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Small craft — Remote steering systems for inboard mini jet boats

Petits navires — Appareils à gouverner commandés à distance pour petites embarcations à tuyère intérieure

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15652 was prepared by Technical Committee ISO/TC 188, *Small craft*.

Small craft — Remote steering systems for inboard mini jet boats

1 Scope

This International Standard specifies the minimum level of requirements for construction, operation and installation of remote steering systems for all small inboard jet boats weighing less than 1 000 kg, excluding water scooters.

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 8848:1990, *Small craft — Remote steering systems*

ISO 9775:1990, *Small craft — Remote steering systems for single outboard motors of 15 kW to 40 kW power*

3 Terms and definitions

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

3.1
console
structure that contains the steering helm, shift and throttle controls, switches, and instruments for use in the operation of mini jet boats

3.2
control station
console and its operating and/or controlling components, the only location in the boat from which steering, shift and throttle control may be achieved

3.3
control element
wheel, handlebar or joystick

3.4
handlebar
mechanical means for applying manual steering effort to the helm, normally a horizontal configuration with hand grips at each end and the helm connected at the middle

3.5
helm
mechanism, exclusive of a steering wheel or other means for manual application of controlling force, by which the controlling force is fed into a boat steering-system cable

3.6
joystick
mechanical means for applying manual steering effort into the helm, normally a vertical configuration with hand grips at the top end and the helm at the bottom end

3.7
mini jet boat
boat weighing less than 1 000 kg with an inboard engine powering a water-jet pump as its primary propulsion, designed to be operated with one or more persons within the confines of a hull

3.8
minimum retained system performance
system capability after test(s) such that at least 90 % of the steering arc normally available at each side of the mid-position may be attained by exertion of no more than 27 N·m of torque at the helm through the wheel or other normal control

NOTE This criteria does not define steering-system performance while a boat is underway, but is intended to provide quantitative limits for design and testing purposes.

4 Constructional requirements

4.1 General

All threaded fasteners whose integrity affects operation of the system, such that separation or loss of the fastener would cause sudden loss of steering without warning, shall be provided with a locking means.

Threaded fasteners whose integrity affects operation of the system, such that separation or loss of the fastener would cause sudden loss of steering without warning, and that may be expected to be disturbed by installation or adjustment procedures, shall be referenced by instructions for correct assembly and shall either

— be locked by a device whose presence is determinable by visual inspection, or by feel, following assembly, or

— incorporate integral locking means, provided the fastener cannot be omitted or substituted without making the system inoperable.

NOTE Self-locking nuts with plastic inserts that create mechanical plastic interference meet the requirements of this subclause.

Loose lockwashers, distorted thread nuts, or separately applied adhesives are prohibited.

Plain threaded jam nuts are prohibited.

For assemblies not intended to be disassembled for installation, the choice of locking means is at the discretion of the system manufacturer.

Mechanical fittings relying upon spring force for connection integrity shall not be used.

4.2 Helms

Helms that use a steering wheel shall be permanently marked with the manufacturer's recommendation of the largest wheel diameter and the deepest wheel dish that may be used. See Figure 1.

