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ISO 12858-3

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Optics and optical instruments — Ancillary devices for geodetic instruments —

Part 3: **Tribrachs**

Optique et instruments d'optique — Équipements annexes pour les instruments géodésiques —

Partie 3: Embases

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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 12858-3 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 6, *Geodetic and surveying instruments*.

ISO 12858 consists of the following parts, under the general title *Optics and optical instruments — Ancillary devices for geodetic instruments*:

— *Part 1: Invar levelling staffs*

— *Part 2: Tripods*

— *Part 3: Tribrachs*

Introduction

ISO 12858 consists of a series of parts which detail specifications for ancilliary devices to be used with geodetic instruments in surveying. This third part specifies requirements for Tribrachs.

Additional parts, covering further ancillary devices, may be added to ISO 12858 as the need arises.

Optics and optical instruments — Ancillary devices for geodetic instruments —

Part 3: Tribrachs

1 Scope

This part of ISO 12858 specifies the most important requirements of tribrachs used in geodesy for the connection of the instrument's body with its base.

The requirements in this part of ISO 12858, however, do not guarantee the full interchangeability of the instrument's body with tribrachs of different manufacturers, but give the detailed specifications of the clamp system to ensure the reliable mounting and clamping without prejudicing their performance and their usefulness. There are mainly two types of tribrach in use, categorized in this part of ISO 12858 as Types W and Z.

This part of ISO 12858 is applicable to tribrachs which are used for levels, theodolites, tacheometers, GPS equipment, EDM instruments and in combination with targets, reflectors, antennae etc.

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 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 9849, *Optics and optical instruments — Geodetic and surveying instruments — Vocabulary*

ISO 12858-2:1999, *Optics and optical instruments — Ancillary devices for geodetic instruments — Tripods*

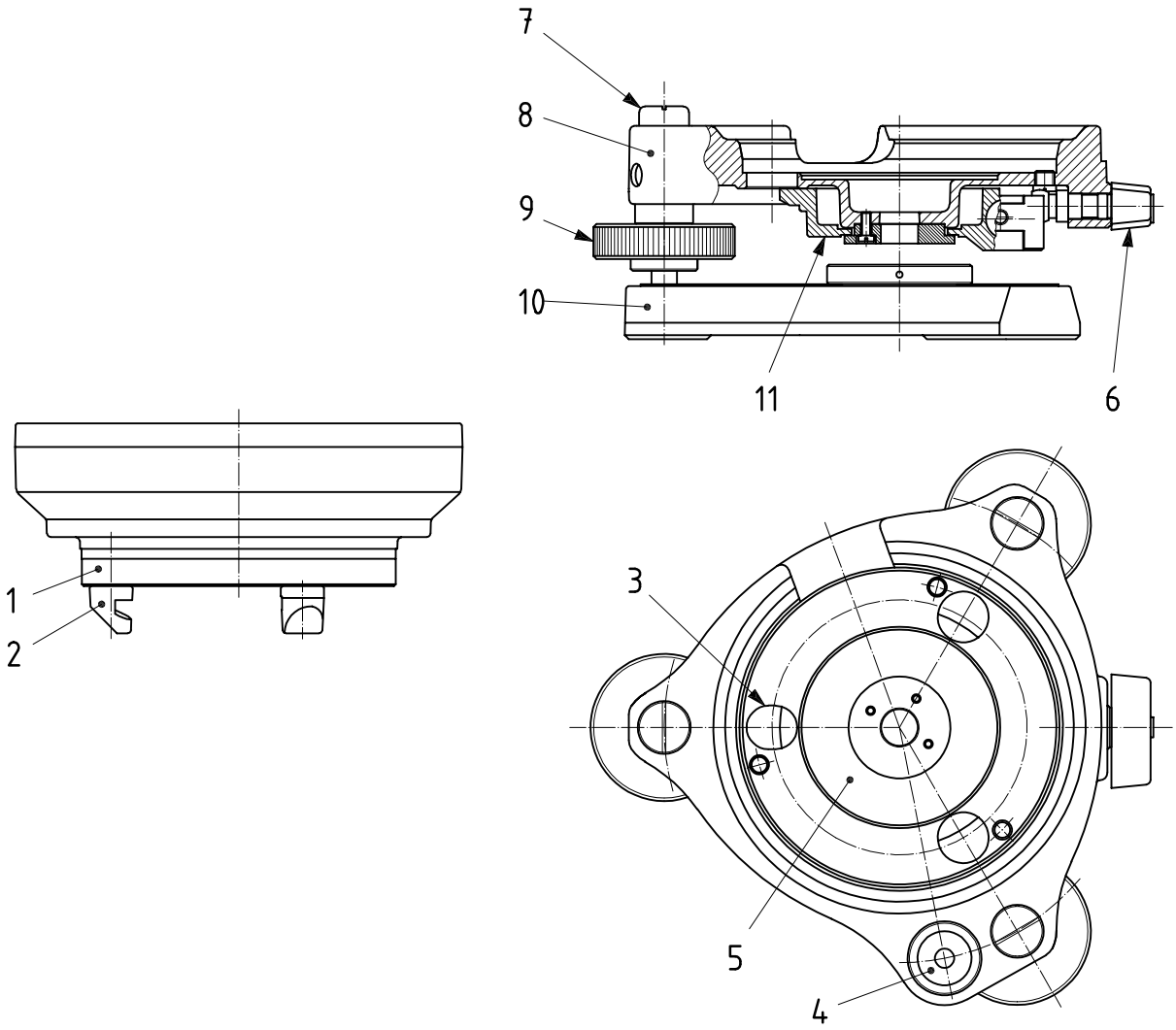
3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9849 apply.

