SLOVENSKI STANDARD
SIST EN 4111:2009

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Aeronavtika - Vijaļ niki (obroļ ni in nasadni) za cevne fitinge - Tehniļ na specifikacija

Aerospace series - Wrenches, splined, socket for pipe fittings - Technical specification

Luft- und Raumfahrt - Ringschlüssel und Steckschlüsseleinsätze für Rohrverschraubungen - Technische Lieferbedingungen

Série aérospatiale - Clés et embouts cannelés, à tuyauter - Spécification technique

Ta slovenski standard je istoveten z: **EN 4111:2006**

ICS:

49.030.99 Drugi vezni elementi Other fasteners

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English Version

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Foreword

This European Standard (EN 4111:2006) has been prepared by the European Association of Aerospace Manufacturers - Standardization (AECMA-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 AECMA, 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of an identical text or by endorsement, at the latest by November 2006, and conflicting national standards shall be withdrawn at the latest by November 2006.

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1 Scope

This standard specifies the requirements which must be met by hand-operated splined wrenches and sockets for aerospace applications.

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 4156, *Straight cylindrical involute splines — Metric module, side fit — Generalities, dimensions and inspection.*

ISO 6508 (all parts), *Metallic materials — Rockwell hardness test.*

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

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply.

3.1
batch
a batch consists of wrenches or sockets of the same types and of the same materials defined by the same standard

4 Required characteristics

4.1 Materials

The materials shall meet the required characteristics specified in the product standard.

4.2 Physical characteristics

4.2.1 Surface condition/appearance

The hand-operated wrenches or sockets shall be free from pitting, deposits, forging flashes, cracks, splits, burrs and other defects liable to impair their characteristics and their endurance and to cause injury to operators.

4.2.2 Surface coating

The surface coating shall be that laid down in the product standard.

4.2.3 Characteristics of the inner profile of the splines

All of the splines shall be free from burrs and rough spots. The surface roughness is specified in the product standard.

4.3 Mechanical characteristics

The strength and endurance of the various types of wrench are tested by torque tests, the procedures for which are described in Clause 5.

At the end of the strength and endurance test, the wrenches or sockets shall not exhibit deterioration or distortion as defined below:

— The tips of the splines shall not exhibit rounding or fretting and shall be in accordance with the characteristics described in 4.2.3;

— The wrench or socket shall be free from cracks;

— The general surface condition shall be in accordance with the requirements of 4.2.1;

— Distortion of more than 0,05 mm of the outer diameter of the sockets and wrench heads;

— The surface coating shall show no significant sign of deterioration or flaking;

— Permanent distortion of the wrench handle of more than 5°;

— A Rockwell hardness test (ISO 6508) shall demonstrate values in accordance with the values indicated in the product standard.

4.4 Dimensions and tolerances

The dimensions and tolerances shall be in accordance with requirements of the product standard.

5 Test methods

5.1 Test equipment

The wrenches or sockets are fitted on a splined test mandrel. The mandrel dimensions for a relevant wrench shall be based on the maximum corresponding values for an external 45° pressure angle – side fit – root radius – 6H spline to ISO 4156, and a hardness of 60 HRC.

5.2 Test on splined wrenches and sockets

The wrenches or sockets shall be fully engaged on the mandrel; during the test, the wrench shall be moved smoothly without knocks and jerks.

The load shall be applied as far away as possible on the arm of the wrench or at the driving square of the sockets, perpendicularly to the axis, continuously and progressively up to the torque value appropriate to the wrench under test.

5.3 Conduct of the test

On each wrench or socket tested, carry out a cycle of 500 applications, at maximum rate of 60 per minute, at the endurance torque indicated in Table 1. At the end of each 100 applications, apply the resistance torque, which is equivalent to 1,5 times the endurance torque indicated in Table 1, and move the wrench 1/8 of a turn.

In the case of double-ended wrenches, each end shall be tested.

Table 1 — Resistance and endurance torque values

DN [a]	Resistance torque Nm	Endurance torque Nm
4	27	18
6	42	28
8	48	32
10	54	36
12	62	42
13	66	44
14	71	47
16	83	55
18	98	65
20	128	85
22	158	105
25	188	125
32	218	145

[a] DN: Diameter Nominal (outside diameter of the corresponding pipe)

6 Quality assurance

6.1 Qualification

EN 9133: Requirement for ISO 9000:2000 not applicable.

Qualification tests specified in this document shall be applied to each type and each dimensional combination of wrench of socket in accordance with Tables 2 and 3.

Some or all of these tests may also be used for acceptance of function where a more comprehensive test proves necessary.

6.2 Acceptance

The aim of the acceptance tests is to check, as simply as possible, that wrenches or sockets from different batches satisfy the requirements of this standard.

The acceptance tests shall be conducted on wrenches or sockets chosen at random from different production batches in accordance with Tables 4 and 5.

7 Marking/packaging

7.1 Marking

The marking is specified in the product standard.

7.2 Packaging

The packaging of the wrenches or sockets is left to the choice of the manufacturers.

Table 2 — Summary of qualifications and production acceptance tests

Characteristics	Qualification		Production acceptance	
	Clause	Sample size	Clause	Sample size
Non destructive				
Dimensions and tolerances	4.4	5	4.4	Table 4
Marking	7.1	5	–	–
Surface condition/appearance	4.2.1	5	4.2.1	Table 4
Surface coating	4.2.2	2	–	–
Characteristics of the inner profile of the splines	4.2.3	2	4.2.3	Table 4
Destructive				
Test methods	5	4	5	Table 5
Mechanical characteristics	4.3	4	–	–

Table 3 — Qualification tests for each size of wrench or socket sample

Type of test	Defined in	Wrench or socket sample number				
		1	2	3	4	5
Non destructive						
Dimensions and tolerances	4.4	X	X	X	X	X
Marking	7.1	X	X	X	X	X
Surface condition/appearance	4.2.1	X	X	X	X	X
Surface coating	4.2.2		X		X	
Characteristics of the inner profile of the splines	4.2.3			X	X	
Destructive						
Test methods	5	X		X	X	X
Mechanical characteristics	4.3	X		X	X	X