INTERNATIONAL STANDARD

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Hydraulic fluid power — Hose assemblies —

Part 1: Dimensions and requirements

Transmissions hydrauliques — Flexibles de raccordement —

Partie 1: Dimensions et exigences

Reference number
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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 17165-1 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 4, *Connectors and similar products and components*.

ISO 17165 consists of the following parts, under the general title *Hydraulic fluid power — Hose assemblies*:

— *Part 1: Dimensions and requirements*

— *Part 2: Recommended practices for hydraulic hose assemblies*

Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit.

Components may be connected through their ports by piping (both connectors and conductors). Hose assemblies make up the flexible part of piping.

Hydraulic fluid power — Hose assemblies —

Part 1:
Dimensions and requirements

1 Scope

This part of ISO 17165 specifies requirements for hose assemblies that are manufactured from hoses that conform to ISO 3949 and to all parts of ISO 1436, ISO 3862, ISO 4079 and ISO 11237 and hose fittings with elastomeric seals that conform to ISO 12151-1, ISO 12151-2, ISO 12151-3 and ISO 12151-6.

This part of ISO 17165 contains information of the most important criteria for the selection of preferred types of hoses and hose fittings with elastomeric sealing for use in hydraulic fluid power applications.

Recommendations for installation, storage, life cycle and the necessary inspections to ensure the full functionality of hose assemblies are given in ISO/TR 17165-2.

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 1436-1, *Rubber hoses and hose assemblies — Wire-braid-reinforced hydraulic types — Specification — Part 1: Oil-based fluid applications*

ISO 1436-2, *Rubber hoses and hose assemblies — Wire-braid-reinforced hydraulic types — Specification — Part 2: Water-based fluid applications*

ISO 3862-1, *Rubber hoses and hose assemblies — Rubber-covered spiral-wire-reinforced hydraulic types — Specification — Part 1: Oil-based fluid applications*

ISO 3862-2, *Rubber hoses and hose assemblies — Rubber-covered spiral-wire-reinforced hydraulic types — Specification — Part 2: Water-based fluid applications*

ISO 3949, *Plastics hoses and hose assemblies — Textile-reinforced types for hydraulic applications — Specification*

ISO 4079-1, *Rubber hoses and hose assemblies — Textile-reinforced hydraulic types — Specification — Part 1: Oil-based fluid applications*

ISO 4079-2, *Rubber hoses and hose assemblies — Textile-reinforced hydraulic types — Specification — Part 2: Water-based fluid applications*

ISO 5598[1], *Fluid power systems and components — Vocabulary*

ISO 6743-4, *Lubricants, industrial oils and related products (class L) — Classification — Part 4: Family H (Hydraulic systems)*

ISO 8330, *Rubber and plastics hoses and hose assemblies — Vocabulary*

ISO 8434-1:2007, *Metallic tube connections for fluid power and general use — Part 1: 24° cone connections*

ISO 11237-1, *Rubber hoses and hose assemblies — Wire-braid-reinforced compact types for hydraulic applications — Specification — Part 1: Oil-based fluid applications*

ISO 11237-2, *Rubber hoses and hose assemblies — Wire-braid-reinforced compact types for hydraulic applications — Specification — Part 2: Water-based fluid applications*

ISO 12151-1, *Connections for hydraulic fluid power and general use — Hose fittings — Part 1: Hose fittings with ISO 8434-3 O-ring face seal ends*

ISO 12151-2, *Connections for hydraulic fluid power and general use — Hose fittings — Part 2: Hose fittings with ISO 8434-1 and ISO 8434-4 24° cone connector ends with O-rings*

ISO 12151-3[2], *Connections for hydraulic fluid power and general use — Hose fittings — Part 3: Hose fittings with ISO 6162-1 or ISO 6162-2 flange ends*

ISO 12151-6[3], *Connections for hydraulic fluid power and general use — Hose fittings — Part 6: Hose fittings with ISO 8434-6 60° cone ends*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598 and ISO 8330 and the following apply.

3.1
manufacturing date of the hose assembly
date that a hose and hose fittings were assembled into a hose assembly

1) To be published. (Revision of ISO 5598:1985)

2) Under development. (Revision of ISO 12151-3:1999)

3) Under development.