4 Type W tribrachs

4.1 Nomenclature

The names of the most important parts of a Type W tribrach are given in Figure 1.



Key

1 pivot
2 hook
3 guide hole
4 circular level
5 socket
6 clamp knob
7 foot-screw cap
8 tribrach plate
9 foot-screw knob
10 base plate
11 fixing star

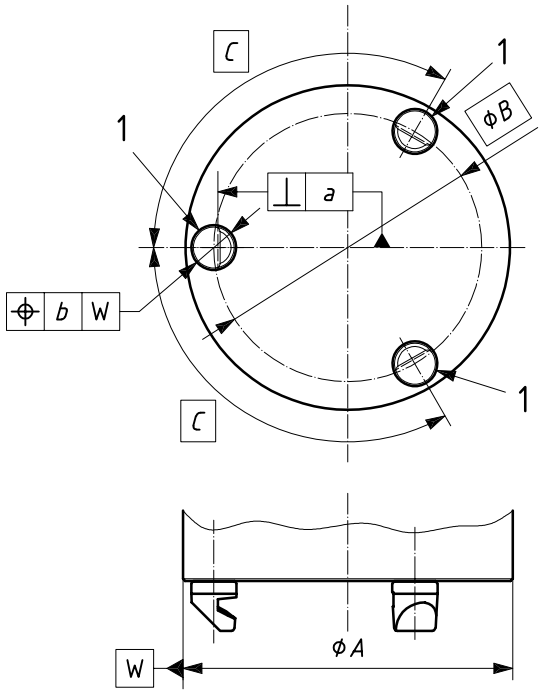
Figure 1 — Nomenclature for Type W tribrachs

4.2 General features — Dimensions

The mechanical properties and the base part of instruments shall comply with the values given in Table 1. The shape of the tribrach and the body as shown in Figures 2, 3 and 4 are examples for information only.

