BS EN 4056-001:2015

BSI Standards Publication

Aerospace series — Cable ties for harnesses

Part 001: Technical specification

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee ACE/6, Aerospace avionic electrical and fibre optic technology.

A list of organizations represented on this committee can be obtained on request to its secretary.

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ISBN 978 0 580 86331 8

ICS 49.060

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2015.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 4056-001

June 2015

ICS 49.060

Supersedes EN 4056-001:2006

English Version

Aerospace series - Cable ties for harnesses - Part 001: Technical specification

Série aérospatiale - Frettes de câblage pour harnais - Partie 001: Spécification technique

Luft- und Raumfahrt - Befestigungsbänder für Leitungsbündel - Teil 001: Technische Lieferbedingungen

This European Standard was approved by CEN on 28 June 2014.

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Ref. No. EN 4056-001:2015 E

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Foreword

This document (EN 4056-001:2015) 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of an identical text or by endorsement, at the latest by December 2015, and conflicting national standards shall be withdrawn at the latest by December 2015.

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1 Scope

This European Standard specifies the characteristics, test methods, qualification and acceptance conditions of plastic cable ties, used for the bundling, fixing and/or marking of cable harnesses in aircraft. The cable ties should be installed with a qualified application tool, which controls the application force thus avoiding damage to the cable insulation.

It defines the aerospace requirements not specified in EN 62275.

2 Normative references

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

EN 2424, *Aerospace series — Marking of aerospace products*

EN 2825, *Aerospace series — Burning behaviour of non metallic materials under the influence of radiating heat and flames — Determination of smoke density*

EN 2826, *Aerospace series — Burning behaviour of non metallic materials under the influence of radiating heat and flames — Determination of gas components in the smoke*

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

EN 4056-002, *Aerospace series — Cable ties for harnesses — Part 002: Index of product standards*

EN 4057 (all parts), *Aerospace series — Cable ties for harnesses — Test methods*

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

EN 62275, *Cable management systems — Cable ties for electrical installations*

ISO 8815, *Aircraft — Electrical Cables and Cable Harnesses — Vocabulary*

MS 90387, *Tool, hand, adjustable for plastic and metal tie down straps* [1)]

3 Terms and definitions

For the purposes of this standard, the terms and definitions given in EN 3475-100 and ISO 8815 and the following apply.

3.1
cable loom or cable harness
any assembly of cables, complete with end terminals, which may be manufactured and formed on or off the aircraft, with two or more end destinations

3.2
cable bundle
any group of cables which are tied together

1) Published by: DoD National (US) Mil. Department of Defense. http://www.defenselink.mil/

4 Conditions of use

4.1 Temperature ratings (type)

The ties shall be capable of use within the temperature range specified in the product standards.

Temperature ratings shall be defined by the material codes specified in EN 4056-002.

4.2 Flammability class

Ties shall meet either class 1 or class 2 flammability requirements as defined Table 2 test EN 4057-302 and in the appropriate product standard:

— Class 1 has the highest degree of flame retardant properties;

— Class 2 has a lower degree of flame retardant properties.

5 Descriptions and design

5.1 Description

Ties, see Figure 1, shall be designed for installation by a tool providing controlled tension in accordance with MS 90387. The head design, locking system and strap cross sectional dimensions shall be such that the requirements of the tests given in Clause 6 are met. Ties are available with plastic or metallic locking mechanisms and those with plastic locking mechanisms may have either internal or external serrations on the strap.

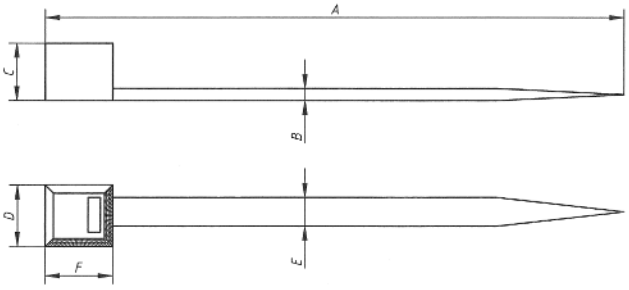

Figure 1

5.2 Design and manufacture

The finish shall prevent abrasion to the harness and to adjacent harnesses or breakouts. In completing the joint, no sharp or abrasive edges shall be formed that could damage the cable insulation of the loom or any adjacent looms, or that could cause injury to an operator.

