



EXTERNAL VISUAL INSPECTION OF QUARTZ CRYSTAL UNITS

ESCC Basic Specification No. 2053501

Issue 2	February 2014
---------	---------------



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

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	SCOPE	5
2	GENERAL REQUIREMENTS	5
2.1	APPLICABILITY	5
2.2	PROCEDURE	5
2.3	MAGNIFICATION	5
2.4	MOUNTING FIXTURES	5
3	DETAILED REQUIREMENTS	5
3.1	GENERAL	5
3.2	DIMENSIONS AND MARKING	5
3.3	MATERIALS	6
3.4	LEAD CONDITIONS	6
3.5	LEAD CONFIGURATION	6
3.6	CASE DEFECTS	6
3.6.1	Quartz Crystal Units in Glass Envelopes	6
3.6.1.1	Glass-filled Cases	6
3.6.1.2	Face of the Glass Envelope through which the Leads Pass	6
3.6.1.3	Other Faces (if visible)	6
3.6.2	Quartz Crystal Units in Metal Cases	7
3.7	CASE OR PACKAGE SEALING	7
3.8	CASE CONCENTRICITY	7
3.9	FOREIGN PARTICLES	7
4	FIGURES	8
4.1	FIGURE 1: OFF-CENTRE LEADS	8
4.2	FIGURE 2: LEAD TILT	8
4.3	FIGURE 3: CASE CONCENTRICITY	9

1 **SCOPE**

This specification, to be read in conjunction with ESCC Basic Specification No. [20500](#), External Visual Inspection, contains additional requirements for Quartz Crystal Units.

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.

2.3 **MAGNIFICATION**

All items shall be examined with a binocular or stereoscopic microscope under a magnification of at least X7.

2.4 **MOUNTING FIXTURES**

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

3 **DETAILED REQUIREMENTS**

3.1 **GENERAL**

A unit shall be rejected if it exhibits one or more of the defects listed in any of the following paragraphs. Where applicable, drawings are included to provide additional explanatory material.

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 ESCC Basic Specification No. [20500](#).

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 ESCC Detail Specification.

3.3 MATERIALS

The materials used shall be verified for conformance to the requirements of the applicable ESCC Detail Specification.

The production records shall be checked to ensure that the specified material requirements are met.

3.4 LEAD CONDITIONS

- (a) Base material, exposed by chipped glass meniscus, in excess of lead diameter or thickness.
- (b) Exposed base material anywhere on the lead within a distance of 20mm of the case, other than that caused by (a).
- (c) Exposed base material more than 5% of the surface area anywhere on the lead, beyond a distance of 20mm from the case.
- (d) Non-conductive material on the lead beyond a distance of 1.5mm from the case.
- (e) Reduction of more than 10% in lead diameter, width or thickness, within 20mm of the case.
- (f) Nicks, fractures, non-uniformity or discolouration of coating or abrasions exposing base material.

3.5 LEAD CONFIGURATION

- (a) Configuration of pin count and style in accordance with the relevant ESCC Detail Specification.
- (b) Round leads, twisted more than 1 revolution along the length, or flat leads, twisted more than 10° per 10mm of length.
- (c) Leads kinked, or bent and rebent, within 20mm of the case.
- (d) Leads deviating from the specified direction by more than 1mm per any 5mm of length.
- (e) The minimum distance between the lead and the body shall be 0.13mm (See Figure 1 Para. 4.1).
- (f) Lead tilted by more than 5° (see Figure 2 Para. 4.2).

3.6 CASE DEFECTS

3.6.1 Quartz Crystal Units in Glass Envelopes

3.6.1.1 *Glass-filled Cases*

Filling protruding beyond the level of the case flange.

3.6.1.2 *Face of the Glass Envelope through which the Leads Pass*

- (a) Single bubbles, whose diameters exceed 7.5% of the minor dimension of the face or 0.5mm, whichever is less.
- (b) A localised area of bubbles, which cannot be separated from each other or whose spatial distribution cannot be determined.
- (c) Cracks.
- (d) Embedded foreign material.
- (e) Surface chips.

