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## Kalmar Group Standard

# KGS 90102

Part

Group

**Article Standard**

**9. Hydraulic Components**

Name

**Designation - Hydraulic Fitting, Adapter**

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## 1 Scope

The standard gives an overview of hydraulic fittings and designations meant to adapt to another hydraulic fitting. This may be in size, thread type, or orientation. This standard does not cover all hydraulic fittings available on the market; it covers the most common hydraulic fitting adapters used in the Kalmar Group. For hydraulic fittings intended to connect to a hose, see KGS 90101 - Designation - Hydraulic Fitting.

This standard covers hydraulic fittings that do not connect to hoses.

*Notes:*

- The designation “Hydraulic Fitting” and KGS 90101 is intended to cover and identify the majority of hydraulic fittings used by Kalmar.
- The designation “Hydraulic Fitting, Adapter” and this KGS standard is intended to cover and identify fittings that do not have an ORFS or JIC end which would be covered by KGS 90101.

## 2 Purpose

This standard specifies the designation of hydraulic fittings used in the Kalmar Group.

## 3 Responsibilities

Engineer, Standards Engineer - for the purpose of properly naming a hydraulic fitting and standardizing on a naming designation.

## 4 Definitions

**Hydraulic Fitting** - used to connect hydraulic hoses, tubes, and pipes to pumps, valves, cylinders and other parts of the hydraulic system; also used in place of the term “adapter” - a device that allows connection of parts whose interfaces are dissimilar in size or type as defined in ISO 5598 §3.2.12; replacing the term “connector” as defined in ISO 5598 §3.2.122

**Stud end** - male external threaded end of a connector allowing connection to a port.

**Adapter** - a device that allows connection of parts whose interfaces are dissimilar in size or type. (ISO 5598 §3.2.12) In KGS cases, not including ORFS or JIC ends.

**Nipple** - a straight type of hydraulic fitting connector with male threads on both ends; does not include ORFS or JIC ends.

**Coupling** - a straight type of hydraulic fitting connector with female threads on both ends; does not include ORFS or JIC ends.

**ORFS** - abbreviation for O-Ring Face Seal. A metallic tube connection for fluid power and general use.

**JIC** - abbreviation for Joint Industry Council. A metallic tube connection for fluid power and general use with a 37° flared connection.

## 5 Records / references / attachments

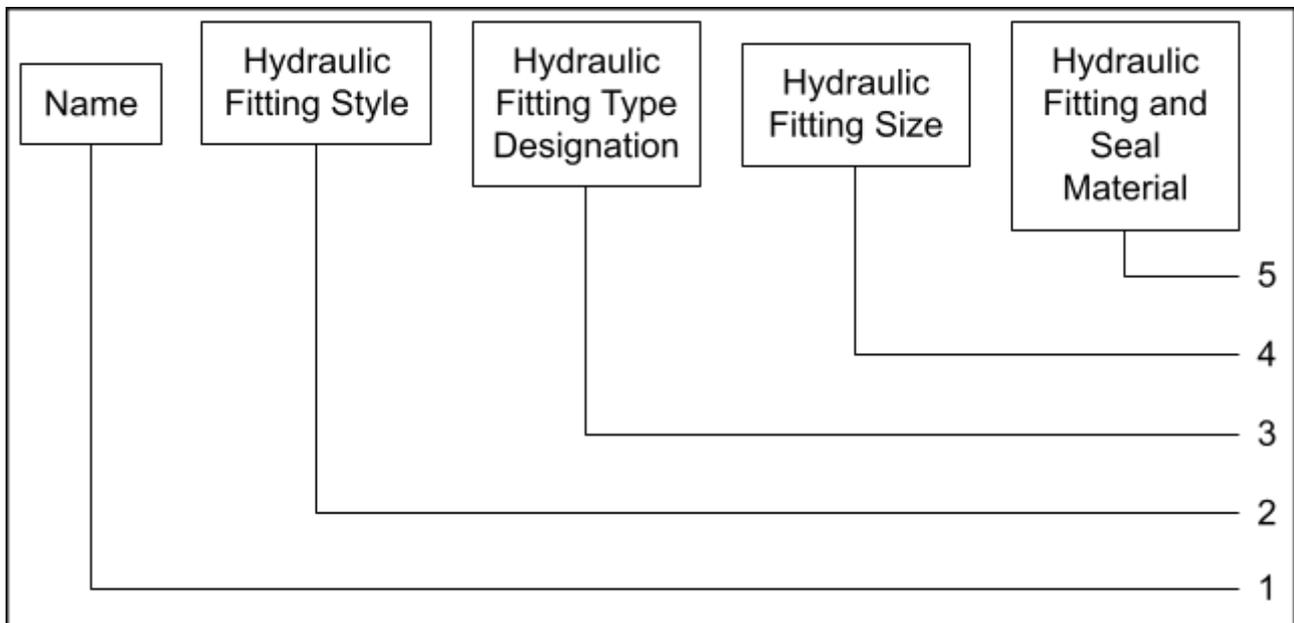
KGS 90101, *Designation - Hydraulic Fitting*