Table 1 — Mechanical properties of Type W tribrachs

Description	Symbol	Unit	Dimensions		Figure No.
			Nom.	Tol.	
Centring diameter	$\varnothing A$	mm	80	$^{-0,02}_{-0,07}$	2
Pitch circle diameter	$\varnothing B$	mm	65		2
Pitch circle angle	C	°	120		2
Orientation tolerance of hook flank	a	mm	0,1		2
Location tolerance of hook flank	b	mm	0,2		2
Lead angle of hook flank	D	°	95		3
Angle of hook flank	E	°	120		3
Radial height of root	F	mm	1	$\pm$ 0,1	3
Working position of bearing flank (∅58)	G	mm	3,5		3
Axial height of bearing flank (∅58)	H	mm	7,88		3
Flank location tolerance	c	mm	0,04		3
Angularity of flank	d	mm	0,025		3
Diameter of hook	$\varnothing I$	mm	11	$^{0}_{-0,05}$	3

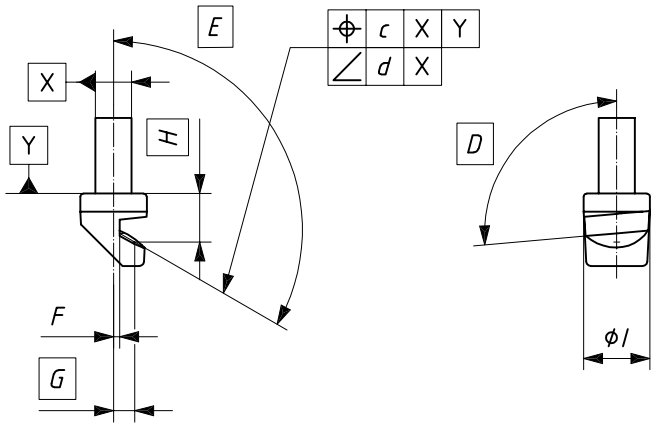


Key

1 hook (see Figure 3)

NOTE See Table 1 for explanation of symbols.

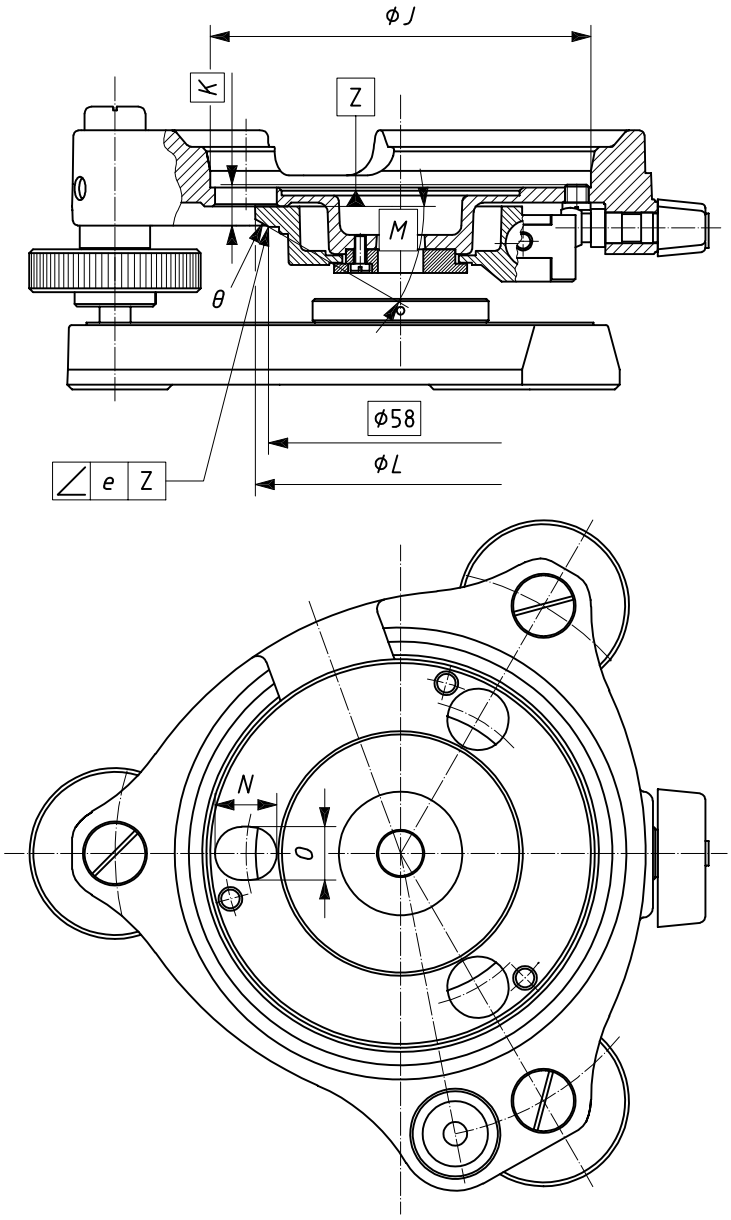
Figure 2 — Vertical axis holder of the instrument



