SLOVENSKI STANDARD
kSIST FprEN 16602-70-08:2014

01-julij-2014

Zagotavljanje varnih proizvodov v vesoljski tehniki - Ročno spajkanje visoko zanesljivih električnih spojev

Space product assurance - Manual soldering of high-reliability electrical connections

Raumfahrtproduktsicherung - Manuelles Löten von hoch-zuverlässigen elektrischen Verbindungen

Assurance produit des projets spatiaux - Soudage manuel des connexions électriques à fiabilité élevée

Ta slovenski standard je istoveten z: **FprEN 16602-70-08**

ICS:

25.160.50	Trdo in mehko lotanje	Brazing and soldering
49.140	Vesoljski sistemi in operacije	Space systems and operations

kSIST FprEN 16602-70-08:2014 **en,fr,de**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

kSIST FprEN 16602-70-08:2014

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

FINAL DRAFT
FprEN 16602-70-08

April 2014

ICS

English version

Space product assurance - Manual soldering of high-reliability electrical connections

Assurance produit des projets spatiaux - Soudage manuel des connexions électriques à fiabilité élevée

Raumfahrtproduktsicherung - Manuelles Löten von hoch-zuverlässigen elektrischen Verbindungen

This draft European Standard is submitted to CEN members for unique acceptance procedure. It has been drawn up by the Technical Committee CEN/CLC/TC 5.

If this draft becomes a European Standard, CEN and CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN and CENELEC in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN and CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN and CENELEC members are the national standards bodies and national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

CEN-CENELEC Management Centre:
Avenue Marnix 17, B-1000 Brussels

© 2014 CEN/CENELEC All rights of exploitation in any form and by any means reserved worldwide for CEN national Members and for CENELEC Members.

Ref. No. FprEN 16602-70-08:2014 E

kSIST FprEN 16602-70-08:2014

Table of contents

Foreword **9**

Introduction **10**

1 Scope **11**

2 Normative references **12**

3 Terms, definitions and abbreviated terms **13**

3.1 Terms from other standards 13

3.2 Terms specific to the present standard 13

3.3 Abbreviated terms 20

4 Principles of reliable soldered connections **22**

5 Preparatory conditions **23**

5.1 Calibration 23

5.2 Facility cleanliness 23

5.3 Environmental conditions 23

5.4 Lighting requirements 24

5.5 Precautions against static discharges 24

5.5.1 General 24

5.5.2 Precautions against ESD during manufacturing 24

5.5.3 Protective Packaging and ESD Protection 25

5.5.4 Packing and filler materials 26

5.6 Equipment and tools 26

5.6.1 General 26

5.6.2 Brushes 26

5.6.3 Cutters and pliers 26

5.6.4 Bending tools 27

5.6.5 Clinching tools 27

5.6.6 Insulation strippers 28

5.6.7 Soldering irons and resistance soldering equipment 29

5.6.8 Soldering tools 30

kSIST FprEN 16602-70-08:2014

6 Materials selection 31
6.1 General..31
6.2 Solder 31
6.2.1 Form 31
6.2.2 Composition 31
6.3 Flux 32
6.3.1 Rosin-based fluxes...32
6.3.2 INH1 corrosive acid flux 33
6.3.3 Application of flux 33
6.4 Solvents...34
6.5 Flexible insulation materials 34
6.6 Terminals...35
6.6.1 Materials 35
6.6.2 Tin-, silver- and gold-plated terminals...35
6.6.3 Shape of terminals 35
6.7 Wires 35
6.8 PCBs 36
6.8.1 Boards 36
6.8.2 Gold finish on conductors 36
6.9 Component lead finishes 36
6.10 Adhesives (staking compounds and heat sinking), encapsulants and conformal coatings...36
7 Preparation for soldering 38
7.1 General..38
7.1.1 Tools..38
7.1.2 Components...38
7.2 Preparation of conductors, terminals and solder cups............................38
7.2.1 Insulation removal 38
7.2.2 Surfaces to be soldered 39
7.2.3 De-golding of gold-plated leads and terminals...................................40
7.2.4 Constraints on degolding and pretinning methods..............................41
7.2.5 Pretinning of stranded wires...42
7.2.6 Pre-tinning of component leads and solid-wire conductors.................42
7.3 Preparation of the soldering bit 43
7.3.1 Fit...43
7.3.2 Maintenance 43
7.3.3 Plated bits 43

kSIST FprEN 16602-70-08:2014

7.3.4 Tip in operation 43
7.4 Maintenance of resistance-type soldering electrodes....44
7.5 Handling (work station) 44
7.6 Storage (work station)....44
7.6.1 Components....44
7.6.2 PCBs....44
7.6.3 Materials requiring segregation 44
7.7 Preparation of PCBs for soldering....45
7.7.1 Process....45
7.7.2 Demoisturization methods....45
7.7.3 Storage of prepared PCBs 45