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KGS 90103, *Designation - Hydraulic Fitting, Flange*  
 ISO 5598, *Fluid power systems and components – Vocabulary*  
 ISO 8434-2, *Metallic tube connections for fluid power and general use - Part 2: 37° flared connectors*  
 ISO 8434-3, *Metallic tube connections for fluid power and general use - Part 3: O-ring face seal connectors*  
 ISO 6149 (series), *Connections for hydraulic fluid power and general use – Ports and stud ends with ISO 261 metric threads and O-ring sealing*  
 ISO 9974 (series), *Connections for general use and fluid power – Ports and stud ends with ISO 261 threads with elastomeric or metal-to-metal sealing*  
 ISO 1179 (series), *Connections for general use and fluid power – Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing*  
 ISO/TS 11672:2016, *Connectors for fluid power and general use - Designation and nomenclature*  
 SAE J514, *Hydraulic Tube Fittings*  
 SAE J846, *Coding Systems for Identification of Fluid Conductors and Connectors*  
 SAE J1453-1, *Specification for O-Ring Face Seal Connectors: Part 1 - Tube Connection Details and Common Requirements for Performance and Tests*  
 SAE J1926 (series), *Connections for General Use and Fluid Power - Ports and Stud Ends with ASME B1.1 Threads and O-Ring Sealing*  
 SAE J476, *Dryseal Pipe Threads*

## 6 Procedure Description

Designations:

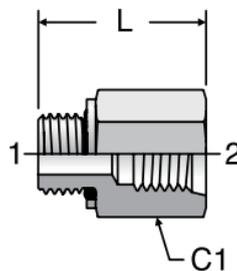


Key:

1. Name - Hydraulic Fitting - see §6.1.1
2. Hydraulic fitting Style - Adapter - see §6.1
3. Hydraulic fitting type designation - the abbreviated designation consists of symbol for connector end type (Table 1) followed by, when needed, symbol for connector shape (Table 2) followed by symbol for complete connector (Table 3), if so ordered. - see 6.3
4. Hydraulic fitting size - see §6.4
5. Hydraulic fitting material symbol (Table 8) followed by seal material (Table 9), where applicable.

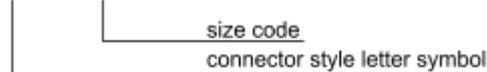
6.1 Hydraulic fittings *adapting* to the hydraulic fitting connecting directly to the hose shall be designated by an alphanumeric code to facilitate ordering. They shall be designated by the words “Hydraulic fitting” followed by a comma and a space, then “Adapter” followed by a comma and a space, then the connector style letter symbols (see 6.2 and 6.9), followed by a hyphen and, for the ends, the thread designation of the stud end with which they are to be connected, each separated by a multiplication symbol (×), followed by a hyphen and then the material code (as defined in SAE J846 §3.1.4). There shall be no spaces on either side of the multiplication symbol.