NOTE See Table 1 for explanation of symbols.

Figure 3 — Details of the hook

Dimensions in millimetres



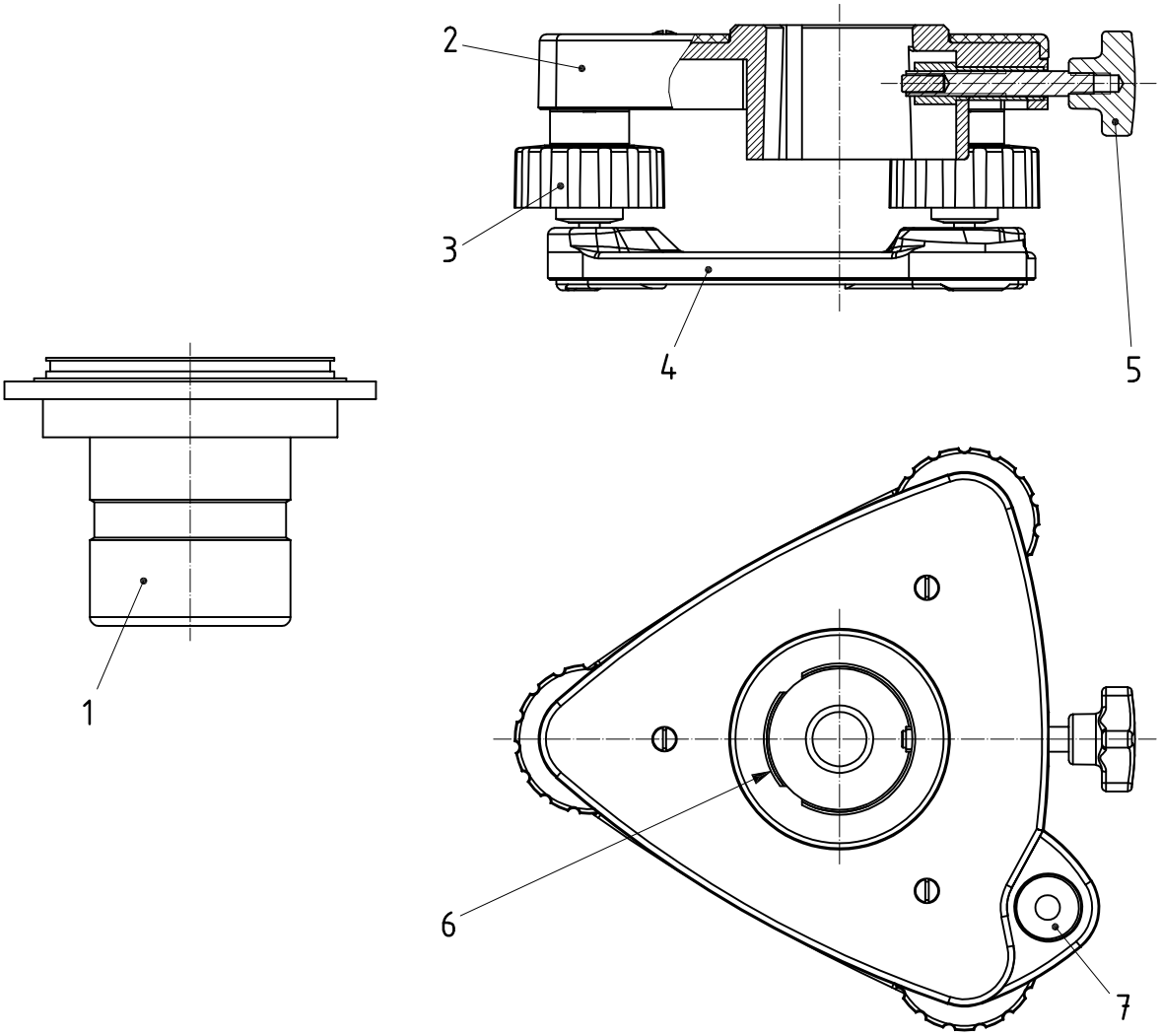
NOTE See Annex A for explanation of symbols.

