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agence spatiale européenne

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**EXTERNAL VISUAL INSPECTION OF
ELECTROMECHANICAL SWITCHES
ESA/SCC Basic Specification No. 2053701**



**space components
coordination group**

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SCC

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1. SCOPE

This specification, to be read in conjunction with ESA/SCC Basic Specification No. 20500, 'External 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 Qualifying Space Agency 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. During handling of components, lint free gloves/finger cots shall be used.

2.3 MAGNIFICATION

All items shall be examined using a binocular or stereoscopic microscope with 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.

The external visual inspection includes the verification of:

- Dimensions.
- Marking.
- Materials.
- Mechanical Defects.

3.2 DIMENSIONS AND MARKING

Dimensions and marking shall be inspected in accordance with the requirements of ESA/SCC Basic Specification No. 20500, Paras. 4.6 and 4.7.

All letters and numbers shall be clearly legible without the use of optical resources.

Dimensional tolerances, including those of pin diameter and pin spacing, shall be as specified in the relevant ESA/SCC Detail Specification.



3.3 MATERIALS

The materials used shall be verified for conformance to the requirements of the applicable ESA/SCC Detail Specification. The production records shall be checked to ensure that the specific material requirements are met.

3.4 TOGGLE SWITCHES

3.4.1 Cases

- (a) Faulty or damaged fixation of metal frame to plastic case (see Figure I).
- (b) Cracks in the rivet joint of lever axle (see Figure II).
- (c) Damaged thread or damaged keyway which prevents from satisfactory mounting (see Figure III).
- (d) Protruding burr greater than 0.4mm.
- (e) Potting compound on case (except bottom).
- (f) Evidence of corrosion.

3.4.2 Feedthroughs

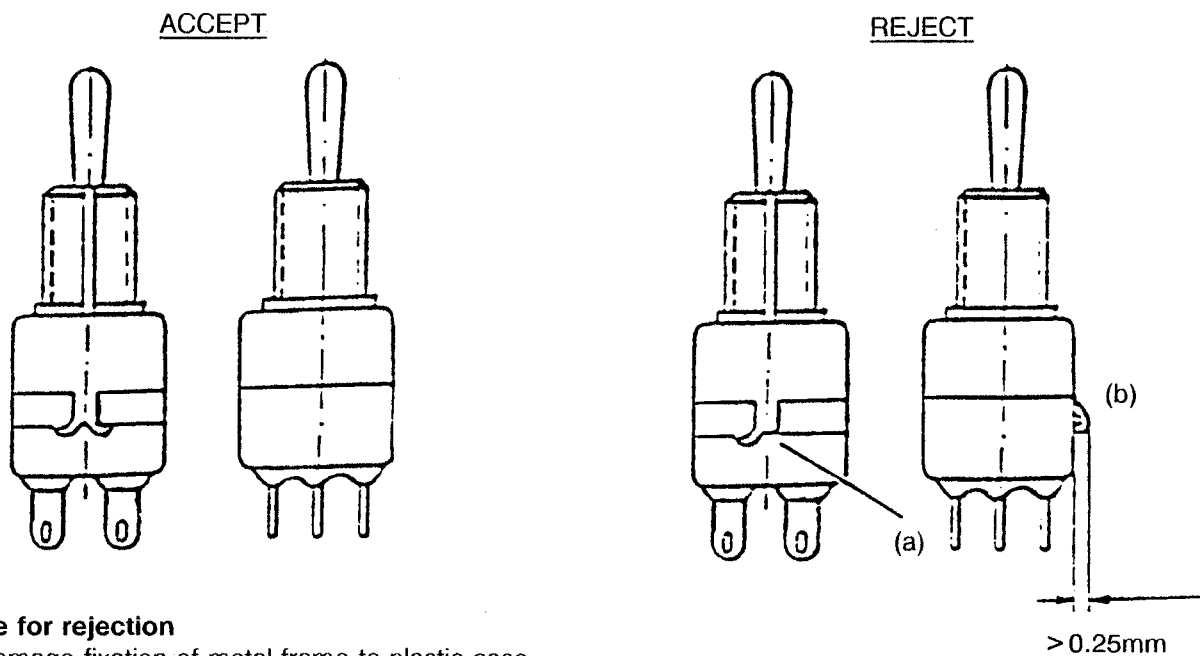
- (a) Terminal to case connection not completely covered by potting compound (see Figure IV).
- (b) Chip-outs in the potting compound.
- (c) Terminal tilted by more than 7°.

3.4.3 Terminals

- (a) Nicks, gooves, or imprints reducing the terminal dimension in width or thickness by more than 20% of the relevant size. (see Figure VI).
- (b) Terminals bent by more than 7° (see Figure V).
- (c) Potting compound or other non-conductive material covers more than 2.0mm of the terminal (see Figure V).
- (d) Terminals twisted by more than 10°.
- (e) Protruding burr greater than 0.2mm.
- (f) Evidence of corrosion.
- (g) Exposed base material in excess of 5.0% of the surface area anywhere on the lead, beyond a distance of 1.5mm from the case.