3.6.1.3 *Other Faces (if visible)*

- (a) Single bubbles, whose diameters exceed 1mm.
- (b) A localised area of bubbles, which cannot be separated from each other or whose spatial distribution cannot be determined.
- (c) Cracks.
- (d) Embedded foreign material.
- (e) Surface chips.

3.6.2 Quartz Crystal Units in Metal Cases

- (a) Cracks or chips in glass seals.
- (b) Bubbles or an area of adjacent bubbles in the seal area larger than 12.5% of the seal area.
- (c) Foreign particles enclosed in the glass seal.
- (d) Burrs and sharp edges not removed from metal parts.
- (e) Corroded metal.
- (f) Soiled or dented metal.
- (g) Scratches in finish exposing base metal.

3.7 CASE OR PACKAGE SEALING

- (a) Lack of solder continuity around the entire perimeter of the case or solder protruding beyond the edge of the case.
- (b) Soldering fluxes and their residues not removed after soldering.
- (c) Weld: spatters, lack of uniformity or continuity of weld.
- (d) Reduction by more than 30% of the design sealing area due to undercutting of sealing material or misalignment of case parts.

3.8 CASE CONCENTRICITY

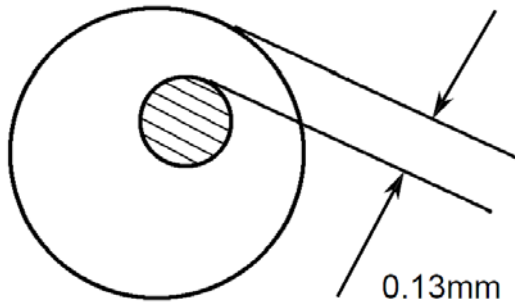
- (a) Minimum clearance between case perimeter and header perimeter is less than 70% of the maximum clearance (see Figure 3 Para. 4.3).
- (b) Incorrect mounting of holder cover onto base.

3.9 FOREIGN PARTICLES

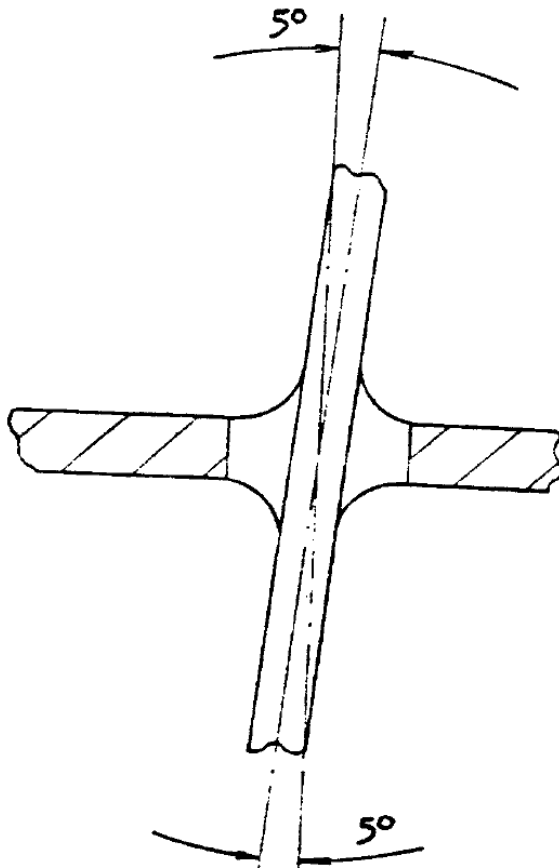
Loose solder or other foreign particles in quartz crystal unit (to be inspected by shaking the unit).

4 **FIGURES**

4.1 **FIGURE 1: OFF-CENTRE LEADS**



4.2 **FIGURE 2: LEAD TILT**



4.3 FIGURE 3: CASE CONCENTRICITY

