
**Aerospace — Collar, threaded, self-
locking — Test method for torque and
preload**

*Aéronautique et espace — Bague filetée, à freinage interne —
Méthode d'essai de couple et de précharge*

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 4, *Aerospace fastener systems*. [ISO 23886:2021](https://standards.iteh.ai/catalog/standards/sist/74d2b534-1656-430d-8691-85731d710971/iso-23886-1-2021)

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Aerospace — Collar, threaded, self-locking — Test method for torque and preload

1 Scope

This document describes torque and preload test method for threaded collars. This test method is used to measure the locking torque, breakaway torque, torque off and preload of threaded collars.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

locking torque

highest torque value obtained in the installation direction prior to contact with the bearing surface

3.2

breakaway torque

torque required to start threaded collar rotation from its installed position

Note 1 to entry: The breakaway torque shall be measured after twisting off the hex portion and after removal of the preload.

Note 2 to entry: The breakaway torque is for seated breakaway test only.

3.3

test bolt

bolt to be used in conjunction with the collar during the test

4 General requirements

4.1 Test apparatus

A torque tension test bench, torsion machine or the equivalent precision machine shall be used for the test, which shall have been calibrated within a period of 12 months prior to the test date.

4.2 Test bolt

Test bolt shall be in accordance with product specification.

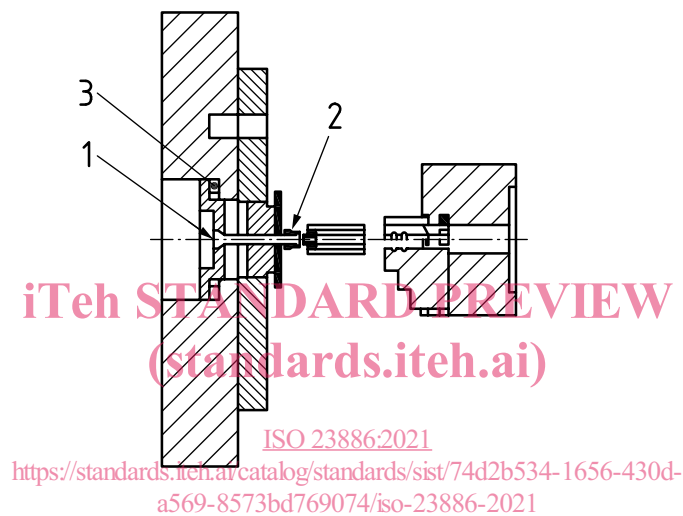
4.3 Test accessories

The material of the collar bearing surface (see [Figure A.2](#), item 8) shall be alloy steel; the roughness of the interface contacting with the collar shall be between $R_a = 0,4 \mu\text{m}$ and $R_a = 0,8 \mu\text{m}$. The hardness shall be 50 HRC to 60 HRC.

5 Detail requirements

5.1 Test procedures

- a) Install the test bolt on the torsion machine; install the threaded collar finger tight against the locking element; install the threaded collar hex head into the socket adapted to the machine drive mechanism. See [Figure 1](#). Measure the distance between the end surface of the bolt and threaded collar; then calculate the cycling number.



Key

- 1 test bolt
- 2 threaded collar
- 3 cell

Figure 1 — start point at the assembling process

- b) Rotate the threaded collar at the rate of $(10 \pm 2) \text{ r/min}$. Continue applying the torque until the threaded collar seats (the hex portion of threaded collar twists off), as shown in [Figure 2](#).

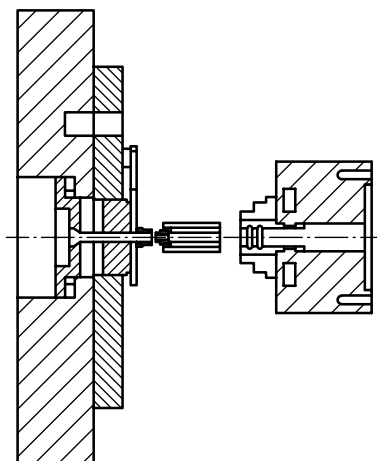


Figure 2 — the assembling process

- c) Release the axial load. A recommended test fixture is given in [Annex A](#). Relative rotation between test bolt and threaded collar is not possible during the process.
- d) The unlocking area of threaded collar shall be clamped by the torsion machine, as shown in [Figure 3](#). Reverse the torque at the speed of (10 ± 2) r/min.

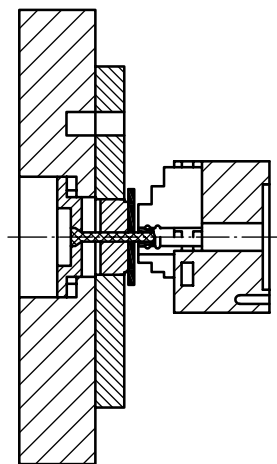


Figure 3 — the disassembling process

5.2 Experiment data processing

Record the angle and corresponding torque during the test and record the torque-angle curve and tension-angle curve, and determine the locking torque, preload, torque off and breakaway torque as shown in [Figure 4](#).