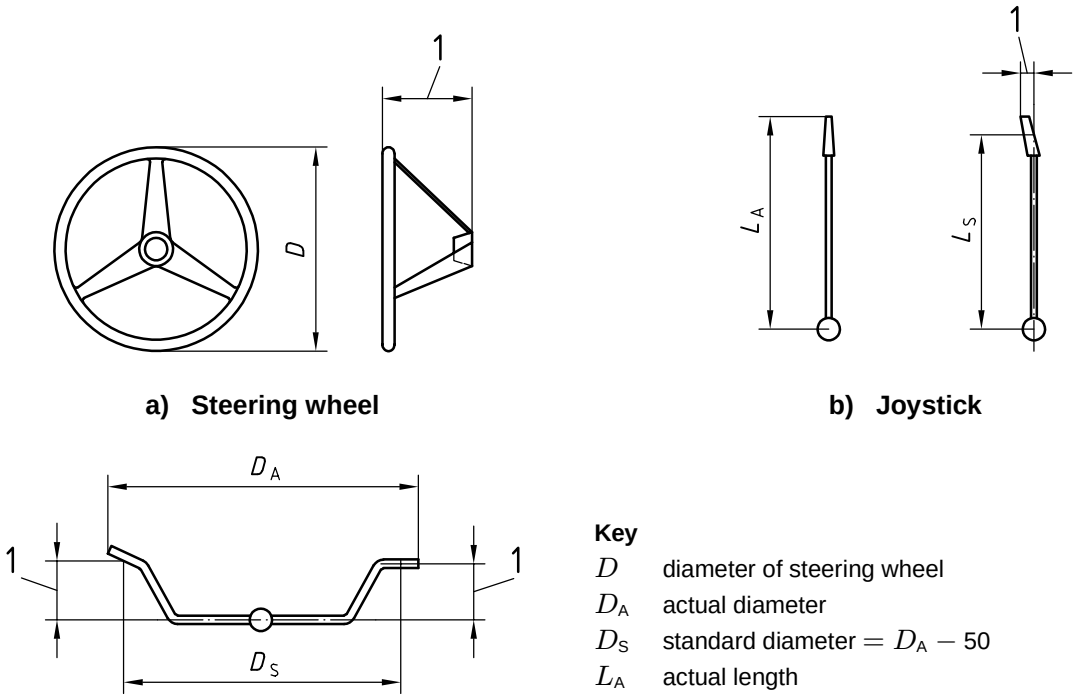
Helms that incorporate a handlebar shall be permanently marked with the manufacturer's recommendation of the largest handlebar length and greatest effective offset that may be used.

Helms that incorporate a joystick shall be permanently marked with the manufacturer's recommendation of the largest stick allowed.

Helms that use a handlebar or joystick shall be permanently marked with the manufacturer's recommendation of the largest envelope defined by Figure 1.

The helm shall incorporate travel stops to eliminate overloading of the steering cable.

Dimensions in millimetres



a) Steering wheel

b) Joystick

c) Handlebar

Key

D	diameter of steering wheel
D_A	actual diameter
D_S	standard diameter $= D_A - 50$
L_A	actual length
L_S	standard length $= L_A - 50$
1	dish

Figure 1 — Control elements

4.3 Cables

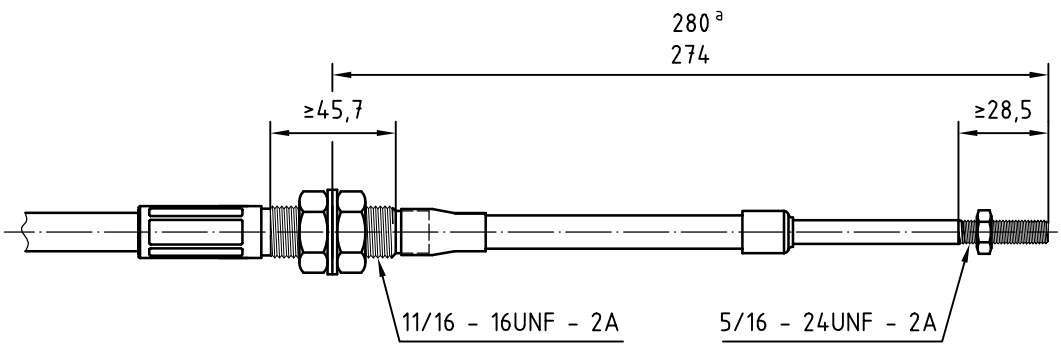
The cable or steering-system output device shall provide $89^{+6,4}_{0}$ mm of travel.

The cable or steering-system output device shall not be interchangeable with a steering cable that meets the dimensional requirements of ISO 8848 or ISO 9775 and shall follow the mounting specified in Figure 2.

If metal is used for the core of a steering cable, it shall be corrosion-resistant and equivalent to 300 series stainless steel.

The minimum bend radius of the cable shall be specified by the cable manufacturer.

Dimensions in millimetres



[a] Mid-travel.

Figure 2 — Output mounting configuration

4.4 Steering systems

Steering wheels and helm shafts shall be selected for proper fit in accordance with ISO 8848 and ISO 9775, see Figure 3.

Steering systems shall be capable of operating throughout a temperature range of − 20 °C to + 100 °C.

