

DIN EN 16602-70-26

ICS 49.060; 49.140

Ersatz für
DIN EN 16602-70-26:2015-06**Raumfahrtproduktsicherung –
Crimpen von hochzuverlässigen elektrischen Verbindungen;
Englische Fassung EN 16602-70-26:2019**

Space product assurance –
Crimping of high-reliability electrical connections;
English version EN 16602-70-26:2019

Assurance produit des projets spatiaux –
Sertissage de connections électriques haute fiabilité;
Version anglaise EN 16602-70-26:2019

Gesamtumfang 61 Seiten

DIN-Normenausschuss Luft- und Raumfahrt (NL)

Nationales Vorwort

Dieses Dokument (EN 16602-70-26:2019) wurde vom Technischen Komitee CEN/CLC/JTC 5 „Raumfahrt“ erarbeitet, dessen Sekretariat von DIN (Deutschland) gehalten wird.

Das zuständige deutsche Normungsgremium ist der Arbeitsausschuss NA 131-06-02 AA „Interoperabilität von Informations-, Kommunikations- und Navigationssystemen“ im DIN-Normenausschuss Luft- und Raumfahrt (NL).

Dieses Dokument (EN 16602-70-26:2019) basiert auf ECSS-Q-ST-70-26C Rev.1.

Dieses Dokument ersetzt DIN EN 16602-70-26:2015-06.

Dieses Dokument enthält unter Berücksichtigung des DIN-Präsidialbeschlusses 1/2004 nur die Englische Fassung von EN 16602-70-26:2019.

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

Für die in diesem Dokument zitierten internationalen Dokumente wird im Folgenden auf die entsprechenden deutschen Dokumente hingewiesen:

ISO 7500-1:2004 siehe DIN EN ISO 7500-1:2004-11

ISO 17025* siehe DIN EN ISO/IEC 17025

Änderungen

Gegenüber DIN EN 16602-70-26:2015-06 wurden folgende Änderungen vorgenommen:

- a) Überarbeitung von Anhang A inklusive Korrektur von Tabelle A-1.

Frühere Ausgaben

DIN EN 16602-70-26: 2015-06

* Im Referenzdokument wird auf „ISO 17025“ verwiesen, gemeint ist jedoch ISO/IEC 17025.

Nationaler Anhang NA (informativ)

Begriffe und Abkürzungen

Die Benummerung der folgenden Begriffe und Abkürzungen ist identisch mit der Benummerung in der englischen Fassung.

3.1 Begriffe aus anderen Normen

- a) Für die Anwendung dieses Dokuments gelten die Begriffe nach ECSS-S-ST-00-01, insbesondere die folgenden Begriffe:
 - 1) Annahme;
 - 2) Analyse;
 - 3) Los;
 - 4) Bauteil;
 - 5) Konformität;
 - 6) Verunreinigung.
- b) Für die Anwendung dieser Norm gelten die Begriffe nach ECSS-Q-ST-60-05, insbesondere die folgenden Begriffe:
 - 1) Prozessidentifizierungs-Dokument (PID) (en: process identification document)
- c) Für die Anwendung dieser Norm gelten die Begriffe nach ECSS-Q-ST-70-08, insbesondere die folgenden Begriffe:
 - 1) elektrische Verbindung

3.2 Für diese Norm spezifische Begriffe

3.2.1

einstellbares Verpresswerkzeug

Crimpwerkzeug mit fortschreitender Deformation, welches ein einstellbares Teil (Einstellvariable) hat, das die Anschluss- oder Aderendhülse am Leiter einkerbt oder zusammenpresst

3.2.2

Crimpanordnung

Kombination von Crimpwerkzeug, Crimpstück und Anzahl und Art der durch die Technischen Lieferbedingungen festgelegten Drähte

Anmerkung 1 zum Begriff: Beispiele für Crimpstücke umfassen Kabelschuh, Spleiß und Kontakt, Aderendhülse.

Anmerkung 2 zum Begriff: Drahtarten umfassen Werkstoff, Größe, Oberflächenausführung und Los, falls es sich nicht um einen ESCC-qualifizierten Draht handelt.