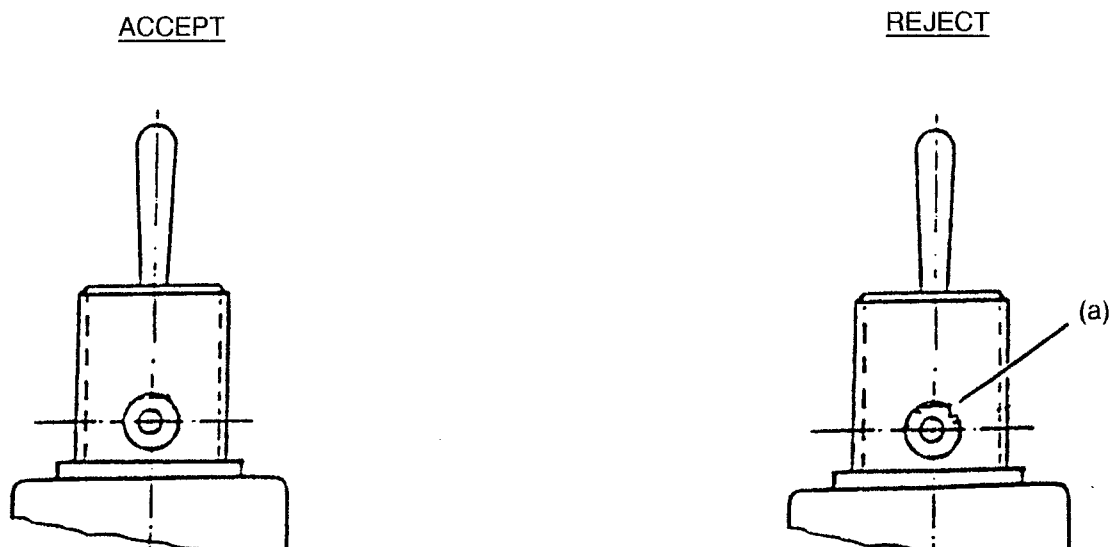
FIGURE I - FIXATION OF METAL FRAME TO PLASTIC CASE



Cause for rejection

- (a) Damage fixation of metal frame to plastic case.
- (b) Faulty fixation of metal frame to plastic case.

FIGURE II - CRACKS IN THE RIVET JOINT OF LEVER AXLE

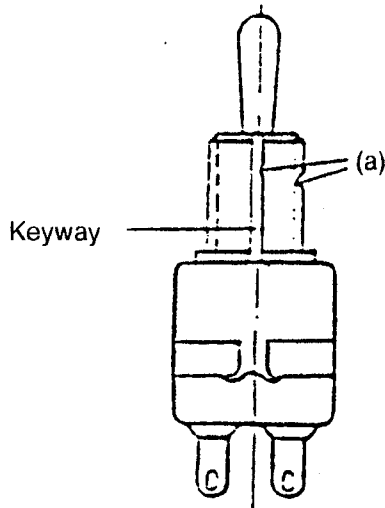


Cause for rejection

- (a) Cracks.



FIGURE III - DAMAGED THREAD OR DAMAGED KEYWAY

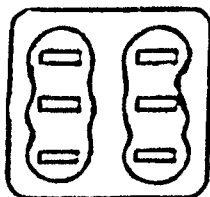


Cause for rejection

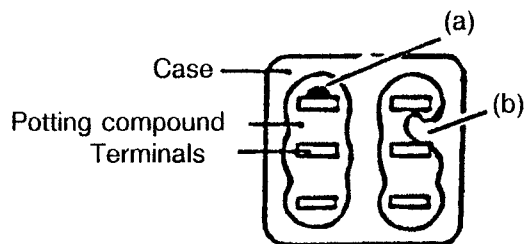
(a) Damaged thread or damaged keyway which prevents satisfactory mounting.

FIGURE IV - TERMINAL TO CASE CONNECTION

ACCEPT



REJECT



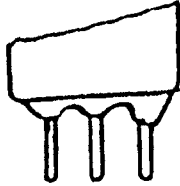
Cause for rejection

(a) Voids.
(b) Incomplete filling with the potting compound.

