INTERNATIONAL STANDARD

ISO 3174

Second edition
1994-12-01

Aircraft — Connections for checking hydraulic systems by ground appliances — Threaded type

Aéronefs — Raccords pour la vérification des circuits hydrauliques par des appareils au sol — Type fileté

Reference number
ISO 3174:1994(E)

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 3174 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 10, *Aerospace fluid systems and components*.

This second edition cancels and replaces the first edition (ISO 3174:1981), of which it constitutes a technical revision.

Annex A of this International Standard is for information only.

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Aircraft — Connections for checking hydraulic systems by ground appliances — Threaded type

1 Scope

This International Standard specifies the requirements for connections installed in aircraft hydraulic system pressure and suction lines, intended for checking the systems by means of ground appliances.

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 3323:1987, *Aircraft — Hydraulic components — Marking to indicate fluid for which component is approved.*

MIL-STD-810, *Environmental Test Methods and Engineering Guidelines.*

3 Basic connection elements

The basic elements and dimensions of the connections shall be in accordance with figure 1 and table 1.

4 Connecting thread

4.1 The profile, basic elements and dimensions of the three-start thread shall be in accordance with figure 2 and table 1.

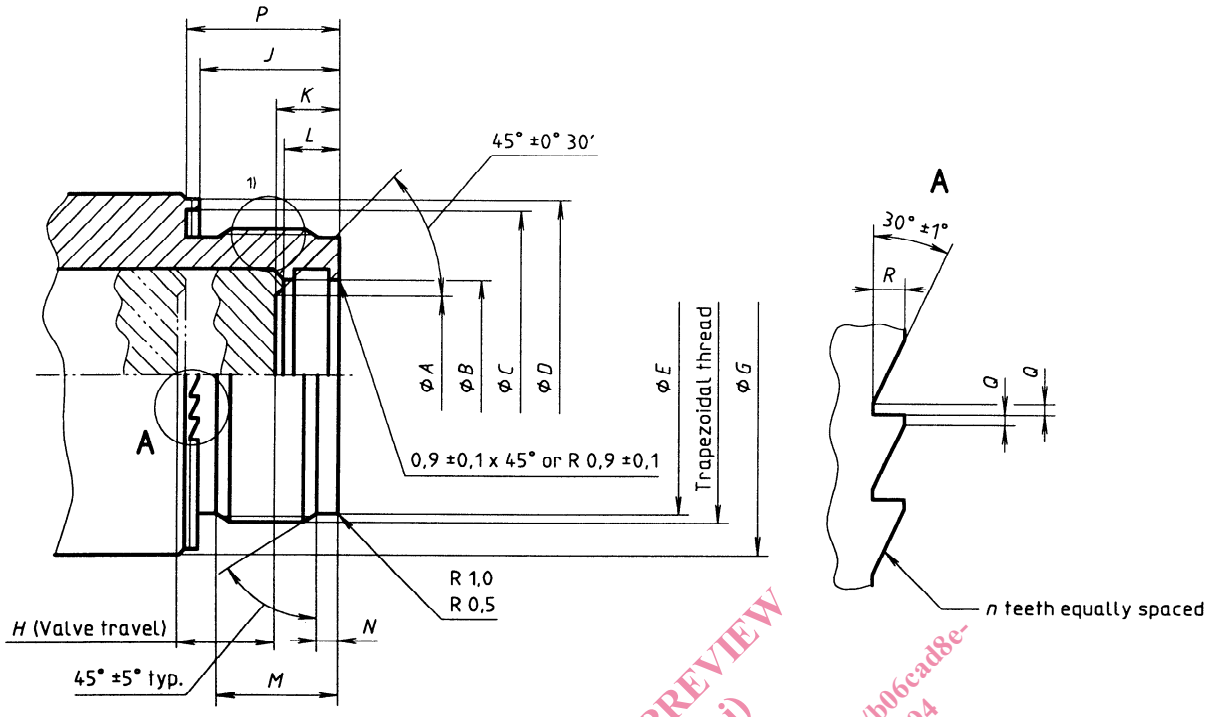
4.2 The end of the thread shall be relieved in order to ensure ease of engagement.

