

DIN EN 16602-70-26

ICS 49.140; 49.060

Einsprüche bis 2014-05-28

Entwurf**Raumfahrtproduktsicherung –
Quetschen von hochzuverlässigen elektrischen Verbindungen;
Englische Fassung FprEN 16602-70-26:2013**

Space product assurance –
Crimping of high-reliability electrical connections;
English version FprEN 16602-70-26:2013

Assurance produit des projets spatiaux –
Sertissage des connexions électriques à fiabilité élevée;
Version anglaise FprEN 16602-70-26:2013

Anwendungswarnvermerk

Dieser Norm-Entwurf mit Erscheinungsdatum 2014-03-28 wird der Öffentlichkeit zur Prüfung und Stellungnahme vorgelegt.

Weil die beabsichtigte Norm von der vorliegenden Fassung abweichen kann, ist die Anwendung dieses Entwurfes besonders zu vereinbaren.

Stellungnahmen werden erbeten

- vorzugsweise online im Norm-Entwurfs-Portal des DIN unter www.entwuerfe.din.de bzw. für Norm-Entwürfe der DKE auch im Norm-Entwurfs-Portal der DKE unter www.entwuerfe.normenbibliothek.de, sofern dort wiedergegeben;
- oder als Datei per E-Mail an nl@din.de möglichst in Form einer Tabelle. Die Vorlage dieser Tabelle kann im Internet unter www.din.de/stellungnahme oder für Stellungnahmen zu Norm-Entwürfen der DKE unter www.dke.de/stellungnahme abgerufen werden;
- oder in Papierform an den Normenausschuss Luft- und Raumfahrt (NL) im DIN, 10772 Berlin (Hausanschrift: Burggrafenstr. 6, 10787 Berlin).

Die Empfänger dieses Norm-Entwurfs werden gebeten, mit ihren Kommentaren jegliche relevanten Patentrechte, die sie kennen, mitzuteilen und unterstützende Dokumentationen zur Verfügung zu stellen.

Gesamtumfang 44 Seiten

Normenausschuss Luft- und Raumfahrt (NL) im DIN

Nationales Vorwort

Dieses Dokument (FprEN 16602-70-26:2013) wurde vom Technischen Komitee CEN/CLC/TC 5 „Raumfahrt“ erarbeitet, dessen Sekretariat vom DIN (Deutschland) gehalten wird.

Dieses Dokument ist derzeit zum einstufigen Annahmeverfahren vorgelegt.

Dieses Dokument wurde speziell zur Behandlung von Raumfahrtsystemen erarbeitet und hat daher Vorrang vor jeglicher Europäischer Norm, da es denselben Anwendungsbereich hat, jedoch über einen größeren Geltungsbereich (z. B. Luft- und Raumfahrt) verfügt.

Das zuständige deutsche Normungsgremium ist der Arbeitsausschuss NA 131-10-01 AA „Interoperabilität von Informations-, Kommunikations- und Navigationssystemen“ im DIN-Normenausschuss Luft- und Raumfahrt (NL).

Nationaler Anhang NA (informativ)

Begriffe

3 Begriffe und Abkürzungen

3.1 Begriffe aus anderen Normen

Für die Anwendung dieses Dokuments gelten die Begriffe nach ECSS-S-ST-00-01 und ECSS-Q-ST-70-38, insbesondere die folgende Begriffe:

elektrische Verbindungen

Prozessidentifizierungs-Dokument (PID)

ANMERKUNG zum Begriff: Die DRD für das PID ist in ECSS-Q-ST-70-38 angegeben.

3.2 Für diese Norm spezifische Begriffe

3.2.1

einstellbares Verpresswerkzeug

Crimpwerkzeug mit einstellbarem Teil (Einstellvariable), das die Anschluss- oder Aderendhülse am Leiter einkerbt oder zusammenpresst

3.2.2

Crimpwerkzeug

mechanisches Werkzeug für die Herstellung einer dauerhaften Verbindung zwischen einer Einrichtung mit Drahtanschluss und einem Leiter durch Druckverformung oder Verformung der Anschlusshülse um den Leiter mit dem Ziel eines guten elektrischen und mechanischen Kontakts

3.2.3

Aderendhülse

kurzes Metallrohr zur Herstellung von Quetschverbindungen am Außenleiter von geschirmten oder Koaxialkabeln

3.2.4

Kabelschuh

Metallrohr mit einem mit einer Bohrung versehenen Flansch für die Befestigung an einer Gewindeverbindung

3.2.5

Spleiß

Vorrichtung zum Zusammenfügen von zwei oder mehr Leitern

3.2.6

Anschluss

Anschlussklemme

Metallvorrichtung zur Herstellung elektrischer Verbindungen

3.3 Abkürzungen

Für die Anwendung dieses Dokuments gelten die Abkürzungen in ECSS-S-ST-00-01 und die folgenden Abkürzungen:

Abkürzung	Bedeutung
AWG	amerikanische Drahtnorm, amerikanische Drahtlehre (en: American wire gauge)
QA	Qualitätssicherung (en: quality assurance)
PID	Prozessidentifizierungs-Dokument (en: process identification document)
RFA	Genehmigungsantrag (en: request for approval)
RH	relative Luftfeuchte (en: relative humidity)

October 2013

ICS 49.060; 49.140

English version

Space product assurance - Crimping of high-reliability electrical connections

Assurance produit des projets spatiaux - Sertissage des connexions électriques à fiabilité élevée

Raumfahrtproduktsicherung - Quetschen von hochzuverlässigen 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

Table of contents

Foreword	5
1 Scope.....	6
2 Normative references	8
3 Terms, definitions and abbreviated terms.....	9
3.1 Terms defined in other standards	9
3.2 Terms specific to the present standard	9
3.3 Abbreviated terms.....	10
4 Principles	11
5 Requirements.....	12
5.1 Preparatory conditions.....	12
5.1.1 Facilities.....	12
5.1.2 Tools and equipment.....	13
5.2 Crimping operations for specific interconnections	14
5.2.1 General	14
5.2.2 Material selection	15
5.2.3 Process review and documentation.....	15
5.2.4 Connector barrel and single wire crimping	16
5.2.5 Connector barrel and multiple wire crimping.....	16
5.2.6 Ferrule shield crimping.....	17
5.2.7 Lug and splice wire crimping	18
5.3 Requirements for new crimp configurations	19
5.3.1 General	19
5.3.2 Test procedure.....	19
5.3.3 Sealing and marking	20
5.4 Test methods.....	21
5.4.1 General	21
5.4.2 Voltage drop.....	21
5.4.3 Tensile strength	23
5.4.4 Metallography	26

5.5	Quality assurance	26
5.5.1	General	26
5.5.2	Personnel training and certification	27
5.5.3	Workmanship	29
5.5.4	Visual inspection	30
5.5.5	Shift performance inspection and test	31
5.5.6	Calibration of crimping tools	31
5.5.7	Records	32
5.5.8	Nonconformance.....	33
5.6	Document requirements.....	33
Annex A (informative) Crimp configurations and tools		34
Bibliography.....		40

Figures

Figure 1-1: Specific interconnections in this Standard	7
Figure 5-1: Example of a typical connector barrel and single wire crimping	16
Figure 5-2: Example of a typical connector barrel and multi-wire crimping.....	17
Figure 5-3: Example of a typical ferrule shield crimping.....	18
Figure 5-4: Examples of typical lug and splice wire crimping	19
Figure 5-5: Typical plots showing variation in crimp termination characteristics with increasing indentation depth.....	21
Figure 5-6: Measurement of voltage drop across a crimped termination.....	22
Figure 5-7: Quality control during crimping operation	28
Figure 5-8: Visible workmanship standards	29
Figure 5-9: Workmanship examples and crimp micro-sections	29
Figure A-1 : Confined irregular-octagon crimp (compactive).....	35
Figure A-2 : Dimpled confined octagon crimp (compactive).....	35
Figure A-3 : Regular-hexagon crimp (compactive).....	35
Figure A-4 : Semicircular one- or two-indent crimp (dispersive).....	35
Figure A-5 : Four-indent crimp (dispersive).....	35
Figure A-6 : Typical test fixture for testing lug and splice crimps.....	39

Tables

Table 5-1: Equipment for verification process.....	14
Table 5-2: Voltage drop test requirements.....	23
Table 5-3: Required ultimate axial strength for compactive and dispersive crimped joints	25

Table A-1 : Guideline for selector setting - Four-indent crimp (dispersive) Single wire (Crimping tool 22520/2-01).....	37
Table A-2 : Guideline for selector setting - Four-indent crimp (dispersive) -Two wires (Crimping tool 22520/2-01).....	38
Table A-3 : Guideline for die selection (ferrule coaxial shield crimping)	38

Foreword

This document (FprEN 16602-70-26:2013) has been prepared by Technical Committee CEN/CLC/TC 5 "Space", the secretariat of which is held by DIN (Germany).

This document (FprEN 16602-70-26:2013) originates from ECSS-Q-ST-70-26C.

This document is currently submitted to the Unique Acceptance Procedure.

This document has been developed to cover specifically space systems and will therefore have precedence over any EN covering the same scope but with a wider domain of applicability (e.g. : aerospace).

1

Scope

This Standard specifies:

- Requirements for the following crimping wire terminations intended for high reliability electrical connections for use on customer spacecraft and associated equipment operating under high vacuum, thermal cycling and launch vibration:
 - removable contacts, single wires
 - removable contacts, multiple wires
 - coaxial connectors, ferrules
 - lugs and splices.

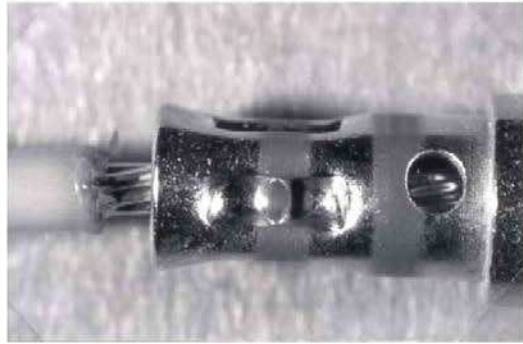
NOTE These are the most common used crimping wire termination and are represented in Figure 1-1.