Note: Tube size will be disregarded in lieu of the adapting thread size/type unless the tube size is necessary to fully describe the “Hydraulic Fitting, Adapter”.



Example 1: For a conversion adapter - a straight stud connector (SDS) for use with ½” G code (BSPP) to female M18x1.5 stud end, in accordance with ISO 6149-2, is designated as follows:

**Hydraulic Fitting, Adapter, SDS-G1/2xFM18-S**



*More examples in section §8.*

- 6.1.1 Kalmar **Name\_1** used in internal systems like Sovelia and 3DExperience shall be “Hydraulic Fitting”.
- 6.1.2 Kalmar **Name\_2** used in internal systems like Sovelia and 3DExperience shall be “Adapter”.
- 6.1.3 Related to internal Kalmar system tools, the remainder of the designation, as noted above, shall go in the **Description** or **Additional Description** field.
- 6.2 Although this KGS standard is not for tube end connection, in accordance with ISO 8434-2 & ISO 8434-3 §6.3, tube ends are assumed to be external male threaded ends and thus do not need to be designated as such in the connection type code. However, if another type of end type is involved, it shall be designated. Note (ISO 8434-2 & ISO 8434-3) §6.6 & §6.7 for the order of designation for tee and cross connectors.
- 6.3 Connector style letter symbol  
 The following letter symbols and combination thereof shall be used (reference ISO/TS 11672 and also ISO 8434-2 & ISO 8434-3). They shall designate the *connection end type*, the *shape*, the *component type*, the *completeness identification*, and the *stud end sealing type*.

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**Table 1 - Letter symbols to be used in designating connector types for fluid power and general use (reference ISO/TS 11672)**

Connection End Type	Letter
Banjo	BJ
Bulkhead	BH
Braze-on	BR
Cap	CP
Plug	PL
Port	P
Reducer	RD
Reducer with nut Reducer without nut	RDA RDB
Stud	SD
Swivel	SW
With sealing surface not exposed	SWA
With sealing surface exposed	SWB
Swivel with O-ring	SWO
Swivel bulkhead	SWBH
Swivel port	SWP
Tube end	TE
Weld-on / Weld-in	WD

**Table 2 - Letter symbols to be used in designating shapes of connectors for fluid power and general use (reference ISO/TS 11672)**

Shape	Letter
Branch tee	BT
90° elbow 90° long elbow	E EL
22.5° elbow	E22

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30° elbow	E30
45° elbow	E45
60° elbow	E60
67.5° elbow	E67
Cross	K
Run tee	RT
Straight	S
Long straight	SL
Tee	T
Y shape	Y

**Table 3 - Letter symbols to be used in designating types of components of connectors for fluid power and general use** (reference ISO/TS 11672)

Type of connector component	Letter
Cutting ring	CR
One-piece flange clamp	FC
Split flange clamp pair	FCS
Flange head	FH
Locknut	LN
Sleeve: For metric tube For inch tube	SL MSL ISL
Nut Standard strength nut High strength nut	N NA NB
Nipple For metric tube For inch tube	NP MNP INP

**Table 4 - Letter symbols to be used in designating completeness, with sleeve(s) or cutting ring(s) and nut(s), of connectors for fluid power and general use (reference ISO/TS 11672)**

Completeness indication	Letter
Complete connector	C

**Table 5 - Letter symbols to be used in designating stud end sealing types of connectors for fluid power and general use (reference ISO/TS 11672)**

Typically used with G-Code (ISO 1179) or Metric ISO 9974 flat face ports. The sealing type designation follows the thread designation.

