DOCUMENT CHANGE REQUEST

DCR number 1120	Changes required for: General	Originator: Steve Thacker
Date: 2018/02/26	Date sent: 2017/11/17	Organisation: ESCC Executive Secretariat
Status: IMPLEMENTED		

Title:	Generic Specification for Switches Thermostatic Bimetallic Hermetically Sealed.		
Number:	3702	Issue:	4

Other documents affected:

Page:

Total reformat/re-write of ESCC Generic Specification 3702 issue 4 as part of the ongoing conversion of legacy ESA/SCC specifications to the ESCC format.

Paragraph:

All

Original wording:

See ESCC 3702 issue 4

Proposed wording:

The Generic Specification is proposed to be extensively amended to incorporate various policy, technical & editorial amendments & corrections in order to bring it in line with other ESCC Generic Specifications that have already been converted to the new ESCC format plus to implement specific changes requested by the single ESCC Qualified Manufacturer who actively supports procurement against this specification, Comepa.

The layout, format and general structure, and editorial content of ESCC 3702 draft 5 are based on other published, converted ESCC Generic Specifications such as ESCC 5000, 9000, 4001, 3001, etc.

The proposed technical content of 3702 draft 5 is based on the current content of ESCC 3702 issue 4 plus additional changes proposed for the purposes of general improvement and technical change.

This DCR summarises all the amendments to ESCC 3702 issue 4, plus identifies the additional technical changes not already generally detailed and justified by previous, approved DCRs related to conversion of other ESCC Generic Specifications.

For full details of the proposed contents of ESCC 3702 issue 5, see the attached draft Generic specification ESCC 3702 Draft 5 that implements all the proposed changes.

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Change Details:

A) Main General Changes (similar to those already incorporated into other converted ESCC generic specifications e.g. ESCC5000, etc, including rewording and restructure of various sections, paragraphs and Charts of the specification, plus

other editorial changes based on the layout and editorial content of other Generic Specifications already converted to ESCC format):

1) Chart I, The General Flow Chart is replaced by Chart F1; It clarifies the flow of components for Procurement.

2) Para. 5, Charts II & III have been replaced by Chart F2 Production Control & Chart F3, Screening Tests.

3) Charts IV & V, Qualification and Lot Acceptance Testing charts have been incorporated, with some modifications, into a single Chart F4, Qualification, Periodic Testing and Lot Validation Testing. The tests included in Chart F4 are based on a mix of qualification and LAT level 1 requirements.

Modifications include:
• Periodic testing is mandatory for ESCC qualified components with a defined testing schedule (i.e. 24 months for Endurance Subgroup (*) and 24 months for all other testing).
Note *: The 24 months for the Endurance Subgroup is specifically proposed by Manufacturer Comepa as an addition to this DCR.

• Para 8.2 & Chart V, etc, Lot Acceptance Testing has been deleted but an Orderer option for similar Lot Validation Testing, for procurement, has been added. Lot Validation Testing is not mandatory and will only be done if specifically stipulated by the Orderer in the PO.

• Para 8.2.1, The requirement for LAT level 3 as a minimum for non-qualified component procurement is removed.

• No failures are allowed during Chart F4 testing.

• Sampling for the subgroups in Chart F4 is based on both Chart IV & Chart V sampling as applicable to Qualification Testing and to Periodic Testing for renewal of qualification after lapse, or Periodic Testing for extension of qualification, respectively (with some specific changes proposed by Comepa; see item 47 below).

4) Para 1.2, etc, Introduction of Technology Flow Qualification per ESCC No. 25400 to the Generic spec.

5) Para 1.2, etc, Introduction of ESCC 23100 (ESCC Recommendations on the use of the ESCC Specification System for the Evaluation and Procurement of Unqualified Components) to the generic spec.

6) Para 1.2, etc, The Generic Specification has been made applicable and fully usable for procurement of unqualified components as well as its main function covering ESCC Qualified components.

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7) Para 2.1, etc, Clarification that the term PID is specific to ESCC qualified components.

8) Para 2.1 & 4.5, Material outgassing reference document is corrected to be ESCC No. 22600 (not “ECSS-Q-70-02”). Material restrictions per ESCC No. 22600 are specified.