- The general conditions to be met for the approval of terminations other than the above mentioned ones.

NOTE Additional forms of crimps, not covered in this standard, are listed (not exhaustively) in the informative Annex A.

- Product assurance provisions for both the specific and the generic terminations mentioned above.
- Training and certification requirements for operators and inspectors (clause 5.5.2), additional to those specified in ECSS-Q-ST-20.

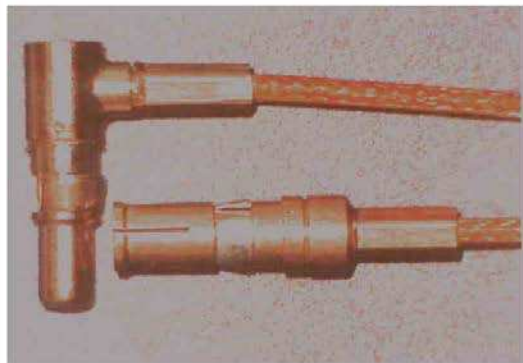
This standard may be tailored for the specific characteristics and constraints of a space project, in conformance with ECSS-S-ST-00.



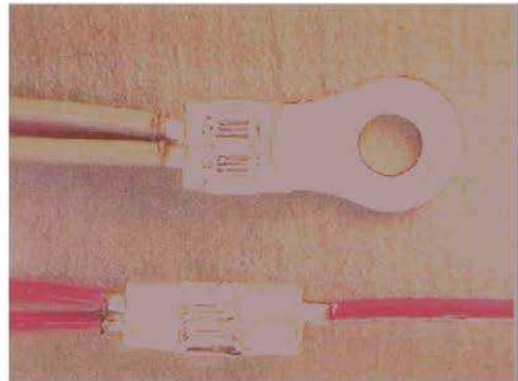
Removable co ntacts, single wires



Removable co ntacts, multiple wires



Coaxial connectors, ferrules



Lugs and splices

Figure 1-1: Specific interconnections in this Standard

2

Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this ECSS Standard. For dated references, subsequent amendments to, or revisions of any of these publications do not apply. However, parties to agreements based on this ECSS Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references the latest edition of the publication referred to applies.

EN reference	Reference in text	Title
EN 16601-00-01	ECSS-S-ST-00-01	ECSS system - Glossary of terms
EN 16602-10-09	ECSS-Q-ST-10-09	Space product assurance - Nonconformance control system
EN 16602-20	ECSS-Q-ST-20	Space product assurance - Quality assurance
EN 16602-60	ECSS-Q-ST-60	Space product assurance - Electrical, electronic and electromechanical (EEE) components
EN 16602-70	ECSS-Q-ST-70	Space product assurance - Materials, mechanical parts and processes
EN 16602-70-08	ECSS-Q-ST-70-08	Space product assurance - Manual soldering of high-reliability electrical connections
EN 16602-70-38	ECSS-Q-ST-70-38	Space product assurance - High-reliability soldering for surface-mount and mixed technology
EN 16602-70-71	ECSS-Q-ST-70-71	Space product assurance - Data for selection of space materials and processes
	MIL-DTL-22520G	Crimping tools, terminal hard, wire termination, general specification for
	NASA-STD-8739.4/CHG3 09/05/2006	Crimping, Interconnection cables, harnesses and wiring
	SAE-AS-7928A 02/01/2008	Terminals, lugs, splices, conductor, crimp style, copper, general specification for
	SAE-AS-81824 08/01/1998	Splices, electric, permanent, crimp style, copper, insulated, environment resistant

3

Terms, definitions and abbreviated terms

3.1 Terms defined in other standards

For the purpose of this Standard, the terms and definitions from ECSS-S-ST-00-01 and ECSS-Q-ST-70-38 apply, in particular for the following terms:

electrical connections

process identification document (PID)

NOTE The DRD for the PID is given in ECSS-Q-ST-70-38.

3.2 Terms specific to the present standard

3.2.1 adjustable indenter tool

crimping tool which has an adjustable part (setting variable) that indents or compresses the conductor barrel or ferrule

3.2.2 crimping tool

mechanical tool used for permanently attaching a wire termination device to a conductor by pressure deformation or by reshaping the barrel around the conductor to establish good electrical and mechanical contact

3.2.3 ferrule

short metal tube used to make crimp connections to the outer conductor of shielded or coaxial cables

3.2.4 lug

metallic tube with drilled flange projection for fixing to threaded terminal

3.2.5 splice

device for joining two or more conductors to each other

3.2.6 terminal

metallic device that is used for making electrical connections

3.3 Abbreviated terms

For the purpose of this Standard, the abbreviated terms from ECSS-S-ST-00-01 and the following apply:

Abbreviation	Meaning
AWG	American wire gauge
QA	quality assurance
PID	process identification document
RFA	request for approval
RH	relative humidity