Figure 4 — The tribrach dish and fixing star

5 Type Z tribrachs

5.1 Nomenclature

The names of the most important parts of a Type Z tribrach are given in Figure 5.



Key

1 pivot
2 tribrach plate
3 foot-screw knob
4 base plate
5 clamp screw
6 pivot hole
7 circular level

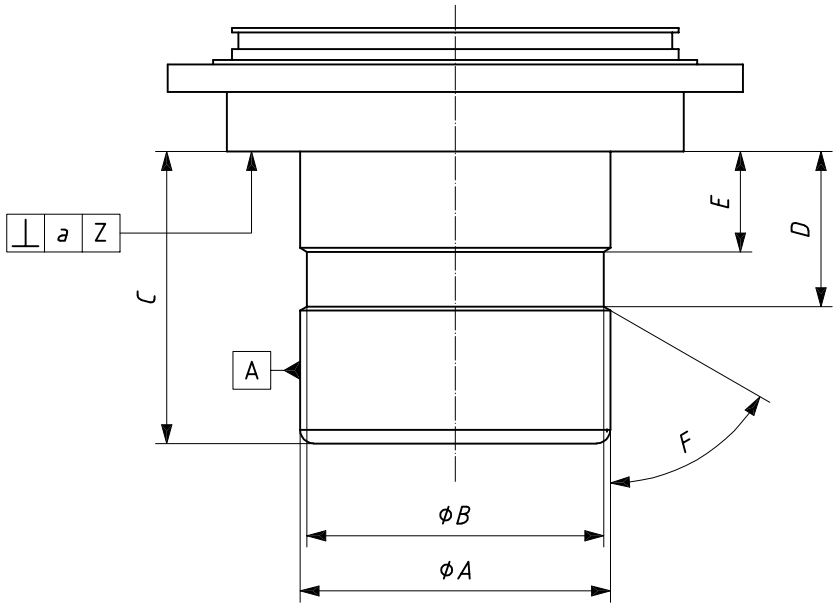
Figure 5 — Nomenclature for Type Z tribrachs

5.2 General features — Dimensions

The mechanical properties and the base part of instruments shall comply with the values given in Table 2. The shape of the tribrach and the body as shown in Figures 6, 7, 8 and 9 are examples given for information only.

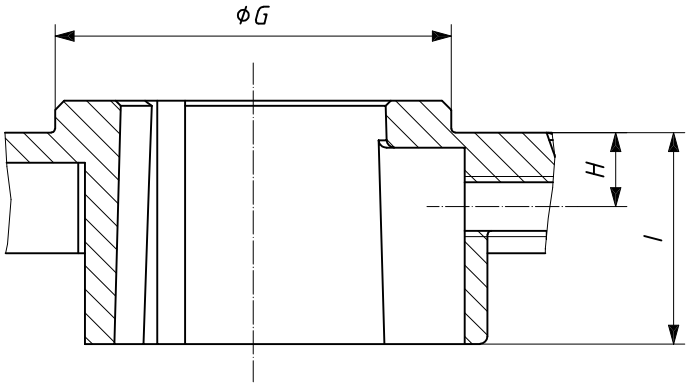
Table 2 — Mechanical properties of Type Z tribrachs