Anmerkung 3 zum Begriff: Crimpwerkzeug, basierend auf der Kombination von Werkzeugreferenz, Einstellung und Positionierer (wenn erforderlich).

3.2.3

Crimpwerkzeug

mechanisches Werkzeug mit fortschreitender Deformation 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

3.2.4

Aderendhülse

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

3.2.5

inhärente Drahtstärke

Zugfestigkeit eines in einer Crimpverbindung angewendeten Drahts, bestimmt durch eine spezielle Zugprüfung

3.2.6

Kabelschuh

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

3.2.7

Spleiß

Metallrohr zum Zusammenfügen von zwei oder mehr Leitern

3.2.8

Anschluss

Anschlussklemme

Metallvorrichtung zur Herstellung elektrischer Verbindungen

3.3 Abkürzungen

Für die Anwendung dieser Norm gelten die Abkürzungen nach ECSS-S-ST-00-01 und die folgenden Abkürzungen:

Abkürzung	Bedeutung	
AWG	amerikanische Drahtnorm, amerikanische Drahtlehre	(en: American wire gauge)
DRD	Definition der Dokumentanforderungen	(en: document requirements definition)
IPA	Isopropylalkohol	(en: iso-propyl alcohol)
KIP	Schlüsselprüfpunkt	(en: key inspection point)
MIP	Hauptprüfpunkt	(en: mandatory inspection point)
NCR	Nichtkonformitätsbericht	(en: nonconformance report)
PID	Prozessidentifizierungs-Dokument	(en: process identification document)
QA	Qualitätssicherung	(en: quality assurance)
RFA	Genehmigungsantrag	(en: request for approval)
RFW	Antrag auf Aufhebung	(en: request for waiver)
RH	relative Luftfeuchte	(en: relative humidity)

Nationaler Anhang NB (informativ)

Literaturhinweise

DIN EN ISO 7500-1:2004-11, *Metallische Werkstoffe — Prüfung von statischen einachsigen Prüfmaschinen — Teil 1: Zug- und Druckprüfmaschinen — Prüfung und Kalibrierung der Kraftmesseinrichtung (ISO 7500-1:2004); Deutsche Fassung EN ISO 7500-1:2004*

DIN EN ISO/IEC 17025, *Allgemeine Anforderungen an die Kompetenz von Prüf- und Kalibrierlaboratorien*

— Leerseite —

EUROPEAN STANDARD

EN 16602-70-26

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2019

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Supersedes EN 16602-70-26:2014

English version

Space product assurance - Crimping of high-reliability electrical connections

Assurance produit des projets spatiaux -
Sertissage de connections électriques haute fiabilité

Raumfahrtproduktsicherung -
Crimpen von hochzuverlässigen elektrischen Verbindungen

This European Standard was approved by CEN on 9 November 2018.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN and CENELEC member.

This European Standard exists 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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European Foreword

This document (EN 16602-70-26:2019) has been prepared by Technical Committee CEN-CENELEC/TC 5 "Space", the secretariat of which is held by DIN.

This standard (EN 16602-70-26:2019) originates from ECSS-Q-ST-70-26C Rev.1.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2019, and conflicting national standards shall be withdrawn at the latest by September 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN16602-70-26:2014.

The main changes with respect to EN16602-70-26:2014 are listed below:

- Implementation of ECSS Change requests
- Several Figures replaced by new Figures
- Clause 3 "Terms, definitions and abbreviated terms" updated
- Nomenclature added as clause 3.4
- Titles of clauses 5.1.2.3, 5.2, 5.2.4, 5.2.5, 5.3, 5.3.2, 5.4.3.2, 5.4.3.3 changed
- Several changes in the Clause 5.3 "Requirements for crimp configuration qualification"
- Several changes in clause 5.4 "Test methods"
- Clause 5.5.2 "Personnel training and certification" updated
- Clause 5.5.4 "Visual inspection" updated
- Several changes in clause 5.5.5 "Shift performance inspection and test for harness manufacturing"
- Clause 5.5.9 "Special crimping activities at spacecraft level, modifications and repairs" added
- All Figures from Issue C replaced
- Annex A "Crimp configurations and tools" updated
- Annex B "Examples of typical ultimate axial strength" added

This document has been prepared under a standardization request given to CEN by the European Commission and the European Free Trade Association.