*Kalmar Group preferred sealing type is elastomeric sealing (E).*

Stud end sealing types	Letter
Metal-to-metal sealing	B
Elastomeric sealing	E
O-ring sealing	F
O-ring retaining ring: Type G Type H	G H

**Table 6 - Letter symbols to be used in designating working pressure levels (duty) of connectors for fluid power and general use (reference ISO/TS 11672)**

Working pressure series	Letter
Extra light-duty	LL
Light-duty	L
Heavy-duty	S

#### 6.4 Hydraulic fitting size and stud end thread specification or flange end specification

6.4.1 Stud end threads: The options for threaded stud ends are vast, beyond simple differences of metric and imperial.

6.4.1.1 Stud end designation requires size and thread type and are noted by the thread size and type.

6.4.1.2 Connection ends are assumed to be male (unless otherwise designated initially with an "F" for female). The male end shall always proceed female end.

6.4.1.3 For tee connectors, the order of designation of the connection ends shall be from larger end to the smaller end on the run, followed by the branch end. *(Derived from ISO 8434-2 & ISO 8434-3 §6.6).*

6.4.1.4 For cross connectors, the order of designation of the connection ends shall be from left to right, followed by top to bottom, with larger ends on the left and at the top. *(Derived from ISO 8434-2 & ISO 8434-3 §6.7).*

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6.4.1.5 Applying the principle found in SAE J514, “the order of thread designation shall be male pipe NPTF, female pipe NPTF, male O-ring and swivel female NPSM”, the Kalmar application shall be: male tapered thread, female tapered thread, male o-ring straight threaded, female o-ring straight threaded. (As next noted, tapered threads are not preferred.)

- 6.4.1.6 The Kalmar, preferred threaded stud ends are:
- for US imperial - UN/UNF-2A (SAE J1926-2) [*also referred to as SAE-ORB (O-Ring Boss)*]
  - for British imperial - G Code, also known as BSPP (ISO 1179 / BS 5200)

For a metric threaded stud end - type ISO 6149 - it is assumed this is the “standard” metric type (as noted in the ISO 8434 standards) and no further clarification is necessary other than the use of “M”.

The following letter/number symbols and combination thereof shall be used for designation of the stud end. The \* notes on which side of the code the thread size shall be designated. For internal female threads, the designation “F” shall proceed the thread code.

Example:

...SDS-M18xFG1/2-C  
size code 18mm metric threaded end (*male is assumed*) x female 1/2”  
 BSPP (ISO 1179) internal threaded end

**Table 7a - Symbols used in designating threaded stud ends and their thread type**

Threaded Stud End type	Code (*thread size designation)
<u>Metric</u>	
ISO 6149 - Metric Straight Thread O-Ring Port	M*
ISO 9974 - Metric Straight Thread Flat Face Port	M(9974)*
<u>Inch</u>	
SAE J1926 (ISO 11926) - SAE Straight Thread O-Ring Port (ORB)	*UN
ISO 1179 - British Standard Pipe Parallel (BSPP) Flat Face Port	G*
SAE J476 - NPTF Dryseal American Standard Taper Pipe	*NPT
JIS/BSPT - British Standard Pipe Taper (BSPT)	R*

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Example(s):

...SDS-M18xFM18-S  
size code 18mm metric threads for ISO 6149 port x female 18mm  
 metric threads for ISO 6149 adapter

...SDS-M(9974)18xF<sup>3</sup>/<sub>4</sub>-16UN-S  
size code 18mm metric threads for ISO 9974 adapter x Female <sup>3</sup>/<sub>4</sub>-16  
 UN threads

...SDS-G1/2xF<sup>3</sup>/<sub>4</sub>-16UN-S  
size code G<sup>1</sup>/<sub>2</sub>" threads for ISO 1179 x Female <sup>3</sup>/<sub>4</sub>-16 UN threads

...SDS-1/2NPTxF<sup>3</sup>/<sub>4</sub>-16UN-S  
size code <sup>1</sup>/<sub>2</sub>"NPT threads for SAE J476 adapter x Female <sup>3</sup>/<sub>4</sub>-16 UN  
 threads

#### 6.4.2 Flange ends

6.4.2.1 An option to a threaded stud end can be a flange end. Hydraulic flange ends follow the ISO 6162 series and can be either Code 61 or Code 61.