Description	Symbol	Unit	Dimensions		Figure No.
			Nom.	Tol.[a]	
Pivot diameter	$\varnothing A$	mm	34	h8	6
Constriction diameter	$\varnothing B$	mm	32,5		6
Pivot length	C	mm	33		6
Constriction length	D	mm	17	$^{+0,2}_{0}$	6
Pivot partial length	E	mm	11	$^{0}_{-0,2}$	6
Tolerance of the orthogonality	a	mm	0,01		6
Phase angle	F	°	60		6
Contact diameter	$\varnothing G$	mm	45		7
Distance clamp screw	H	mm	14	± 0,2	7
Total pivot hole length	I	mm	33,5		7
Free diameter pivot hole	$\varnothing K$	mm	> 35		8
Function diameter pivot hole	$\varnothing L$	mm	33,96	$^{+0,04}_{0}$	8
Max. distance to interface	N	mm	48,2		9
Max. width for an interface	O	mm	35		9
[a] For unspecified tolerances: ISO 2768-m.					



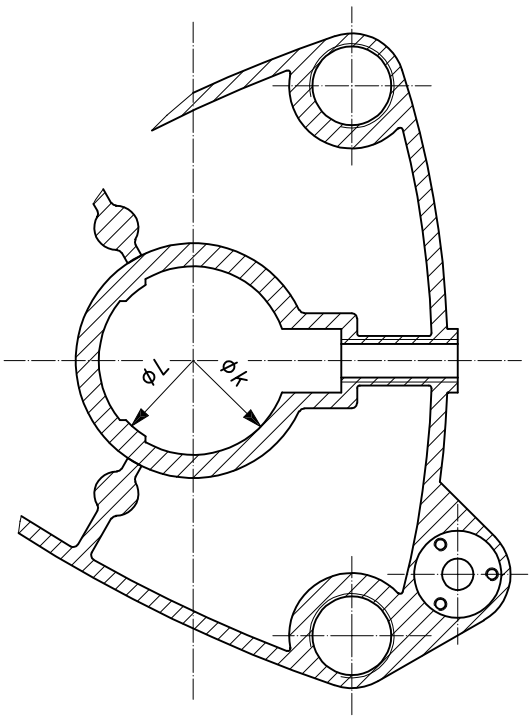
NOTE See Table 2 for explanation of symbols.

Figure 6 — Pivot



NOTE See Table 2 for explanation of symbols.

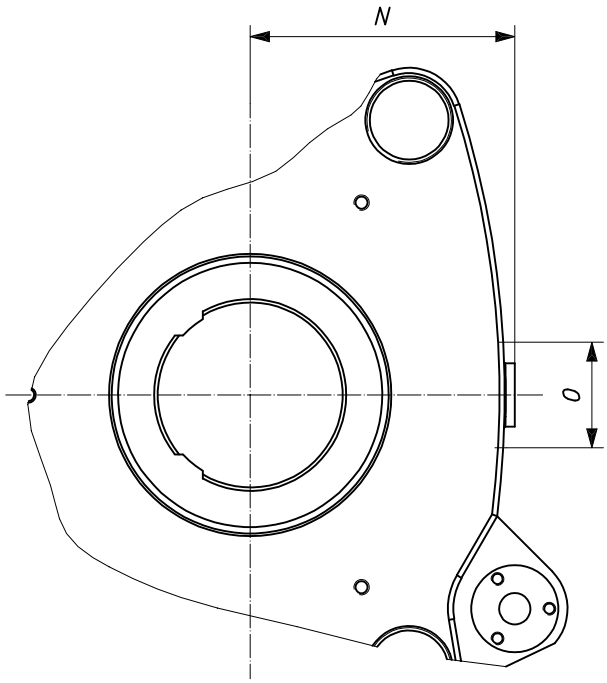
Figure 7 — Pivot hole



NOTE 1 See Table 2 for explanation of symbols.

NOTE 2 The shown solution is one of different possibilities.