4.3 The thread shall be easily coupled or uncoupled from any position of engagement.

5 Installation of the connection

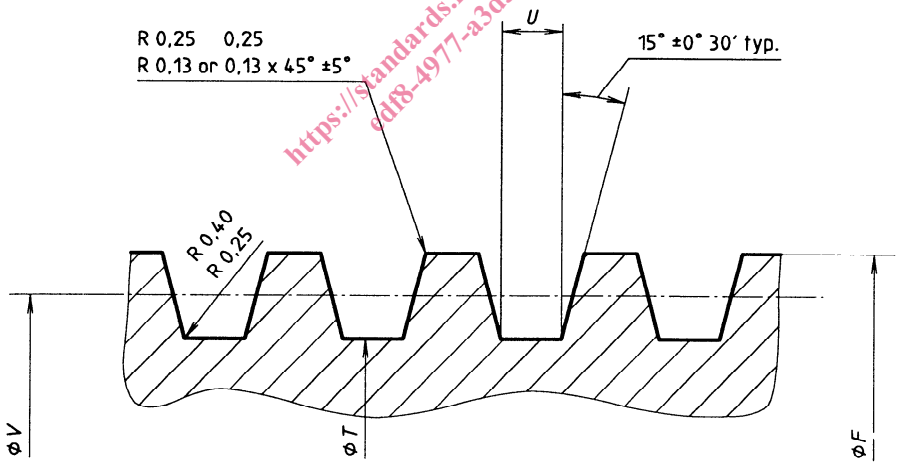
The clearance envelope for the connection on the aircraft shall be in accordance with figure 3.

Dimensions in millimetres



1) See figure 2.

Figure 1 — Basic dimensions of the aircraft connection



NOTE — The thread dimensions conform to ISO 2901, ISO 2902, ISO 2903 and ISO 2904 except for the modified radii.

Figure 2 — Three-start thread dimensions

Table 1 — Basic dimensions of aircraft connections

Dimensions in millimetres

Dimension		DN				
		12	20	25	32	40
A	± 0,12	10,28	14,48	18,8	28,58	32,77
B	max. min.	15,90 15,88	20,65 20,62	26,92 26,90	34,98 34,92	41,32 41,27
C	± 0,25	38,73	44,91	51,82	59,71	71,63
D	± 0,25	41,3	47,5	54,36	62,96	74,42
E	± 0,25	29,65	35,65	43,63	50,63	59,56
F		$34 ^{0}_{-0,236}$	$40 ^{0}_{-0,236}$	$48 ^{0}_{-0,236}$	$55 ^{0}_{-0,236}$	$65 ^{0}_{-0,300}$
G	max.	43,43	49,78	57,15	63,5	77,22
H	min.	9,65	11,18	14,99	16,51	19,56
J	± 0,5	18,42	19,18	26,11	26,42	30,86
K	± 0,38	9,02	10,03	12,7	12,19	12,95
L	± 0,25	8	8,76	11,18	10,92	11,43
M	min.	17	18,03	21,34	22,61	30,23
N	± 0,25	2,54	2,54	3,56	3,81	4,06
n		40	45	50	55	70
P	min.	21,08	21,97	28,7	28,83	34,04
Q	± 0,12	0,51	0,51	0,51	0,51	0,51
R	ref.	1,27	1,32	1,37	1,42	1,42
Trapezoidal thread[1)]		Tr 34 × 9 (P3)	Tr 40 × 9 (P3)	Tr 48 × 9 (P3)	Tr 55 × 9 (P3)	Tr 65 × 12 (P4)
T		$30,5 ^{0}_{-0,585}$	$36,5 ^{0}_{-0,585}$	$44,5 ^{0}_{-0,616}$	$51,5 ^{0}_{-0,616}$	$60,5 ^{0}_{-0,689}$
U		1,098	1,098	1,098	1,098	1,464
V		$32,5 ^{-0,085}_{-0,585}$	$38,5 ^{-0,085}_{-0,585}$	$46,5 ^{-0,085}_{-0,616}$	$53,5 ^{-0,085}_{-0,616}$	$63 ^{-0,085}_{-0,678}$

1) In accordance with ISO 2903.

Dimensions in millimetres (inches)

