
**Commercial road vehicles — Flat
attachment fixing nuts — Test methods**

*Véhicules utilitaires — Écrous de fixation des roues à attache plate —
Méthodes d'essai*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 10597 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 19, *Wheels*.

Annex A of this International Standard is for information only.

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Introduction

This International Standard was developed to provide test methods for evaluating flat attachment fixing nuts for use as wheel fasteners. The test methods are based on needs of the wheel to function properly. These fasteners were first standardized dimensionally in ISO 7575 and this International Standard extends this standardization.

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Commercial road vehicles — Flat attachment fixing nuts — Test methods

1 Scope

This International Standard specifies test methods for hexagonal nuts with flat seating captive washer for 18 mm, 20 mm and 22 mm studs.

This International Standard applies to nuts as specified in ISO 7575. Test methods and performance requirements necessary to ensure proper wheel or rim assembly are specified. Fasteners for less common and special applications are not included.

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2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 6157-2:1995, *Fasteners — Surface discontinuities — Part 2: Nuts.*

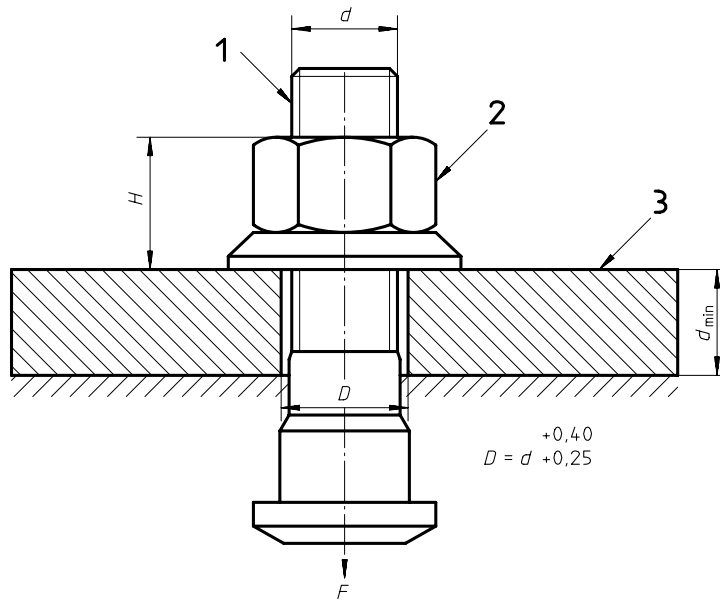
ISO 7575:1993, *Commercial road vehicles — Flat attachment wheel fixing nuts.*

3 Test method for nut body

3.1 Proof load test procedures

Use only fully processed nut assemblies, which are production parts intended for the vehicle. The initial height of the nut (H) shall be measured before beginning the proof load/compression test. The nut shall be loaded on a threaded fixture or bolt as shown in figure 1 or 2. The complete nut assembly shall be loaded axially through the threads three times to a load of $0,6 F$. After three loadings, a fourth loading of $1 \times F$ shall be applied. [Values for proof load (F) calculated for nuts in property class 10 are given in table 1.] The load shall be held for 15 s. The nut shall resist the load without failure by stripping or rupture and shall be removable by hand after the load is released. If the threads on the bolt or test fixture are damaged during the test, the test should be discarded. The test fixture or test bolt (suggested class 10.9 or higher) used shall be threaded to a tolerance class that is representative of the parts to be used in production.

NOTE — It may be necessary to use a manual wrench to start the nut in motion. Such wrenching is permissible, provided that it is restricted to one-half turn and that the nut is then removable by hand.

