5% of the seal area.

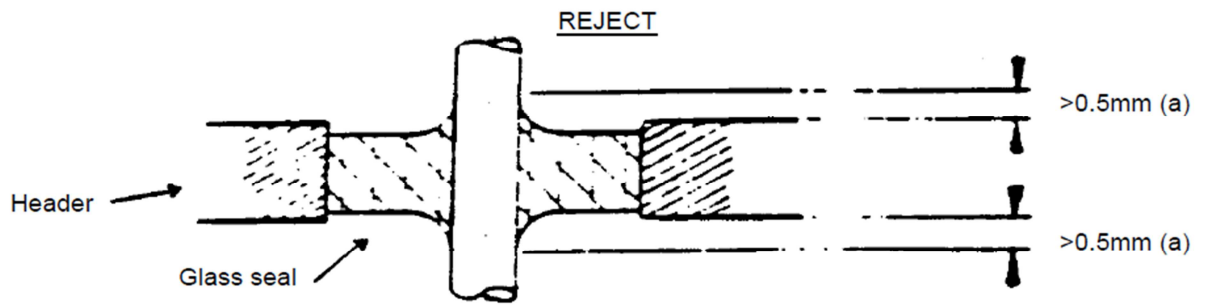
4.8 FIGURE 8: ECCENTRICITY



Cause for rejection

- (a) Eccentricity of terminal, passing through centre of seal, greater than 10% of the seal diameter.

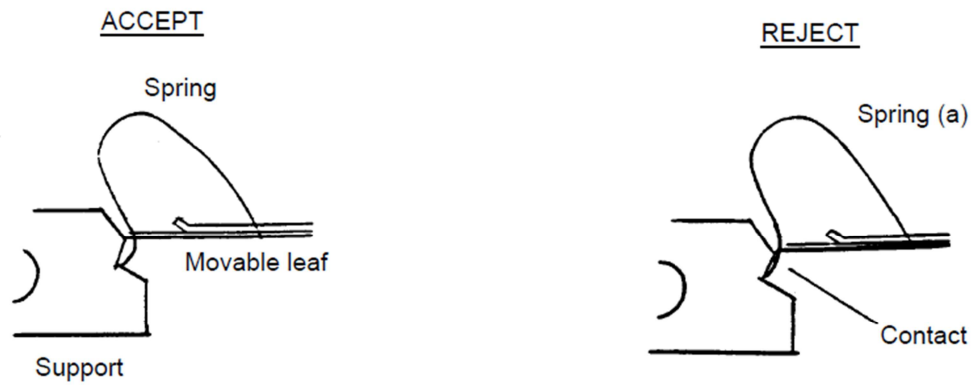
4.9 FIGURE 9: GLASS SEAL PROTUBERANCE



Cause for rejection

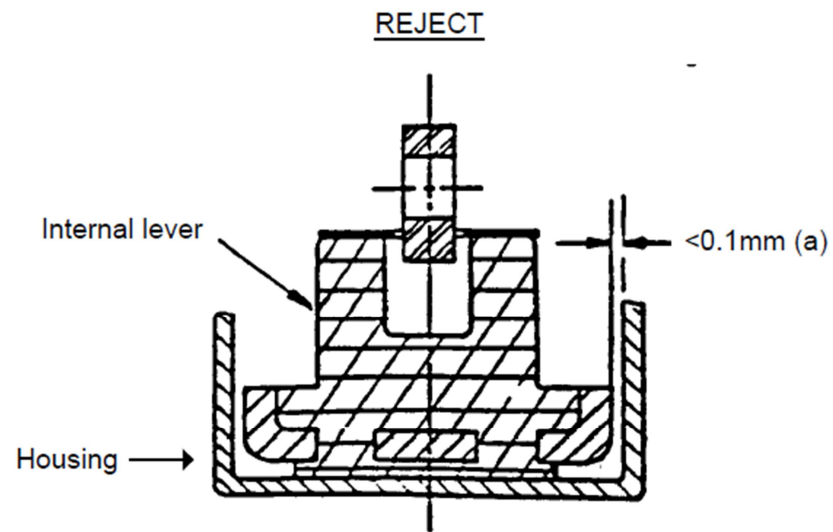
- (a) Non-conductive material on the terminal beyond a distance of 0.5mm from surface of the case.

4.10 FIGURE 10: SPRING POSITION



Cause for rejection

- (a) Incorrect spring position.

4.11 FIGURE 11: LEVER MISALIGNMENT IN SENSITIVE SWITCH HOUSINGS

Cause for rejection

(a) Internal lever misalignment.