9) Para 4.1, 4.3, 4.3.2, Chart I, Chart III, etc, The legacy SCC testing levels B and C have been deleted; there is now only a single ESCC testing level, equivalent to old SCC level B, but it is not given a specific designation. All mention of and requirements applicable to ESCC level C are deleted.

10) Para 4.3, When using the ESCC System to procure components from an unqualified source and marking the parts with the ESCC component number, the Manufacturer should possess a manufacturing and quality assurance system that is compatible with space application. As such, the user expectation should be that parts would be compatible with passing the testing requirements of Chart F4. Accordingly the requirement placed on qualified sources to not knowingly supply components that cannot meet the Chart F4 testing is extended to unqualified sources.

11) Para 4.3.1, the maximum allowed delay for Lot failure notification (provided by the Manufacturer) is now 5 working days (was 2).

12) Para 4.4, Marking requirements per ESCC No. 21700 shall apply.

13) Para 5 & Chart F2, Production Control/Special In-Process Controls, replace Paras 5 & 6 and Chart II.
Redundant tests in Chart II are removed (i.e. optional Seal test; plus the Electrical Measurements test is moved to the end of Chart F3 (i.e. after run-in) (Thermal Measurements are retained in Chart F2).

14) Para 9.4 & Chart II, Dimension Check is performed on 3 samples instead of 5.

15) Para 10.1.2, 10.1.3, The minimum required delivered documentation to the customer for procurement is a Certificate of Conformity & a Cover sheet.

B) Other Technical Changes (specific to ESCC 3702):

16) Para 2.1 & 2.2:
Reference documents that are not actually referenced in 3702 are removed,

i.e. ESCC 20900, IEC No. 60389-1, IEC No. 60410, ECSS Q-70-02.

ESCC 22600, 23100, 25400 are added.

17) Para 3 & 9.5.1, definitions are moved to Para 3. Definitions are amended and added to.
e.g.: “Operating Temperature” is amended to be called “Functioning Temperature” (clarification as proposed by Manufacturer Comepa)

18) Para 4.1.5:
Precap inspection notice is amended to be as stipulated in the PO (was 2 working weeks)
Final Customer Source Inspection is added as an option for the Orderer.

19) Para 5.2:
Weight requirements are added (to Para 5.2.4 & Chart F2).

20) Para 7.4.1,
The PDA requirements are modified to allow up to 2 failures for lot quantity 10 and less (was 1 maximum) (10% PDA still applies otherwise)

Para amended to clarify that seal failures do not count towards PDA plus the PDA is based on the quantity tested after initial measurements of Parameter Drift Values, during Rapid Change of Temperature in Chart F3.

21) Para 8.1.2,
The distribution of test samples within the Qual test lot is amended and clarified.

Reference to grade 1 is removed (as grade 1 is undefined) and replaced by the equivalent: “ … components with … the narrowest actual temperature differential limits, Act Diff .. “ (in new para 7.1.2)

22) Para 8.2.2, the definition of the samples used for qualification maintenance (via Periodic testing) is made independent from the sampling for Qualification (per Para 8.1.2) (as requested by Manufacturer Comepa to provide flexibility during qualification maintenance to allow selection of alternate samples as available at that time, yet still need to be agreed with the ESCC Executive).

23) Para 8.3.2, 9.5.1, 10.8:
The term ‘thermal’ is added to electrical i.e. ‘thermal and electrical measurements’ (to clarify & be consistent with the actual requirements that apply).

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24) Para 9.2, Seal Test
External cleaning note in (a) (test Qk) is deleted (as it is already included in the IEC test method).

25) Para 9.5.1.1(a) & 9.5.1.2, Voltage Proof & Insulation Resistance
'ground is replaced by 'case'

26) Para 9.5.1.1 & 9.5.1.2, Voltage Proof & Insulation Resistance
Duration 5s is applied during screening (not LAT); 60s is applied during qualification & MoQ (periodic testing) (not 5s for LAT)

27) Para 9.5.1.4, Thermal Measurements
A temperature soak for 3 minutes at both T2 and T3 is specified (based on Figure I).