**Table 7b - Symbols used in designating hydraulic flange ends and their type**

Flange End type	Code
ISO 6162-1 (Code 61)	Code 61
ISO 6162-2 (Code 62)	Code 62

6.4.2.2 Reference ISO/TS 11672 for the compatibility with flange connections and the appropriate connector type and component type codings. Several examples are given at the end of this document.

6.4.2.3 For additional Code 61 and Code 62 flange components, refer to KGS 90103 for the designation of the flange clamps; refer to KGS 90101 for the designation of similar ORFS and JIC connection ends.

#### 6.5 Material identification (reference ISO/TS 11672 Table 7 and SAE J846 §3.1.4)

##### 6.5.1 Hydraulic Fitting material

The material identification shall consist of a letter code for the material with protective finish, where applicable, as shown in the following table.

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**Table 8 - Letter symbols to be used in designating connector material of connectors for fluid power and general use** (reference ISO/TS 11672)

<b>Connector Material and Finish</b>	<b>Code</b>
Brass - no added finish treatment, Copper and copper alloys	B
Carbon steel - oil dipped for brazing or welding	CX
Composite material - non-metallic	K
Steel	S
Stainless steel	SS

#### 6.5.2 Seal material

**Table 9 - Letter symbols to be used in designating seal material of connectors for fluid power and general use** (reference ISO/TS 11672)

<b>Seal Finish</b>	<b>Code</b>
Acrylonitrile-butadiene rubber (commonly known as nitrile rubber or NBR)	N
Hydrogenated NBR	H
Terpolymer of ethylene, propylene and a diene or EPDM (not commonly used)	E
Fluoro rubber (commonly known as Viton)	F

#### 6.6 Miscellaneous feature designations

**Table 10 - Letter symbols to be used in designating miscellaneous features of connectors for fluid power and general use** (reference ISO/TS 11672)

<b>Miscellaneous designations</b>	<b>Code</b>
Short	S
Medium	M
Long	L
External hex	EH
Internal hex	IH

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Metric	M
Inch	I
Sealing (style) O-ring	A
Sealing (style) without O-ring	B

- 6.7 For further details, examples, or clarifications regarding designations, reference ISO 8434-2 & ISO 8434-3 §6. Although this KGS standard is regarding Hydraulic Fitting, Adapters and is not referring to ORFS or JIC tube ends, the intent is to have a common designation methodology between “Hydraulic Fitting” and “Hydraulic Fitting, Adapter”. The ISO 8434 series are the primary designation standards

## 7 Specifications

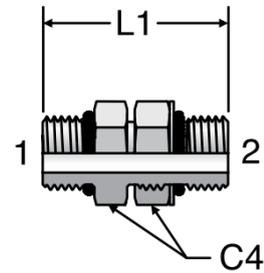
Specifications: Reference KGS 90203 for specifications regarding the hydraulic fitting, adapters.

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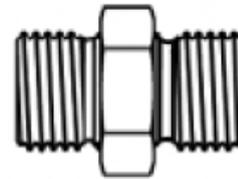
## 8 Designation examples

Examples:

### 8.1 Nipple - NP (male-male):

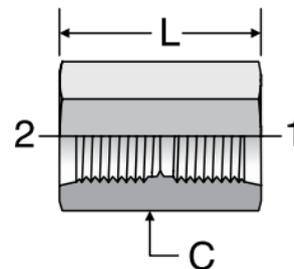


Example: UN - UN (or SAE ORB - SAE ORB)  
 Hydraulic Fitting, Adapter, NPS- $\frac{3}{4}$ -16UNx $\frac{3}{4}$ -16UN-S