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

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1

Scope

This Standard specifies:

- Requirements for the following crimping wire connections intended for high reliability electrical connections for use on spacecraft and associated equipment operating under high vacuum, thermal cycling and launch vibration:

- removable contacts, single wire
- removable contacts, multiple wires
- coaxial contacts, ferrules
- lugs and splices.

NOTE These are the most commonly used crimping wire connections and are represented in Figure 1-1.

- The general conditions to be met for the approval of connections 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 connections 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.

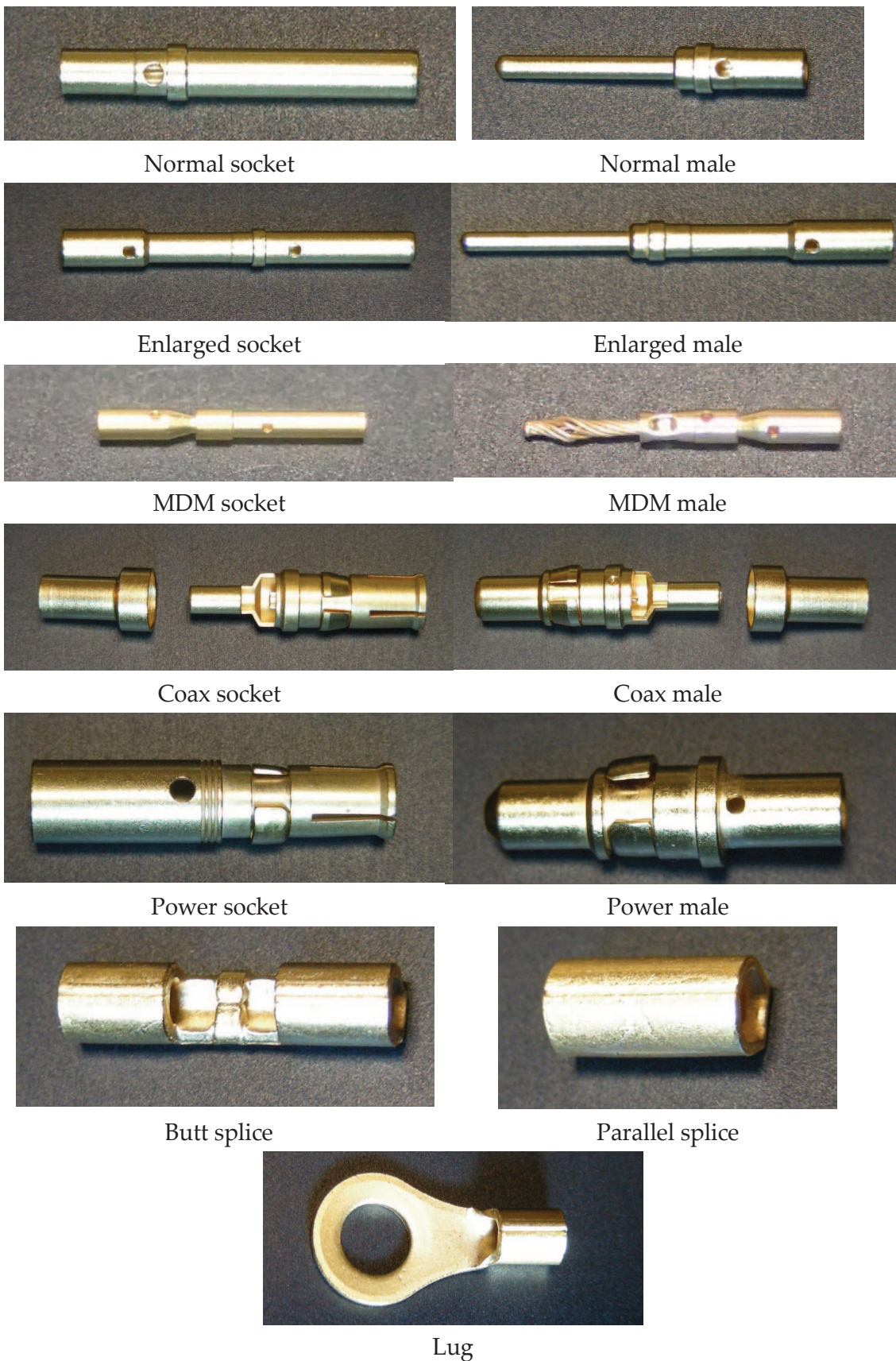


Figure 1-1: Example of interconnections described in this Standard

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 16602-60-05	ECSS-Q-ST-60-05	Space product assurance – General requirements for hybrids
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
	SAE-AS-22520, 24 October 2011	Crimping tools, , wire termination, General specification for
	SAE-AS-7928B 10 March 2011	Terminals, lugs, splices, conductor, crimp style, copper, general specification for
	ISO 7500-1:2004	Metallic materials - Verification of static uniaxial testing machines - Part 1: tension/compression testing machines - Verification and calibration of the force-measuring system

EN reference	Reference in text	Title
	ESCC 3901, Issue 2 May 2013	ESCC generic specification No. 3901 Wires and cables, electrical, 600V, low frequency

3

Terms, definitions and abbreviated terms

3.1 Terms defined in other standards

- a. For the purpose of this Standard, the terms and definitions from ECSS-S-ST-00-01 apply, in particular for the following terms:
 - 1. acceptance
 - 2. analysis
 - 3. batch
 - 4. component
 - 5. conformance
 - 6. contaminant
- b. For the purpose of this Standard, the terms and definitions from ECSS-Q-ST-60-05 apply, in particular for the following terms:
 - 1. process identification document (PID)
- c. For the purpose of this Standard, the terms and definitions from ECSS-Q-ST-70-08 apply, in particular for the following terms:
 - 1. electrical connection

3.2 Terms specific to the present standard

3.2.1 adjustable indenter tool

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