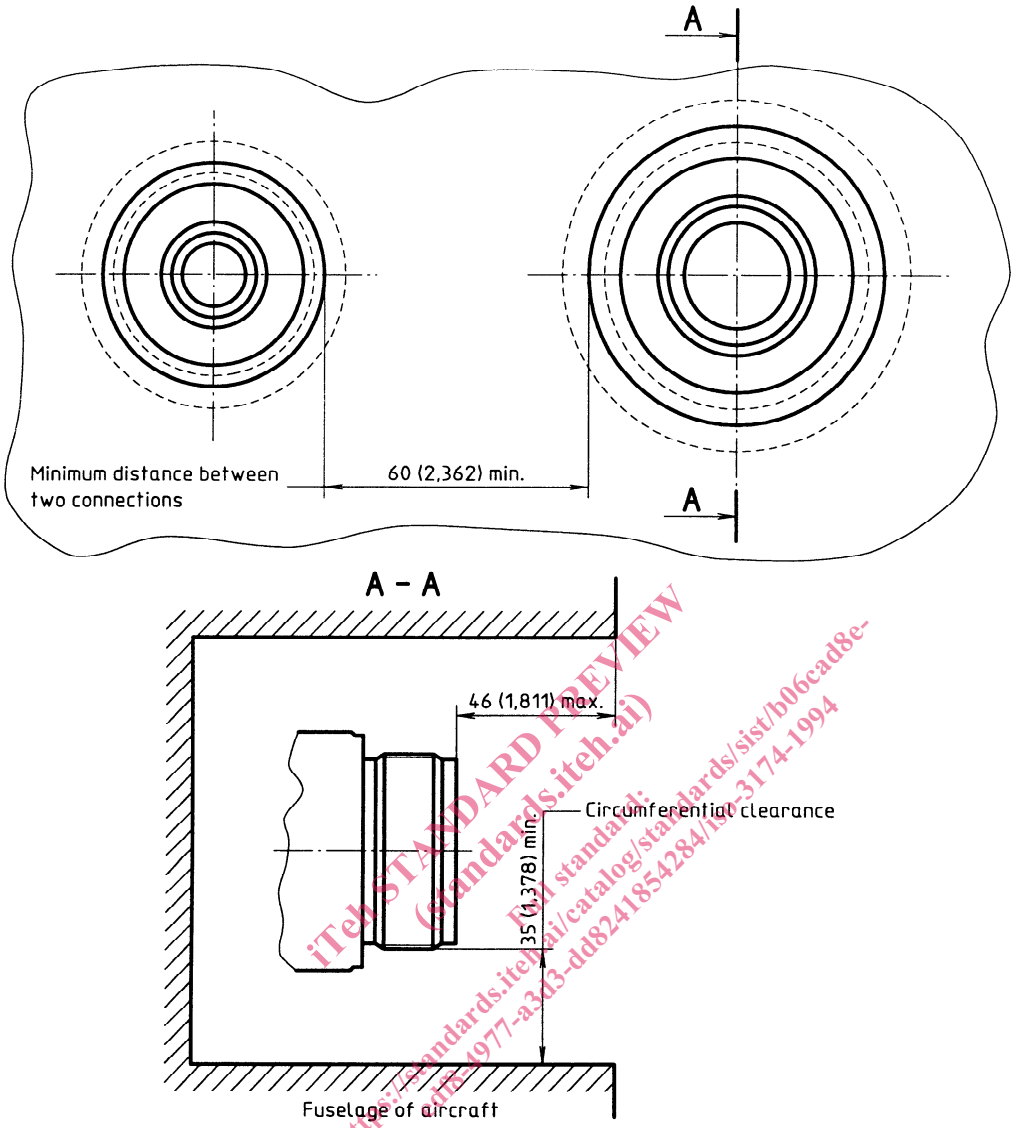


Figure 3 — Clearance envelope

6 Technical requirements

6.1 Design

6.1.1 Operating temperature

The connection shall be capable of continuous operation within a fluid temperature range from – 40 °C to + 96 °C. There shall be no damage when subjected to nonoperating (i.e. static) fluid temperatures of – 54 °C and + 135 °C.

6.1.2 Operating pressure

The operating pressure shall be as specified in table 2.

Table 2 — Operating pressures

Thread size DN mm	Pressure kPa
12	28 000
20	28 000
25	28 000
32	14 000
40	14 000

6.1.3 Ambient pressure

The connection shall be capable of continuous operation within an ambient pressure range from 3,8 kPa abs to 108,0 kPa abs.

6.1.4 Fire resistance

The connection shall be designed such that it will not promote combustion, or in the event of fire, will not sustain or support combustion.

6.1.5 Fungus resistance

The connection shall be designed such that it will not support fungus growth.

6.2 Functional

6.2.1 Coupling device

The coupling device shall be of a screw-together type. The airborne connection shall be a fixed male half and a cap supplied with an attachment chain or lanyard.

The caps shall be capable of withstanding all static and dynamic pressure conditions of the respective connection.

6.2.2 Handling

The mating ground connection and blanking caps shall be hand operated for coupling and uncoupling operations. It shall be possible to couple and uncouple with static pressures from 0 to 415 kPa at fluid temperatures from – 40 °C to + 70 °C.

6.2.3 Positive locking

Upon completion of coupling, there shall be an automatic engagement of a positive lock.

6.2.4 Accidental disconnection

Accidental disconnection shall be impossible.