4 Designation

4.1 The symbols used to designate the forms of hose fitting types covered in Clause 8 of this part of ISO 17165 are given in Table 1.

Table 1 — Symbols used to designate hose fitting types

Symbol	Specification	Corresponding hose fitting standard connection end type and shape designation
G	Male threaded hose fitting with O-ring face seal end conforming to ISO 8434-3	ISO 12151-1, S
F	Female swivel straight hose fitting with O-ring face seal end conforming to ISO 8434-3	ISO 12151-1, SWS
F45	Female swivel 45° elbow hose fitting with O-ring face seal end conforming to ISO 8434-3	ISO 12151-1, SWE45
F90S	Female swivel 90° elbow short hose fitting with O-ring face seal end conforming to ISO 8434-3	ISO 12151-1, SWES
F90M	Female swivel 90° elbow medium hose fitting with O-ring face seal end conforming to ISO 8434-3	ISO 12151-1, SWEM
F90L	Female swivel 90° elbow long hose fitting with O-ring face seal end conforming to ISO 8434-3	ISO 12151-1, SWEL
D	Male threaded hose fitting with 24° compression end conforming to ISO 8434-1, L series	ISO 12151-2, S, L series
E	Male threaded hose fitting with 24° compression end conforming to ISO 8434-1, S series	ISO 12151-2, S, S series
N, N45, N90	Female swivel hose fitting with 24° compression end with O-ring conforming to ISO 8434-1, L series	ISO 12151-2, SWS, SWE45, SWE, L series
P, P45, P90	Female swivel hose fitting with 24° compression end with O-ring conforming to ISO 8434-1, S series	ISO 12151-2, SWS, SWE45, SWE, S series
R, R45S, R45M, R90S, R90M	Hose fitting with flange head with O-ring and flange clamp conforming to ISO 6162-1, 3,5 MPa to 35 MPa (35 bar to 350 bar) series	ISO 12151-3, S, E45S, E45M, ES, EM, 3,5 MPa to 35 MPa (35 bar to 350 bar) series
S, S45S, S45M, S90S, S90M	Hose fitting with flange head with O-ring and flange clamp conforming to ISO 6162-2, 40 MPa (400 bar) series	ISO 12151-3, S, E45S, E45M, ES, EM, 40 MPa (400 bar) series
T	Male threaded hose fitting with 60° cone end conforming to ISO 8434-6	ISO 12151-6, S
U, U45, U90S, U90M, U90L	Female swivel hose fitting with 60° cone end with O-ring conforming to ISO 8434-6	ISO 12151-6, SWSA, SWE45A, SWESA, SWEMA, SWELA

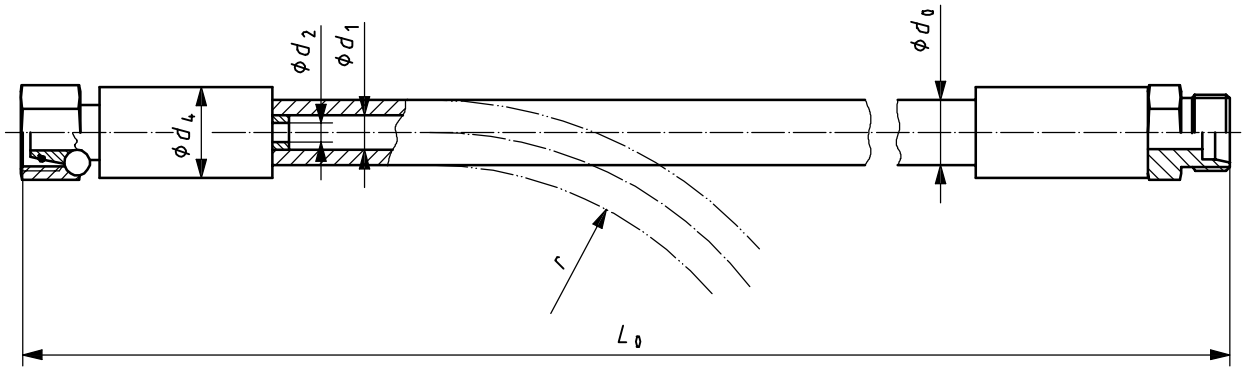
4.2 Unless otherwise agreed between manufacturer and user, crimped hose fittings shall be assumed.

