SLOVENSKI STANDARD
SIST EN 4049-001:2009

01-maj-2009

Aeronavtika - Podaljġevalni kabel termoļ lena - Delovne temperature med ï 65 ÁC in 260 ÁC - 001. del: Tehniļ na specifikacija

Aerospace series - Thermocouple extension cable - Operating tempera-tures between - 65 °C to 260 °C - Part 001: Technical specification

Luft- und Raumfahrt - Thermoelement Ausgleichsleitung - Betriebstemperaturen zwischen - 65 °C to 260 °C - Teil 001: Technische Lieferbedingungen

Série aérospatiale - Câbles, thermocouple - Températures de fonctionnement comprises entre - 65 °C et 260 °C - Partie 001 : Spécification technique

Ta slovenski standard je istoveten z: **EN 4049-001:2006**

ICS:

49.060	Letalska in vesoljska elektriļ na oprema in sistemi	Aerospace electric equipment and systems

SIST EN 4049-001:2009 **en,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 4049-001

December 2006

ICS 49.060

English Version

Aerospace series - Thermocouple extension cable - Operating temperatures between - 65 °C to 260 °C - Part 001: Technical specification

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Foreword

This document (EN 4049-001:2006) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

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of an identical text or by endorsement, at the latest by June 2007, and conflicting national standards shall be withdrawn at the latest by June 2007.

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1 Scope

This standard specifies the required characteristics, test methods, qualification and acceptance conditions of thermocouple used for the connection between the thermocouple and the equipment.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2574:1994, *Aircraft — Electrical cables — Identification marking*

ISO 8056-1:1985, *Aircraft — Nickel-chromium and nickel-aluminium thermocouple extension cables — Part 1: Conductors — General requirements and tests*

ISO 8815, *Aircraft — Electrical cables and cable harnesses — Vocabulary*

EN 3475-100, *Aerospace series — Cables, electrical, aircraft use — Test methods — Part 100: General*

EN 9133, *Aerospace series — Quality management systems — Qualification procedure for aerospace standard parts*

EN 60584-2, *Thermocouples — Part 2: Tolerances*

3 Definitions

See EN 3475-100, ISO 8056-1 and ISO 8815.

4 Materials and construction

4.1 Conductors

The conductors for cables in accordance with the present Technical specification shall consist of conductors as per ISO 8056-1.

The tolerance class is according to EN 60584-2.

Individual strands shall show the following minimum elongation and tensile strength (see Table 1).

Table 1

	Minimum elongation (%)		**Minimum breaking strength** (N)	
	Strand dia. 0,15 mm	Strand dia. 0,20 mm	Strand dia. 0,15 mm	Strand dia. 0,20 mm
Nickel chromium	15	15	10,2	17,7
Nickel aluminium	15	15	9,7	16,7

4.2 Materials

The insulation shall be of regular, circular cross-section throughout the entire length of the cable.

The surface of the cable shall be smooth and comply with the requirements in respect of identification.

The materials used shall be unaffected by corrosion and shall be resistant to the effects of mould fungus and similar micro-organisms.

4.3 Construction of the cables

4.3.1 General

The operating temperature of the wires shall not be lower than the maximum operating temperature of the complete cable.

4.3.2 Cable lay

The lay length of the outer layer shall not be less than 8 times and not more than 16 times the nominal diameter of the cable.

The core shall not be spliced.

4.3.3 Screened cables

4.3.3.1 General

The individual strands used for the screen shall be free from kinks, loops or breaks; their surface shall be free from corrosion and other contamination. They shall satisfy the mechanical tests in EN 3475-505 to EN 3475-508 before use.

The screen shall be in contact with all the cabled cores.

Where spiral screening is used the lay direction shall be contrary to that of the cables cores.

4.3.3.2 Joints

Joints in the individual strands of the screen shall be made by soldering or by laying the individual strands together over a length of at least 10 mm.

There shall be no more than one joint per 3 m cable length (measured between different individual strands).

4.3.3.3 Braid screen pushback capability

In accordance with test 6.41.

4.3.3.4 Angle of spiral screening or braiding

The angle γ of spiral screening or braiding (as shown in Figure 1), measured against the longitudinal axis of the cable shall be at least 10°.