8 Mounting of components 46

8.1 General requirements 46
8.1.1 Introduction 46
8.1.2 Heavy components 46
8.1.3 Metal-case components 46
8.1.4 Glass-encased components....47
8.1.5 Stress relief of components with bendable leads....47
8.1.6 Stress relief of components with non-bendable leads....48
8.1.7 Reinforced plated-through holes 50
8.1.8 Lead and conductor cutting 50
8.1.9 Solid hook-up wire....50
8.1.10 Location 50
8.1.11 Conformal coating, cementing and encapsulation 50
8.2 Lead bending requirements 51
8.2.1 General....51
8.2.2 Conductors terminating on both sides of a non-plated-through hole....51
8.3 Mounting of terminals to PCBs....52
8.4 Lead attachment to PCBs....53
8.4.1 General....53
8.4.2 Clinched leads 53
8.4.3 Stud leads....55
8.4.4 Lapped round leads 56
8.4.5 Lapped ribbon leads....56
8.5 Mounting of components to terminals 56
8.6 Mounting of connectors to PCBs....58

9 Attachment of conductors to terminals, solder cups and cables 59

kSIST FprEN 16602-70-08:2014

9.1 General....59
9.1.1 Conductors....59
9.1.2 Terminals....59
9.2 Wire termination....59
9.2.1 Breakouts from cables....59
9.2.2 Insulation clearance....59
9.2.3 Solid hook-up wire....60
9.2.4 Stress relief....60
9.3 Turret and straight-pin terminals....60
9.3.1 Side route....60
9.3.2 Bottom route....60
9.4 Bifurcated terminals....61
9.4.1 General....61
9.4.2 Bottom route....61
9.4.3 Side route....62
9.4.4 Top route....63
9.4.5 Combination of top and bottom routes....64
9.4.6 Combination of side and bottom routes....64
9.5 Hook terminals....64
9.6 Pierced terminals....65
9.7 Solder cups (connector type)....66
9.8 Insulation sleeving....66
9.9 Wire and cable interconnections....67
9.9.1 General....67
9.9.2 Preparation of wires....67
9.9.3 Preparation of shielded wires and cables....67
9.9.4 Pre-assembly....68
9.9.5 Soldering procedures....68
9.9.6 Cleaning....69
9.9.7 Inspection....69
9.9.8 Workmanship....69
9.9.9 Sleeving of interconnections....69
9.10 Connection of stranded wires to PCBs....70
10 Soldering to terminals and PCBs....72
10.1 General....72
10.1.1 Securing conductors....72
10.1.2 Thermal shunts....72

kSIST FprEN 16602-70-08:2014

10.1.3 High-voltage connections 72
10.2 Solder application to terminals 73
10.2.1 Soldering of swaged terminals onto PCBs 73
10.2.2 Soldering of conductors onto terminals (except cup terminals) 73
10.2.3 Soldering of conductors onto cup terminals 74
10.3 Solder application to PCBs 74
10.3.1 Solder coverage 74
10.3.2 Solder fillets 74
10.3.3 Soldering of component leads to plated-through holes 74
10.3.4 Solder application 75
10.4 Wicking 76
10.5 Solder rework 76
10.6 Repair and modification 76

11 Cleaning of PCB assemblies 77
11.1 General 77
11.2 Ultrasonic cleaning 77
11.3 Monitoring for cleanliness 77
11.3.1 Cleanliness testing 77
11.3.2 Testing frequency 78
11.3.3 Test limits 78
11.3.4 Test method 78

12 Final inspection 79
12.1 General 79
12.2 Acceptance criteria 79
12.3 Visual rejection criteria 80

13 Verification procedure 81
13.1 General 81
13.2 Vibration 81
13.3 Temperature cycling 84
13.4 Microsection 84

14 Quality assurance 85
14.1 General 85
14.2 Data 85
14.3 Nonconformance 85
14.4 Calibration 85
14.5 Traceability 86