4.3 It is not necessary that the hose assembly comply with the relevant figure; however, the relevant dimensions shall be followed (see Table C.1). See the following examples.

EXAMPLE 1

Hose fitting form P
(same as SWS, S series, conforming to ISO 12151-2)

Hose fitting form E
(same as S, S series, conforming to ISO 12151-2)



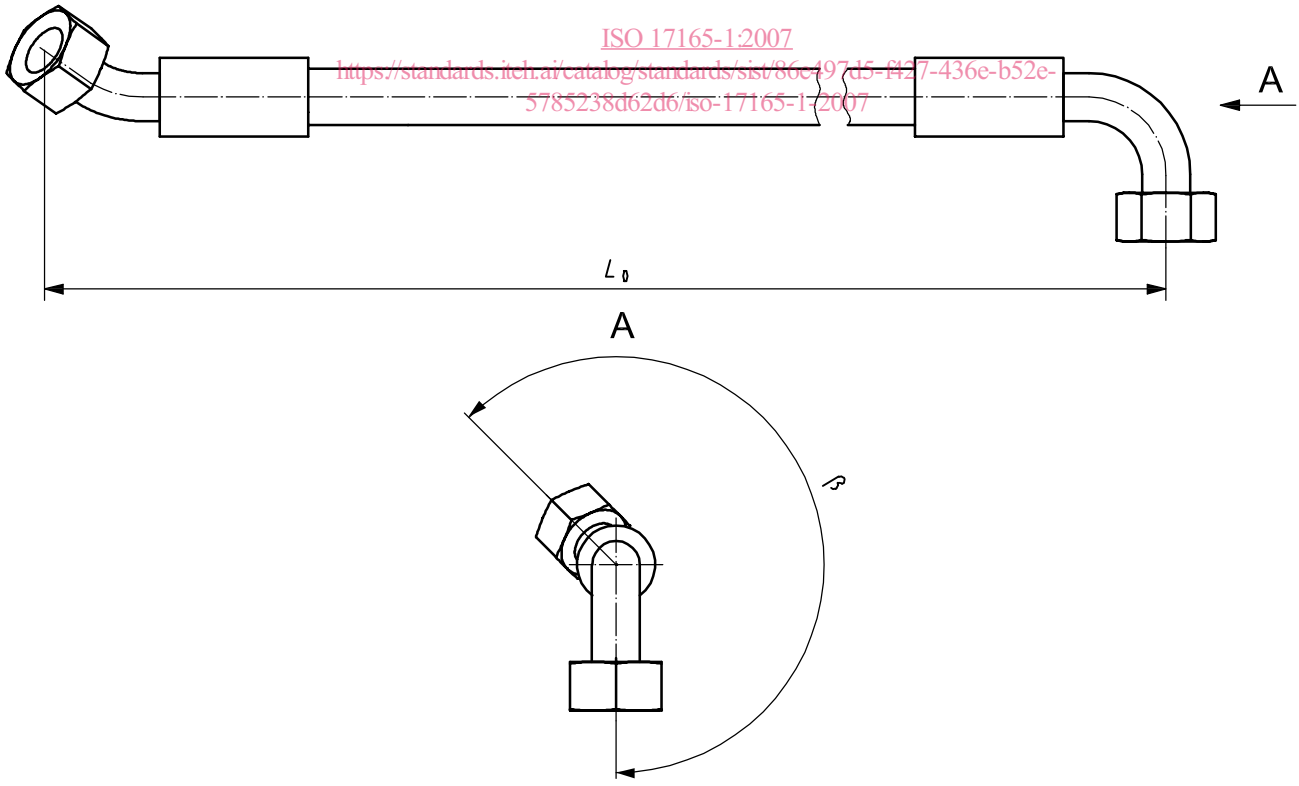
A hose assembly consisting of hose 2SN conforming to ISO 1436-1 with a nominal hose size of 19 mm (d_1) and hose fittings forms P and E with a length of $L_0 = 1\,000$ mm shall be designated as follows:

Hose assembly ISO 17165-1 – 2SN-19-PE-1000

EXAMPLE 2

Hose fitting form P45
(same as SWE45, S series, conforming to ISO 12151-2)

Hose fitting form P90
(same as SWE, S series, conforming to ISO 12151-2)



A hose assembly consisting of hose 2SN conforming to ISO 1436-1 with a nominal hose size of 19 mm (d_1) and hose fitting forms P45 and P90 with a length of $L_0 = 1\,500$ mm and a rotational angle of $\beta = 210°$ (measured anti-clockwise, starting from the hose fitting in the front) shall be designated as follows:

Hose assembly ISO 17165-1 – 2SN-19-P45P90-1500-210

5 Hose types, nominal inside diameters and maximum working pressures, and correspondence of hose sizes to tube sizes

5.1 Hose maximum working pressures and nominal inside diameters shall be selected from the latest edition of the relevant hose standard. A summary of maximum working pressures and nominal inside diameters for various types of hoses that conform to ISO 3949 and all parts of ISO 1436, ISO 3862, ISO 4079 and ISO 11237 is given for informative purposes in Table A.1.

5.2 A summary of dimensions of related steel tubes for use in combination with the hose types specified in 5.1 is given for informative purposes in Table B.1.

6 Dimensions of hose and hose fittings

Maximum hose outside diameters (d_{0max}), maximum hose fitting outside diameters (d_{4max}), minimum hose fitting inside diameters (d_{2min}) and minimum bend radii (r_{min}) of the hoses shall be selected from the relevant hose or hose fitting standard. A summary of these dimensions is given for informative purposes in Table C.1.

7 Overview of hose type, type of hydraulic fluid and temperature range

7.1 ISO 3949 specifies requirements for hose types R7 and R8. ISO 3949 is divided into two parts, depending on electrical conductivity requirements. They are suitable for use with

— petroleum- and synthetic-based hydraulic fluids at temperatures ranging from − 40 °C to + 100 °C;

— water-based hydraulic fluids at temperatures ranging from 0 °C to + 70 °C.

NOTE 1 Operating temperatures in excess of 100 °C can materially reduce the life of the hose.

NOTE 2 Requirements for hydraulic hoses for underground mining are specified in other International Standards.

7.2 ISO 1436, ISO 3862, ISO 4079 and ISO 11237 specify requirements for hose types 1TE, 2TE, 3TE, R3, R6, 1ST, R1A, 1SN, R1AT, 2ST, R2A, 2SN, R2AT, 1SC, 2SC, R16, 4SP, 4SH, R12, R13 and R15. Each International Standard is divided into two parts. They are suitable for use with

— all types of hydraulic fluids designated in accordance with ISO 6743-4 with the exception of HFDR at temperatures ranging from − 40 °C to + 100 °C and for types R12, R13 and R15 from − 40 °C to + 120 °C (see Part 1 of the relevant International Standard);

— water-based fluids at temperatures ranging from − 40 °C to + 70 °C (see Part 2 of the relevant International Standard);

— water at temperatures ranging from 0 °C to + 70 °C (see Part 2 of the relevant International Standard).

NOTE 1 The hoses specified in ISO 1436, ISO 3862, ISO 4079 and ISO 11237 are not suitable for use with castor-oil-based or ester-based fluids.

NOTE 2 It is preferable not to use the hoses and hose assemblies outside the pressure and temperature limits specified in this part of ISO 17165.

NOTE 3 Requirements for hydraulic hoses for underground mining are specified in other International Standards.

8 Summary of hose fitting end forms and key dimensions

Figures 1 through 15 show commonly used hose fitting end forms. Tables 2 through 5 repeat the most important interface dimensions from ISO 12151-1, ISO 12151-2, ISO 12151-3 and ISO 12151-6. The working pressures are shown with the hose fitting end form, along with the related tube outside diameters, related flange sizes and the mating end forms.

NOTE As far as is practicable, the dimension labels in Figures 1 through 15 correspond to the dimension labels in the relevant part of ISO 12151. However, because not all dimensions from the relevant part of ISO 12151 are included in these figures, some dimension labels, such as d_3, are not used.