4.3.3.5 Screen coverage

The screen shall have a coverage β of at least 90 % for spiral screening and at least 85 % for braiding, these values being determined by the following formula:

S = lay length of screen in mm

D = diameter under screen in mm (for cables with 2 or more cores without fillers: $D' = (\pi + N)\ b / \pi$

d = diameter of screen strand in mm

N = number of cores

n = number of strands per carriers

B = diameter of core in mm

Z = total number of carriers

F = filling factor

β = optical coverage

U = see Figure 1.

U' = nd / sin α

γ = see 4.3.3.4.

α = 90° — γ

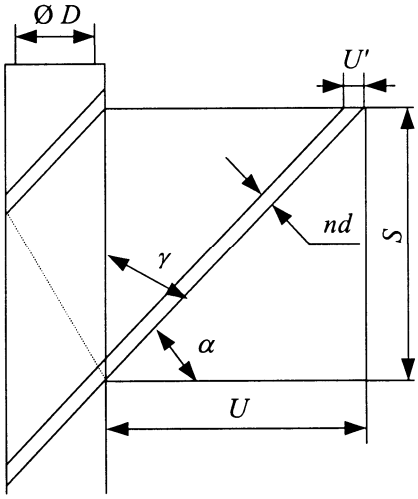

Figure 1 — Cable covering

The screen coverage is calculated using the following formula:

— for spirals:

$U = \pi\ (D + d)$ and $S = \pi\ (D + d)$ tan α $F = U'\ Z\ /\ U = nd\ Z\ /\ [\pi\ (D + d)$ sin $\alpha]$

$\beta = F \times 100$ (%)

— for braids:

$U = \pi\ (D + 2d)$ and $S = \pi\ (D + 2d)$ tan α

For braids, the filling factor F and coverage β, taking into account both braiding directions and a symmetrical braiding pattern are:

$F = (U'\ /\ U)\ (Z\ /\ 2) = \{nd\ /\ [\pi\ (D + 2d)$ sin $\alpha]\}\ (Z\ /\ 2)$

$\beta = F\ (2 - F) \times 100$ (%)

5 Required characteristics

The characteristics of the cables, tested according to the methods described hereafter shall comply with the values given in the product standard.

6 Tests method

See Table 2.

Table 2 — Tests: methods, application, requirements

Clauses No	Tests						Requirements (and/or particulars)
	Description	EN 3475- (and/or particulars)	Qualification[a] (7.1)	Each delivery		Periodic 3 years every (7.2.4)	
				On all cables (7.2.1 and 7.2.2)	Prior to delivery		
6	Test conditions	100	X	X	X	X	
6.1	Visual examination	201	3	X			Product standard
6.2	Mass	202 minimum length 0,5 m	3		X		Product standard
6.3	Dimensions	203	3	X	X	X	Product standard
6.4	Ohmic resistance per unit length	301	3		X		Product standard
6.5	Voltage proof test: — immersion test	302	3		X		1,5 KV r.m.s
	— dry test			X			1,5 KV r.m.s.
	— or dry impulse test	Alternative to dry test					3,5 KV peak voltage
6.6	Insulation resistance at (20 ± 2) °C: at (95 ± 2) °C:	303	3		X	X	For 1 Km length 1 500 MΩ 1 MΩ
6.7	Surface resistance	304	NOT APPLICABLE				
6.8	Overload resistance	305	NOT APPLICABLE				
6.9	Continuity of conductors	306	1	X	X		
6.10	Accelerated ageing	401 Mandrel ∅ and test load: Table 3	3			X	
6.11	Shrinkage and delamination	402 Temperature: product standard	3		X		Product standard
6.12	Delamination and blocking	403 Mandrel diameter: Table 3 Temperature: product standard	3		X		Product standard
6.13	Thermal shock	404 Temperature: product standard	3		X		Product standard
6.14	Bending at ambient temperature	405 Mandrel diameter: Table 3	3			X	
6.15	Cold bend test	406 Mandrel ∅ and test load: Table 3 Temperature: product standard	3			X	Product standard
6.16	Flammability	407	3			X	Product standard