28) Para 9.5.4, Electrical and Thermal Measurements
This test (i.e. Table 2) is limited to Chart F2 & F3 (it is no longer used in Chart F4).
Para 9.5.4 is spilt into 2 Paras: Thermal Measurements, and Electrical Measurements (i.e. new Paras 8.2.2 & 8.2.3)

29) Para 9.5.5, Electrical and Thermal Measurements during Endurance Testing
This test (Table 6 = Intermediate and End-Point Thermal and Electrical Measurements) applies to other tests in Chart F4 where thermal measurement and/or electrical measurements are required (no longer just for Operating life) (as is already specified in Detail Spec 3702/001 issue 5).

30) New Para 8.2.6 "Thermal and Electrical Measurements (during Qualification, Periodic Testing and Lot Validation Testing)" is added to reflect the individual "Thermal and Electrical Measurements" test box at the end of the various subgroups in Chart F4.

31) Para 9.6, Creepage
A temperature soak for 3 minutes at T1 and T4 is specified (based on Figure II).

32) Para 9.8, Response Time
An optional initial measurement of TF is added (i.e. Screening results may be used instead).
B1 period is amended to be 10 minutes (was 5 mins minimum) (based on Figure IV).
B0 duration is specified a 1 minute minimum (previously unspecified) (for clarification)

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33) Para 9.9, Rapid Change of Temperature
For Chart F3: The final measurements during screening are removed (they will be performed subsequent to Run-in)

For Chart F4: An optional initial measurement is added for the Qualification Chart F4 test (i.e. Screening results may be used instead).
The final electrical and thermal measurements are deleted (now to be performed at the end of the Chart F4 test subgroup 1A after Seal test)

34) Para 9.10.2 & 9.10.3 Vibration
The sample is split 50/50 between the 2 test temperatures (the duration in each axis is not split)
The contact loading is copied from the Shock test (previously unspecified)

The duration of the test is changed to be 1 hour in each of the 3 axes (was 2 hours)
Note: this is proposed by Manufacturer Comepa in order to reduce the time taken for testing based on their experience where any failure will occur early into Vibration testing, e.g. within a few minutes of starting the test, and where the limit for testing is the vibration level and frequency, not the test duration.

35) Para 9.11, Shock
The sample is split 50/50 between the 2 test temperatures (the duration in each axis is not split).
The final electrical and thermal measurements are deleted (to be performed at the end of the Chart F4 test subgroup 1A after Seal test)

36) Para 9.14.1 & 9.14.2, Resistance to Soldering Heat
The initial measurements are made optional (i.e. Screening results may be used instead).
Immersion time condition is per the detail spec (rather than fixed per the test method (10s)).
Test method 2 applies for the soldering iron method (i.e. not 1B)
The final measurements are deleted (now to be performed at the end of the Chart F4 test subgroup 2A after Seal test)

37) Para 9.15, Damp Heat
Obsolete IEC test method Ca replaced by equivalent test Cab per IEC Publication No. 60068-2-78.
Recovery period is added (1h ->2h)

38) Para 9.16, Overload
A default load condition (plus a minimum overload requirement) is specified: “resistive loaded with Overload Current (and associated maximum voltage) as specified in Maximum Ratings in the Detail Specification (1.5 x Rated Current).”

Default temperature conditions are specified for the temperature cycles (Tlow T3 and Thigh T2)
Recovery period is added (1h ->2h) for final measurements (for consistency).

Optional Initial measurements are added (to be consistent with other endurance tests) (i.e. Screening results may be used instead). The final measurements are deleted (now to be performed at the end of the Chart F4 test subgroup 2B after Seal test)

Note: monitoring during testing of correct switching, and contact potential when closed for 50% of the closure period, is not included (at the request of Comepa who state: “From COMEPA point of view, this information doesn’t bring information to customer.”).

39) Para 9.17, Operating Life
A default load condition is specified: “resistive loaded with Rated Current (and associated maximum voltage) as specified in Maximum Ratings in the Detail Specification.”

Default temperature conditions are specified for the temperature cycles (Tlow T3 and Thigh T2)
Recovery period is added (1h ->2h) for intermediate & final measurements (for consistency).

The initial measurements are made optional (i.e. Screening results may be used instead).

40) Para 9.18, Solderability
Immersion depth condition is per the detail spec.
Final visual inspection criteria are copied from the Resistance to soldering heat test.