6.2.5 Seal disconnection

There shall be no damage of the seals as a result of rotary and lateral movement during coupling and uncoupling operations.

6.2.6 Cross-coupling

Airborne connections shall be incapable of cross-coupling with ground connections of different sizes. Airborne connections shall also be incapable of cross-coupling with other airborne connections of the same or different sizes.

6.3 Performance tests

Connections supplied in accordance with this International Standard shall be representative of products which have been subjected to and which have successfully passed the requirements and tests specified in this International Standard.

6.3.1 Classification of tests

Tests specified in this International Standard are classified as follows:

a) acceptance tests (see 6.4)

b) qualification tests (see 6.5)

6.3.2 Test fluid

Unless otherwise specified, testing shall be conducted with a hydraulic fluid which is used in the intended application of the connection.

6.4 Acceptance tests

6.4.1 Examination of product

Each connection shall be examined as specified in 6.5.1.

6.4.2 Proof pressure

Each connection shall be tested as specified in 6.5.2.

6.4.3 Leakage

6.4.3.1 Leakage at low pressure

Each connection shall be tested as specified in 6.5.3.1 except that the total time of pressurization shall be 1 min.

6.4.3.2 Leakage at high pressure

Each connection shall be tested as specified in 6.5.3.2 except that the total time of pressurization shall be 1 min.

6.5 Qualification tests

6.5.1 Examination of product

The connection shall be examined to determine conformance to this International Standard with respect to design, basic connection elements and connecting threads.

6.5.2 Proof pressure

The coupled and uncoupled connections shall not leak when pressurized to 150 % of the appropriate operating pressure for 1 min (see table 2). Testing shall be conducted at a temperature of + 135 °C.

6.5.3 Leakage

6.5.3.1 Leakage at low pressure

The coupled connection shall not leak when pressurized to 35 kPa for 12 min. The uncoupled connection shall not leak in excess of one drop per 10 min when pressurized to 35 kPa.

After uncoupling, a waiting period of 2 min shall be allowed to establish a constant leakage rate before testing the uncoupled connection.

6.5.3.2 Leakage at high pressure

The coupled and uncoupled connection shall not leak when pressurized to the appropriate operating pressure for 15 min (see table 2). Fluid loss during uncoupling shall not exceed the appropriate value specified in 6.5.13.

6.5.4 Ultimate burst pressure

The coupled and uncoupled connection shall withstand a burst pressure of not less than 250 % of the appropriate operating pressure (see table 2).

6.5.5 Humidity

The connection shall be subjected to ten cycles of the humidity test, method 507.2, procedure III, Figure 507.2-3 of MIL-STD-810D. Following this test, the connection shall be subjected to the proof pressure test specified in 6.5.2. There shall be no leakage as a result of the proof pressure test or malfunction as a result of the humidity test.

6.5.6 Vibration

The connection shall be subjected to the vibration test specified in MIL-STD-810C, method 514.2, category b.2, procedure IA.

6.5.7 Salt spray

The connection shall be exposed for 48 h to a salt spray environment consisting of 5 % salt and 95 % distilled or demineralized water. Throughout testing, the relative humidity shall be a minimum of 85 % and the temperature shall be + 35 °C.

6.5.8 Sand and dust

The coupled connection shall withstand 28 h of exposure to a sand and dust environment. The particle size shall be 0,150 mm and the relative humidity shall be maintained at less than 22 % throughout testing. Testing shall consist of the following three cycles:

Cycle 1 Time: 6 h
Air velocity: 533 m/min ± 76 m/min
Chamber temperature: + 23 °C
Density: 10,6 g/m^3 ± 7 g/m^3

Cycle 2 Time: 16 h
Air velocity: 91 m/min ± 61 m/min
Chamber temperature: + 63 °C
Density: 10,6 g/m^3 ± 7 g/m^3

Cycle 3 Repeat cycle 1

6.5.9 Operational shocks

The coupled connection shall withstand twelve impact shocks of 196 m/s^2 without leakage or other malfunction. The duration of each impact shock shall be 10 ms ± 1 ms.

6.5.10 Endurance

The connection shall withstand 500 coupling and uncoupling operations without malfunction or degradation. Testing shall be conducted while the connection is pressurized to 100 kPa.

6.5.11 Pressure drop

Connections shall have a maximum pressure drop of 20 kPa with a fluid temperature of 38 °C ± 3 °C at the flowrates given in table 3.