5.3 Materials

Ties shall be made from virgin materials which may be formulated to be UV resistant. The use of in process reground material to a maximum of 25 % by mass is permissible but is limited to the percentage used in the qualification sample.

Materials shall be identified by the codes in EN 4056-002.

5.4 Colour

Ties shall be either natural or un-pigmented material finish or a colour according to the codes shown in Table 1.

Table 1 — Colour codes

Code	Colour
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet
8	Grey
9	Natural/un-pigmented

The colour shall be uniform throughout any coloured tie.

6 Tests

All non-metallic materials used for the manufacture of cable ties shall be tested for their smoke and toxicity properties in accordance with EN 2825 and EN 2826 as defined in the product standard.

Finished products shall be tested as detailed in Table 2 and the product standard. Before commencement of these tests the calibration of the application tools to be used shall be verified in accordance with EN 4057-407.

Table 2 — Tests *(1 of 2)*

EN 4057-	Designation of the test	Number of specimens	Details
201	Visual examination	All test specimens to be examined.	There shall be no sharp or abrasive edges.
202	Examination of mass and dimensions	All test specimens to be tested.	The mass and dimensions shall be in accordance with the product standard.
301	Salt mist test (applicable to ties containing metallic locking barbs)	3 specimens for each cross section grouping (i.e. loop tensile strength group).	The minimum loop tensile strength shall be in accordance with the product standard. The locking device shall show no sign of corrosion.
302	Flammability	3 specimens (see Table 5) of the largest cross-section each material code. (i.e. loop tensile strength group) [a]	After removal of the burner from the specimen, any flame shall extinguish within 5 s. If there are no flaming droplets (or particles) during the test, and the flame extinguishes within 5 s, the specimen will be classified as Class 1. If there are flaming droplets (or particles) but all the flames extinguish within 5 s, the specimen will be classified as Class 2.
303	Resistance to fluids	3 specimens for each material type and or class for each of the test solutions.	The minimum loop tensile strength should be in accordance with the product standard.
304	Loop tensile strength at maximum working temperature	3 specimens for each cross section grouping (see Table 5) (i.e. loop tensile strength group).	The minimum loop tensile strength should be in accordance with the product standard.
305	Colour fastness (applicable only to coloured ties)	1 specimen per colour, material type and material class.	The colour fastness of the specimen should be in accordance with the product standard.
306	Heat ageing test	3 specimens for each material code and cross section group.	The tensile strength shall not be lower than that specified in the appropriate product standard
307	Resistance to ultra violet radiation	As detailed.	The average elongation at break of the exposed samples shall be not less than 60 % of the figure for the unexposed samples.
401	Loop tensile strength	3 specimens per cross section grouping (see Table 5).	The minimum loop tensile strength shall be in accordance with the product standard.

Table 2 — Tests *(2 of 2)*

EN 4057-	Designation of the test	Number of specimens	Details
402	Life cycle	Specimens for each cross section grouping (see Table 5) (i.e. loop tensile strength group).	1. There shall be no damage to the cable insulation when viewed with a 10 times magnification aid. 2. The specimens shall be examined for cracks, breaking and/or release of the locking device during removal from the vibration test harness. 3. The minimum loop tensile strength shall be in accordance with the product standard.
404	Low temperature installation	3 specimens for each cross section grouping (see Table 5) (i.e. loop tensile strength group).	The minimum loop tensile strength shall be in accordance with the product standard.
405	Compass safe distance (applicable to ties containing metallic locking barbs)	1 specimen	The compass safe distance shall not exceed 125 mm.
406	Locking device retention (applicable to ties containing metallic locking barbs)	3 specimens	The force to pull out the barb from the tie head shall meet the requirement of the appropriate product standard.
407	Verification of application tool settings	5 specimens [a]	At the appropriate setting the reading for all 5 specimens shall be as detailed in the product standard $^{0}_{-10}$ %.