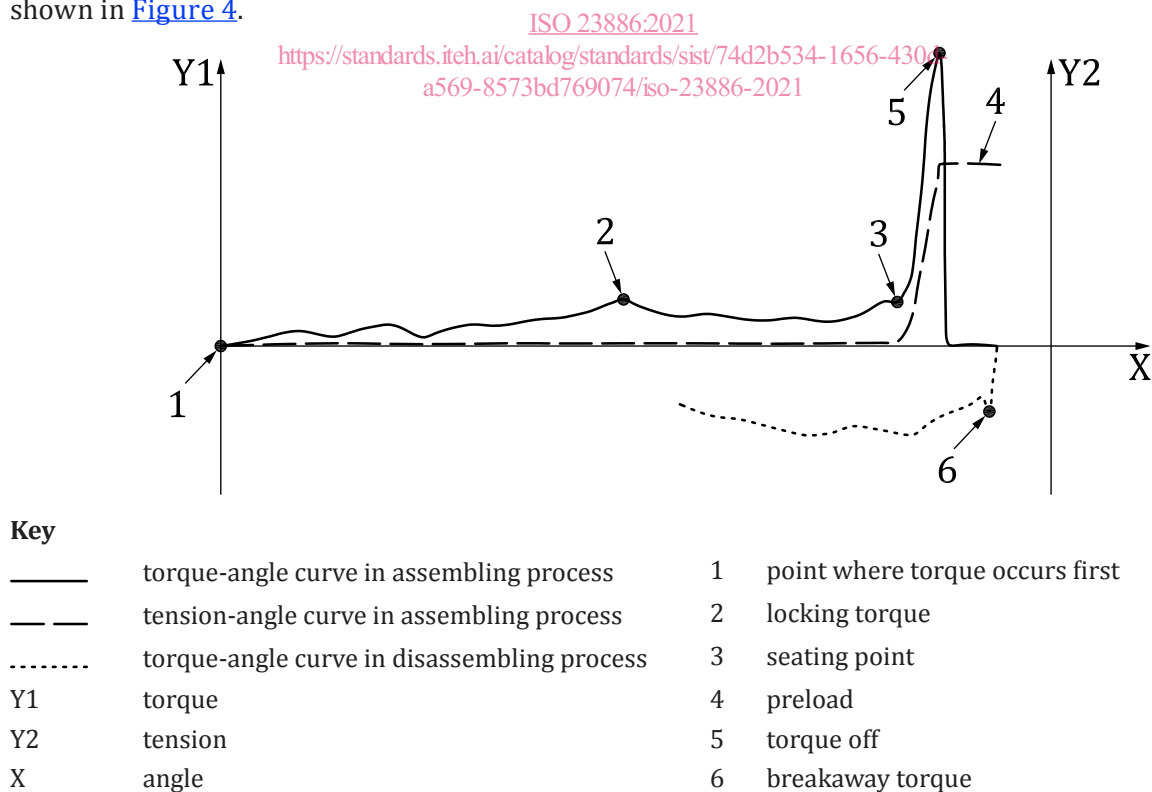


Figure 4 — Torque/Tension/Angle curve

5.3 Test reports

The test report shall include the following data:

- a) part number, lot identification and manufacturer of collar;
- b) model, serial number and calibration date of test machine;
- c) locking torque, preload, torque off and breakaway torque;
- d) results.

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Annex A (informative)

Recommended test fixture

Recommended test fixtures for torque and preload are shown in [Figure A.1](#) and [Figure A.2](#).

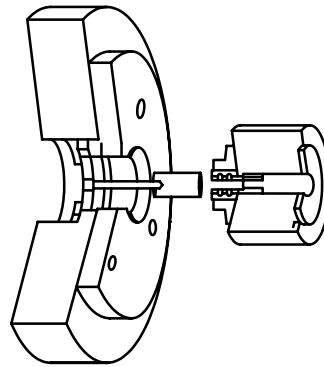
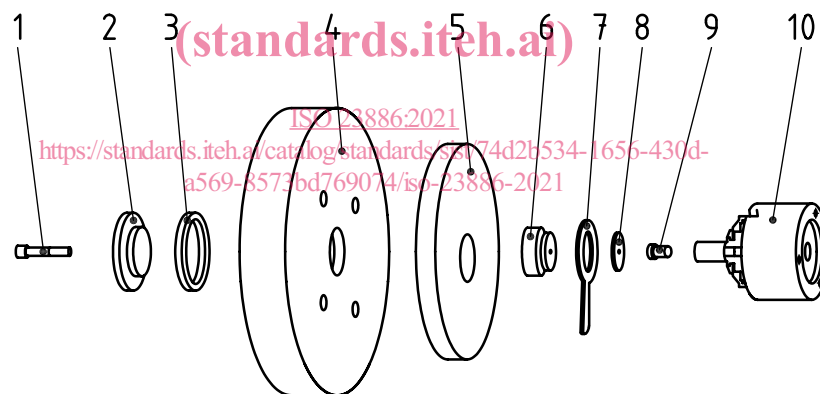


Figure A.1 — Sketch map of test fixture



Key

- | | | | |
|---|--------------------------------------|----|--|
| 1 | test bolt | 6 | preload release fixture with external left-hand thread |
| 2 | test bolt fixing device | 7 | washer fixing device |
| 3 | load cell | 8 | washer contacting with collar bearing surface |
| 4 | part of torsion machine | 9 | threaded collar |
| 5 | plate with internal left-hand thread | 10 | clamping chuck of torsion machine |

Figure A.2 — Exploded assembly drawing of test fixture

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