Table 3 — Pressure drop flowrates

DN mm	Flowrate l/min
12	11,5
20	39
25	75
32	135
40	210

6.5.12 Impulse

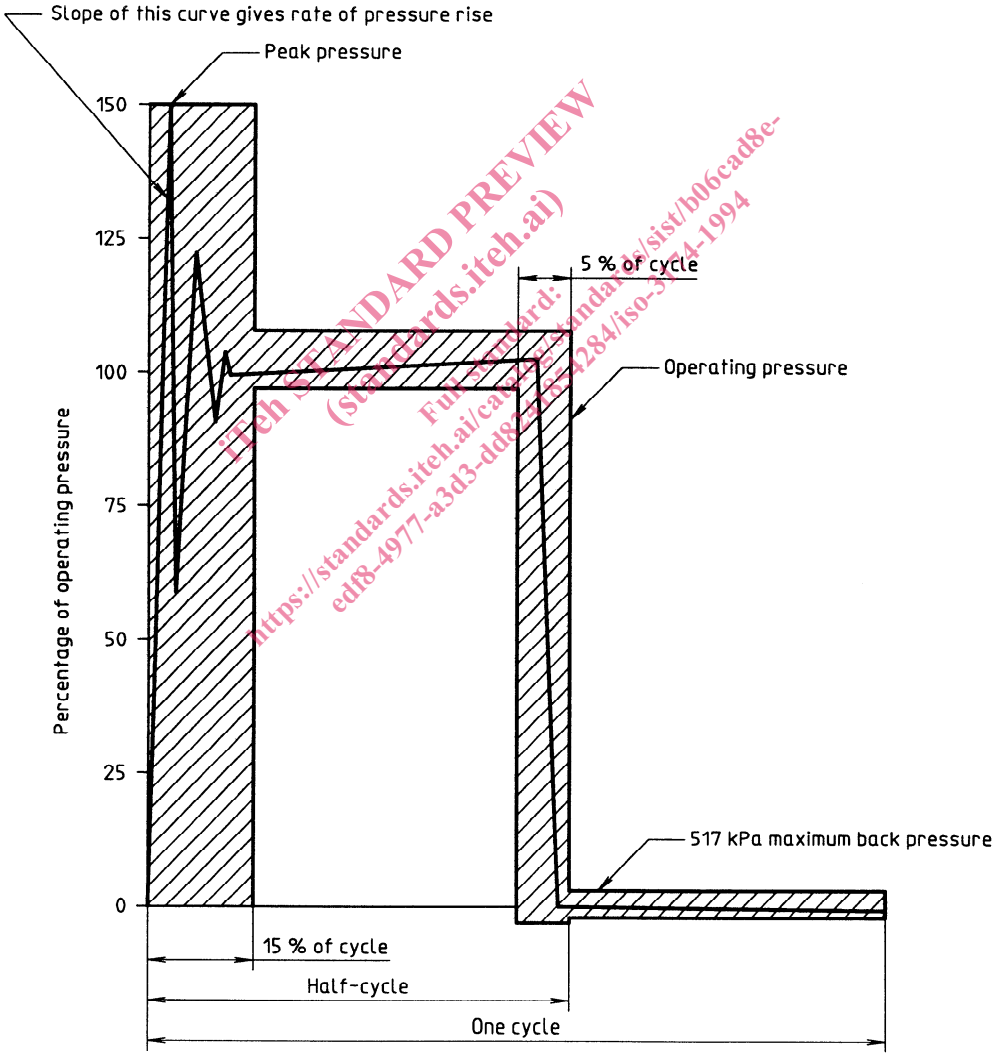
The connection shall withstand 250 000 impulse cycles without leakage or malfunction. Testing shall be conducted at a temperature of + 135 °C for the first 12,5 h, + 107 °C for 37,5 h and room temperature for the remainder of testing. The impulse rate shall be 35 min^{-1} ± 5 min^{-1}. The impulse curve shall conform to figure 4.

6.5.13 Air inclusion and fluid loss

Air inclusion and fluid loss shall not exceed the values given in table 4.

Table 4 — Maximum air inclusion and fluid loss

DN mm	Maximum air inclusion cm^3	Maximum average fluid loss per cycle cm^3
12	0,03	2,2
20	0,11	8,2
25	0,15	9
32	0,2	11,8
40	0,24	14



NOTE — The curve shown above is the approximate pressure/time cycle determined to be of proper severity for impulse testing. Although it is mandatory only that pressure peak rises to 143 % to 157 % of the operating pressure at some point prior to levelling off at operating pressure, it is considered highly desirable that the pressure time curve be confined to the shaded area indicated. One advantage of this method is that results of tests performed on different test machines will be more comparable.

Figure 4 — Impulse trace