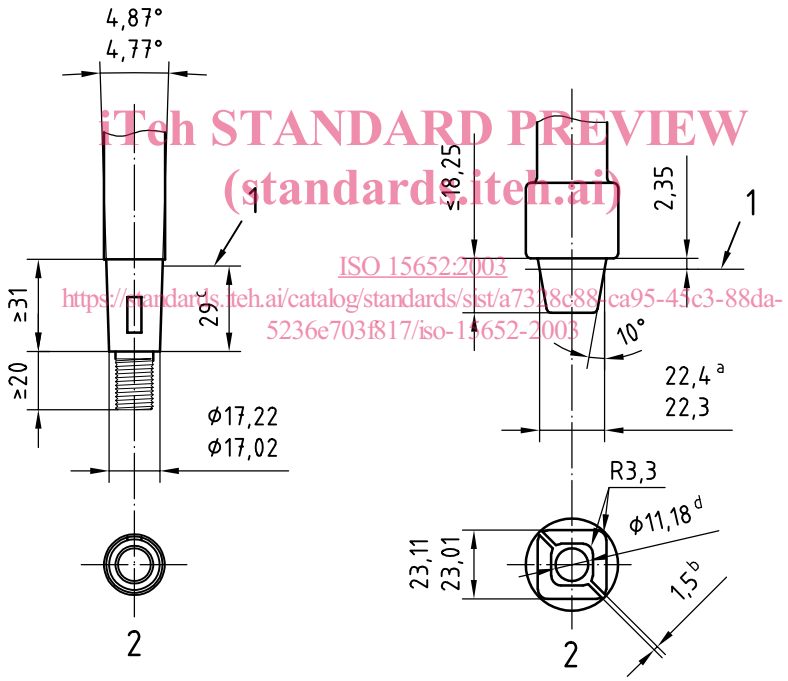
Plastics and elastomers that may be exposed to sunlight should be designed to resist degradation by ultra-violet radiation.

Steering systems and components shall be capable of meeting the applicable test requirements specified in this International Standard.

The steering system shall be capable of unobstructed movement throughout its full range of intended cable travel without interference.

Ball joints used to connect the steering system to the jet drive shall have redundancy such that axial failure of the ball-to-socket connection will not result in total loss of steering.

Dimensions in millimetres



Key

1 wheel level

2 shaft

[a] Square gauging dimension.

[b] Optional value.

[c] Reference value.

[d] Core diameter.

Figure 3 — Helm-shaft dimensions

5 Testing the steering

5.1 General

Component tests are intended to establish minimum acceptable design criteria for components of steering systems.

Each steering system, including helm, cable, and attachment components, shall withstand an axial cable load of 1 430 N in tension and compression, applied at the connection to the jet drive throughout its travel range, without severance of components.

The helm assemblies shall incur no loss of operating function after the following tests, when equipped with the steering wheel of largest diameter and deepest dish, the largest recommended joystick, or the largest recommended handlebar, for which the helm is rated.

5.2 Axial-force test

A 540 N push-pull force shall be cycled for 10 tension-to-compression cycles at a duration of 5 s, applied as appropriate:

— distributed over not more than 100 mm of the steering-wheel rim, applied axially to the helm shaft;

— distributed over not more than 100 mm of a hand grip of the handlebar, applied axially to the pivot shaft;

— distributed over not more than 100 mm of a joystick, applied axially to the joystick.

5.3 Tangential-force test

A 360 N force in either direction shall be cycled from zero-to-360-to-zero for 10 cycles at a duration of 5 s, applied as appropriate:

— at any point on the steering-wheel rim applied tangentially to the rim;

— at any point of maximum leverage of a handlebar applied in the direction of steering arc;

— at the point of maximum leverage of a joystick, applied perpendicularly to the joystick and in the direction of steering movement.

5.4 Fatigue test

The steering components shall withstand a cyclic force resulting from 360 N tension and compression, applied axially to the output of the steering cable, with the helm locked at the mid-travel position. This force shall be applied for 50 000 reversals without causing separation.

5.5 Impact test

5.5.1 Impact test 1

See Figure 4 for the impact-test fixture ($h = 210$ mm). The helm shall withstand a single impact of 170 N·m on the steering-wheel rim, on the hand grip of a handlebar, or on the hand grip of a joystick, without

— deformation that would cause loss of minimum retained system performance,

— propagation of any cracks existing before this test, or

— the appearance of new cracks.