3.2.2 crimping configuration

combination of crimping tool, crimp item and number and type of wires defined by the procurement specification

NOTE 1 Example of crimp item include lug, splice and contact, ferrule.

NOTE 2 Type of wires include material, size, finish and batch if not ESCC qualified wire.

NOTE 3 Crimping tool based on the combination of tool reference, setting and locator (when necessary).

3.2.3 crimping tool

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

3.2.4 ferrule

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

3.2.5 intrinsic wire strength

tensile strength of a wire used in a crimped assembly, determined by a specific pull test

3.2.6 lug

metallic tube with drilled flange projection for fixing to a connection point

3.2.7 splice

metallic tube for joining two or more conductors to each other

3.2.8 terminal

metallic device that is used to make an electrical connection

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
DRD	document requirement definition
IPA	iso-propyl alcohol
KIP	key inspection point
MIP	mandatory inspection point
NCR	nonconformance report
PID	process identification document
QA	quality assurance
RFA	request for approval
RFW	request for waiver
RH	relative humidity

3.4 Nomenclature

The following nomenclature applies throughout this document:

- a. The word “shall” is used in this Standard to express requirements. All the requirements are expressed with the word “shall”.
- b. The word “should” is used in this Standard to express recommendations. All the recommendations are expressed with the word “should”.

NOTE It is expected that, during tailoring, recommendations in this document are either converted into requirements or tailored out.

- c. The words “may” and “need not” are used in this Standard to express positive and negative permissions, respectively. All the positive permissions are expressed with the word “may”. All the negative permissions are expressed with the words “need not”.
- d. The word “can” is used in this Standard to express capabilities or possibilities, and therefore, if not accompanied by one of the previous words, it implies descriptive text.

NOTE In ECSS “may” and “can” have completely different meanings: “may” is normative (permission), and “can” is descriptive.

- e. The present and past tenses are used in this Standard to express statements of fact, and therefore they imply descriptive text.