41) Para 9.19 (& 9.20), High Temperature Storage (& Low Temperature Storage)
The initial measurements are made optional (i.e. Screening results may be used instead).
The final measurements are deleted (now to be performed at the end of the Chart F4 test subgroup 2C after Seal test)

Recovery period is amended to be 1h ->2h for final measurements (was < 96h) (for consistency).

A low temperature Storage test is added (as per Manufacturer Comepa’s proposal:
Why not introduce the “Cold temperature storage”. Because in Space, customers are more interested by Cold temperature storage than High temperature storage. But in this case, because COMEPA is not able to go deeper till -75°C/ -80°C, the help of CNES and/or ESA, free of charge to perform this tests would be required by COMEPA)

42) Para 9.21 & Chart IV, Salt Mist is deleted (as this is an evaluation level test (as stated in Chart IV))

43) Para 10.7.1, Note: there is no read and record data specified for the following tests (that were required previously):

- Rapid Change of Temperature
- Creepage (no measurements are required)
- External visual Inspection (no measurements are required)

44) Chart II
The electrical Measurements performed during Chart II are effectively deleted. Electrical Measurements (which are to be performed separately to the Thermal Measurements) are now only performed once during ESCC screening test after completion of Run-in (see new Chart F3) (this is a specific request from Comepa who state:
“We propose to perform these Electrical Test only one time, and in Chart F3 after VRT and RUN-IN and after Thermal Measurements because by experience, we have never drifts on Electrical Measurements (Creepage, Voltage proof, Contact resistance and insulation resistance).”.

External Visual Inspection at the end of Chart II is made optional at the Manufacturer’s discretion (on the specific request of Comepa).

45) Chart III:
The tests and testing order of Chart III are amended as given in new Chart F3 (in line with Manufacturer Comepa’s stated testing flow):
- Creepage is moved to be after final Thermal Measurements (after Run-in) before Electrical Measurements.
- Rapid Change of Temperature is moved to be after the initial Parameter Drift Value measurements.
- Thermal Measurements are tested separately from Electrical Measurements (on request of Manufacturer Comepa).

46) Chart F4, etc, The Chart title is amended in line with general DCR1027.

47) Chart F4 (was Charts IV & V),
Subgroup designations are added for reference purposes (i.e. 1A, 2A, etc.)

The sample size for Resistance to Soldering Heat (subgroup 1B) is amended to be 3 (for Periodic Testing for extension of qualification; was: 6).

The sample size for Operating Life (Subgroup 2A) is amended to be: 8 (for Qualification Testing, and to Periodic Testing for renewal of qualification after lapse; was: 9) and 4 (for Periodic Testing for extension of qualification; was: 6).

The “Thermal and Electrical Measurements” after seal test at the end of subgroup 2A are made optional at the Manufacturer’s discretion as all test are already performed during the Operating Life Test itself.
Note: these changes are proposed by Manufacturer Comepa based on their experience as a qualified Manufacturer.

Seal test is added after High & Low Temperature Storage; Seal test and External Visual Inspection are added after Robustness of Terminations (in their respective subgroups) (per Manufacturer Comepa’s proposal).

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Creepage is deleted (from Chart V) (i.e. it is now only tested in new Chart F3)

48) Appendix A is deleted.

Justification:

All changes have been defined and included to serve the purposes of technical improvement, clarification, accuracy, completeness, simplification, harmonisation and consistency. The aim is to simplify and improve the content and interpretation of the specification and its requirements whilst maintaining an efficient and acceptable technical baseline.

Additional justification/explanation for changes are given against some change items as above.

All technical changes have been defined and/or agreed by ESA and ESCC qualified Manufacturer Comepa.

Some specific changes are included based on proposals from Manufacturer Comepa (as mentioned above).

ESCC 3702 draft 5 is written to closely follow the layout, format and content of the latest converted ESCC Generic specifications such as ESCC 5000, 9000, 4001, 3001, etc. The justifications for the related policy and editorial changes given in all other previous DCRs related to the conversion of ESCC Generic Specifications also apply to this DCR.

Attachments:

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Modifications:

N/A

Approval signature:



Date signed:

2018-02-26