Figure 8 — Pivot hole



NOTE See Table 2 for explanation of symbols.

Figure 9 — Space for power and data interface

6 Requirements

6.1 General

The tribrach shall be suitable for

— levelling of surveying instruments by using the levelling mechanism such as levelling screws;

— centring of surveying instruments with its centring telescope or through a hole.

Material, machining, surface treatment and assembling of the tribrach are left to the manufacturer's discretion.

6.2 Connection between the tribrach and the tripod

A 5/8 in (inch) nut thread shall be provided in the instrument base plate as specified in ISO 12858-2:1999, 6.3.

6.3 Torsional rigidity

The tribrach shall be capable of absorbing, without lasting deformation, the torsion which occurs when the instrument is used.

When testing the torsional rigidity, set up and fix the instrument with the tribrach on a hard rigid stand (instead of on a tripod), adjusting the cross-hair on a collimator or any target, applying a torque similar to the one which will be exerted on the tribrach when in the intended use (e.g. 0,3 N·m, 0,5 N·m, etc.) by pushing the side of the instrument in a clockwise direction. After releasing the torque, measure the remaining displacement in the horizontal angle. Then, repeat the same procedure in an anticlockwise direction, and read the remaining displacement.

It shall be the responsibility of the user to ensure that the tribrach has sufficient torsional rigidity to be compatible with the accuracy of the instrument.

6.4 Foot screw

The levelling mechanism, such as foot screws, shall enable a smooth and fine levelling operation.

6.5 Protection from corrosion

All components shall be resistant to, or protected from corrosion.

6.6 Clamp knob or clamp screw

6.6.1 Type W

The tribrach shall be equipped with a clamp knob or corresponding device which turns the fixing star and which operation shall be smooth to assure full function of the clamping mechanism.

6.6.2 Type Z

The tribrach shall be equipped with a clamp screw which fixes the pivot without destroying the pivot surface.

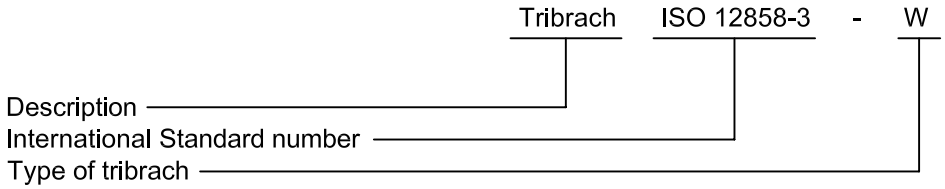
6.7 Circular level

The tribrach can be equipped with a circular level. This circular level shall be built at a position on the tribrach that it can be easily seen.

7 Designation and marking

The marking shall indicate at least the name or trademark of the manufacture (or the responsible supplier) of the tribrach.

The tribrach may be marked additionally on the flat face of the socket with the designation as shown below for the example of a Type W tribrach.



Annex A
(informative)

Recommendations for Type W tribrachs with improved stability

A Type W tribrach with mechanical properties complying with the values given in Table 1 ensures a reliable mounting and clamping without prejudicing its performance and usefulness. For improved stability, however, it is recommended to observe the additional mechanical properties as given in Table A.1.

Table A.1 — Additional mechanical properties for Type W tribrachs with improved stability

Description	Symbol	Unit	Dimensions		Figure No.
			Nom.	Tol.[a]	
Centring diameter	$\varnothing J$	mm	80	$^{+0,03}_{0}$	4
Axial height of working flank of fixing star (∅58)	K	mm	7,88		4
Lead angle (∅58)	θ	°	Pitch P= 16 mm/360° 5,02		4
Outer diameter of fixing star	$\varnothing L$	mm	61	± 0,3	4
Flank angle of fixing star	M	°	30		4
Angularity of flank angle	e	mm	0,025		4
Guide hole diameter	N	mm	13		4
Guide hole diameter	O	mm	11	$^{+0,2}_{+0,05}$	4

[a] For unspecified tolerances: ISO 2768-f.

ICS 17.180.30

Price based on 11 pages