[a] Small sizes may contain insufficient mass for these tests to be performed satisfactorily.

7 Quality assurance

7.1 General conditions

Quality assurance conditions shall conform to EN 9133.

7.2 Qualification testing

All the applicable tests in Table 3 shall be performed on all types, classes and colours of product at the commencement of manufacture, the use of new manufacturing tooling or change of raw material. These tests shall also be carried out at the re-commencement of production in the event of a stoppage longer than three years.

7.3 Maintenance of qualification

For products in continuous production, the tests in Table 3, maintenance of qualification, shall be performed every three years.

Table 3 — Maintenance of qualification

EN 4057-	Designation of the test	Number of specimens
201	Visual examination	6 specimens to be tested
202	Examination of mass and dimensions	3 specimens to be tested
306	Heat ageing	3 specimens to be tested
401	Loop tensile strength	3 specimens to be tested
406	Locking device retention [a]	3 specimens to be tested
[a] Only for cable ties with metal locking barbs.		

7.4 Acceptance testing

Samples should be taken at random in every batch and a test should be carried out as shown in Table 4.

Table 4 — Acceptance

EN 4057-	Designation of the test	Number of specimens
201	Visual examination	6 specimens to be tested
202	Examination of mass and dimensions	3 specimens to be tested. Dimensions only.
401	Loop tensile strength	3 specimens per batch

8 Designation and marking

8.1 Marking

The manufacturer's monogram in accordance with EN 2424, style F shall be marked on the strap of the tie as close to the head as possible such that it is on the outside of the cable bundle after installation.

8.2 Designation

EXAMPLE

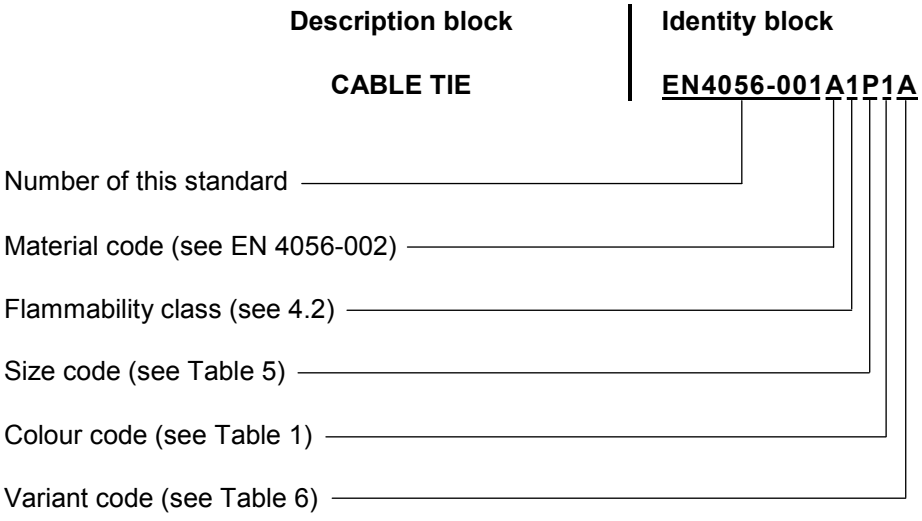

Table 5 — Size code

Size code	Recommended bundle diameter mm	
	min.	max.
P	1,6	20
R	1,6	50
S	1,6	80
T	10	100
U	1,6	110
V	10	130

Table 6 — Variant of cable tie (serration position)

Code	Description
A	Serrations inside
B	Serrations outside
C	No serrations

9 Packaging and storage

9.1 Packaging

Each packet shall be identified with the following information:

a) Product designation,

b) Manufacturers name,

c) Manufacturers part number,

d) Quantity,

e) Batch number and date of manufacture.

9.2 Storage

Until required for use, it is recommended that the product is protected from exposure to direct sunlight.

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