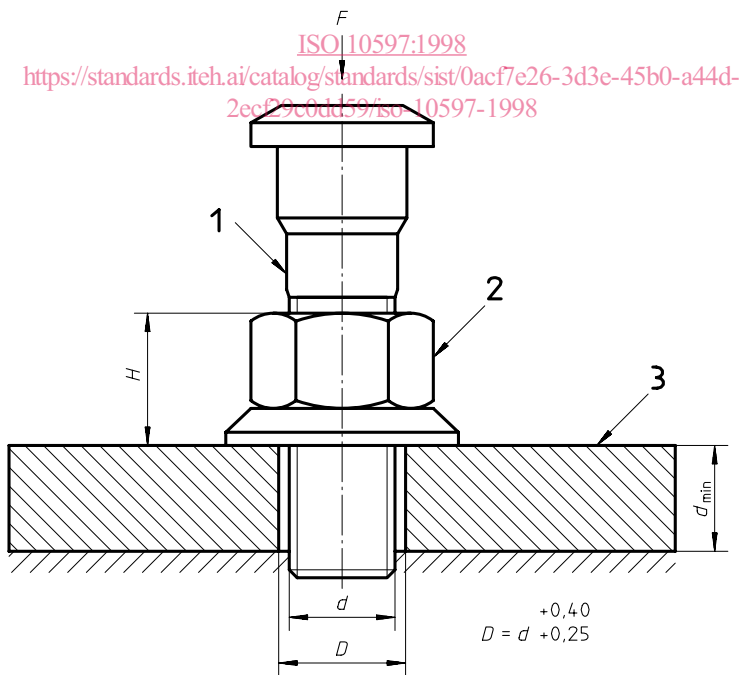


Key

- 1 Bolt or threaded fixture
- 2 Nut assembly
- 3 Fixed plate

Figure 1 — Two-piece flange nut proof/compression test arrangement

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Key

- 1 Bolt or threaded fixture
- 2 Nut assembly
- 3 Fixed plate

Figure 2 — Two-piece flange nut proof/compression test arrangement

3.2 Proof load values, F

Proof load values are given in table 1.

Table 1

Thread	Proof load values F kN
M18 × 1,5	232,2
M20 × 1,5	293,8
M22 × 1,5	359,6

3.3 Rejection criteria

The criteria for rejection due to cracks or other surface discontinuities are given in ISO 6157-2.

The permanent deformation in nut height (H) after unloading shall not exceed 0,13 mm.

Thread deformation shall be checked with a go/no-go thread gauge built to the specifications of the particular thread designation.

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4 Nut assembly test methods

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4.1 Torque/tension — Clamping force

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The purpose of this test is to ensure the ability of the nut assembly to provide proper clamping force. If the use of a lubricant is found to be necessary for components to conform to the acceptance criteria, this shall be stated in the test results. The specification of the lubricant, details of the surfaces lubricated, and the frequency of reapplication shall also be stated. The coefficient of friction should be representative of production parts. The wheel or vehicle manufacturer may determine the friction levels necessary for actual applications.

4.1.1 Selection

Use only fully processed nut assemblies which are representative of production parts intended for the vehicle. New and separate nuts and studs or bolts should be used for each test.

4.1.2 Test procedure

The nut shall be tested on a bolt test stand which can display all necessary data. The following data shall be recorded:

- overall tightening torque,
- bolt tension,
- head friction torque/thread friction torque (optional).

The force shall be applied using a tightening device with a rotational speed of 2 r/min to 10 r/min. Test bolts shall be representative of those used in production. The test method is to torque to the initial value shown in table 2 and take measurements of the tension of the bolt and then to continue to torque to the final value as shown in table 2 and again measure the tension of the bolt. Table 2 gives minimum and maximum test torques and tensions.

Table 2 — Test torques and tensions

Thread	Initial torque	Minimum initial tension	Final torque	Maximum final tension
	N·m	kN	N·m	kN
M18 × 1,5	250	80	420	225
M20 × 1,5	339	100	610	295
M22 × 1,5	500	133	700	310

4.1.3 Rejection criteria

The component shall be rejected if any of the following occurs (see table 2).

- a) inability to reach minimum tension value at initial torque;
- b) exceeding maximum tension value at final torque;
- c) stripping of the nut thread;
- d) inability to withstand final torque;
- e) a new visible crack penetrating through a section (commercially available crack detection devices and techniques may also be used to supplement visual inspection).

If the threads of the test bolt are damaged during test, the test shall be discarded.

Nut shall be evaluated for cracks prior to test as well as after.

NOTE — If any of the criteria listed in items a) to e) above are noted, it may be necessary to rerun the torque tension test on a hardened mandrel. This is needed to determine which part (the nut or the bolt) is the cause of the failure. This mandrel should be hardened to 45 HRC minimum and have threads representative of production bolts.

4.2 Torque/tension — Retorque

The purpose of this test is to ensure the repeatability of the torque/tension curve.

4.2.1 Selection

Use only fully processed nut assemblies and bolt surfaces which are representative of production parts intended for the vehicle. New and separate nuts and studs or bolts should be used for each test.

4.2.2 Test procedure

The nut should be retorqued to the final torque shown in table 2 five times on a machine according to the procedure given in 4.1.2.

4.2.3 Rejection criteria

All the rejection criteria given in 4.1.3 apply and, in addition, a 30 % drop in tension between the initial and fifth retorque shall also constitute a failure.

Annex A (informative)

Bibliography

ISO 898-6:1994, *Mechanical properties of fasteners — Part 6: Nuts with specified proof load values — Fine pitch thread.*

ISO 3894:1995, *Commercial vehicles — Wheels/rims — Test methods.*

ISO 3911:—¹⁾, *Wheels and rims for pneumatic tyres — Vocabulary, designation and marking.*

ISO 4107:1998, *Commercial vehicles — Wheel hub attachment dimensions.*

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