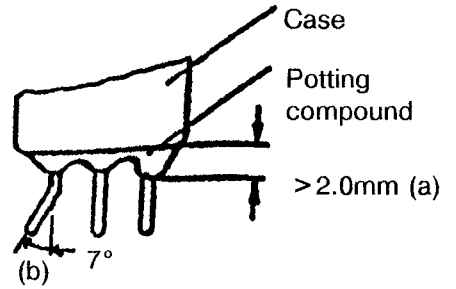


FIGURE V - NON-CONDUCTIVE MATERIAL ON TERMINALS AND BENT MATERIALS

ACCEPT



REJECT

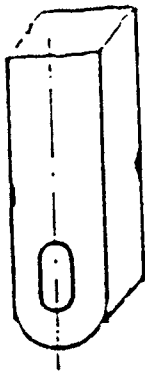


Cause for rejection

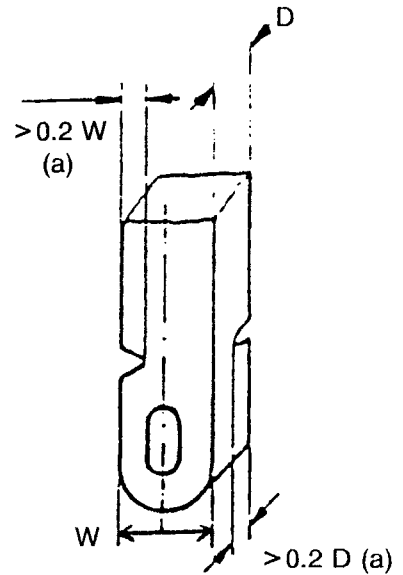
- (a) Non-conductive material on the terminal beyond a distance of 2.0mm for potting seal.
- (b) Terminal bent by more than 7°.

FIGURE VI - REDUCTION ON TERMINALS

ACCEPT



REJECT



Cause for rejection

- (a) Reduction of more than 20% in terminal width or thickness.



3.5 SENSITIVE SWITCHES

3.5.1 Housing

- (a) Dents on or deformation of the membrane.
- (b) Deformation by shock exceeding 0.2mm.
- (c) Marks, burrs, dents on the welding joints.
- (d) Misalignment of lever.
- (e) Twisted lever (see Figure VII)

If applicable:

- (f) Evidence of corrosion.
- (g) Dents on the roller.
- (h) Incorrect position of the keyway.
- (i) Damaged thread or damaged keyway which prevents satisfactory mounting.

3.5.2 Header

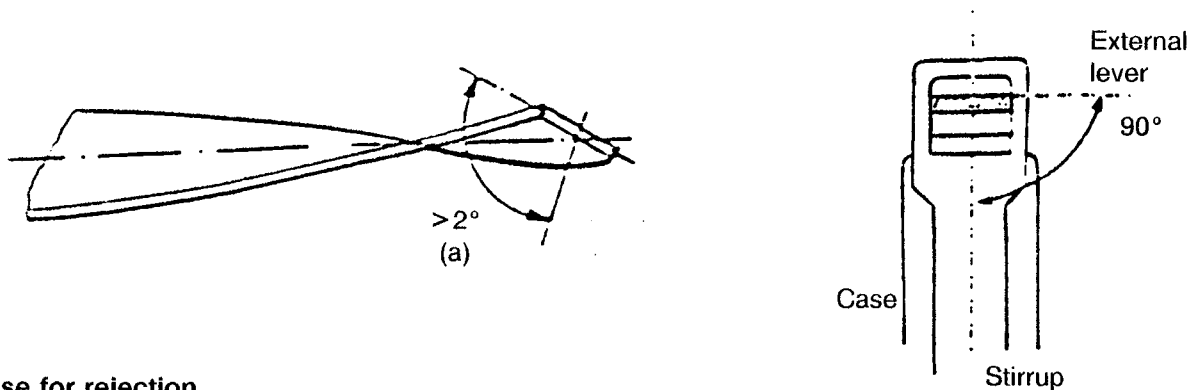
- (a) Open bubbles in the glass seal.
- (b) Foreign particles embedded in the glass seal.
- (c) Cracked or chipped glass seal.

3.5.3 Terminals

- (a) Residual terminal width smaller than 0.2mm (see Figure VIII).
- (b) Protruding burr greater than 0.2mm (see Figure IX).
- (c) Non-conductive material covers more than 2.0mm of the terminal.
- (d) Terminals twisted by more than 10°.
- (e) Terminals bent by more than 7°.
- (f) Evidence of corrosion.
- (g) Exposed base material in excess of 5.0% of the surface area anywhere on the lead, beyond a distance of 1.5mm from the case.



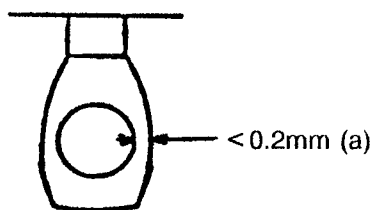
FIGURE VII - TWISTED LEVER



Cause for rejection

- (a) Lever twisted by more than 2°.

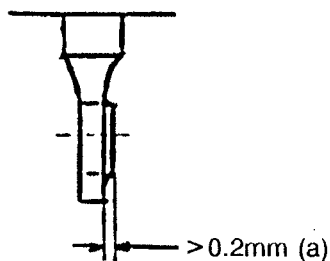
FIGURE VIII - HOLE IN TERMINALS



Cause for rejection

- (a) Eccentricity of hole passing through the terminal, width of remaining material less than 0.2mm.

FIGURE IX - BURR ON TERMINALS



Cause for rejection

- (a) Protruding burr of hole greater than 0.2mm.