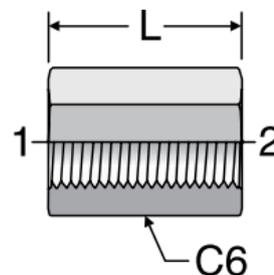


Example: G - M (or BSPP - Metric)  
 Hydraulic Fitting, Adapter, NPS-G $\frac{1}{2}$ xM12-S

### 8.2 Coupling - NP F (female-female):



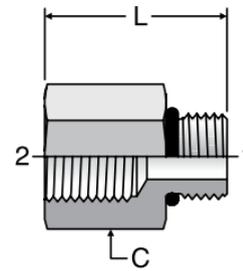
Example: UN - UN (or SAE ORB - SAE ORB)  
 Hydraulic Fitting, Adapter, NPS-F $\frac{3}{4}$ -16UNxF $\frac{3}{4}$ -16UN-S



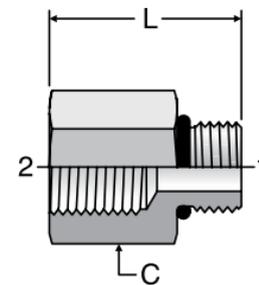
Example: G - G (or BSPP - BSPP)  
 Hydraulic Fitting, Adapter, NPS-FG $\frac{1}{2}$ xFG $\frac{1}{2}$ -S

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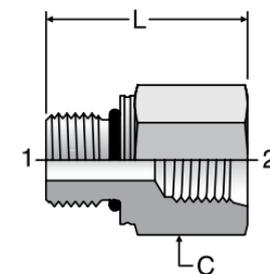
8.3 Reducer, Expander, Conversion - RD:



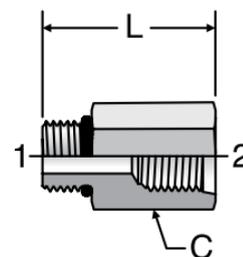
Example: UN - M (or SAE ORB - Metric)  
 Hydraulic Fitting, Adapter, RDS- $\frac{3}{4}$ -16UNxFM18-S



Example: UN - G (or SAE ORB - BSPP)  
 Hydraulic Fitting, Adapter, RDS- $\frac{3}{4}$ -16UNxFG $\frac{1}{4}$ -S



Example: M - M (or Metric - Metric)  
 Hydraulic Fitting, Adapter, RDS-M16xFM18-S



Example: UN - UN (or SAE ORB - SAE ORB)  
 Hydraulic Fitting, Adapter, RDS- $\frac{3}{4}$ -16UNxF7/16-20UN-S

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8.4 45 Elbow (Stud hydraulic fitting) - SDE45:

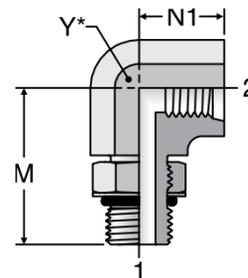


Example: G - G (or BSPP - BSPP Swivel Nut)  
 Hydraulic Fitting, Adapter, SWE45-G $\frac{1}{2}$ xFG $\frac{1}{2}$ -S

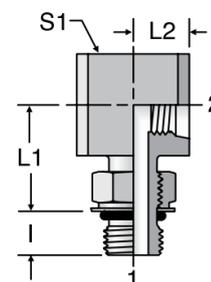


Example: UN - UN (or SAE ORB - ORD Swivel Nut)  
 Hydraulic Fitting, Adapter, SWE45- $\frac{3}{4}$ -16UNxF $\frac{7}{8}$ -14UN-S

8.5 90 Elbow (Stud hydraulic fitting) - SDE:



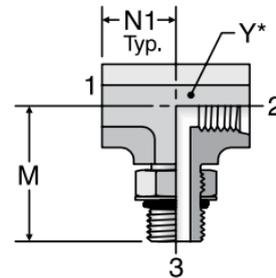
Example: UN - UN (or SAE ORB - SAE ORB)  
 Hydraulic Fitting, Adapter, SDE- $\frac{3}{4}$ -16UNxF $\frac{3}{4}$ -16UN-S



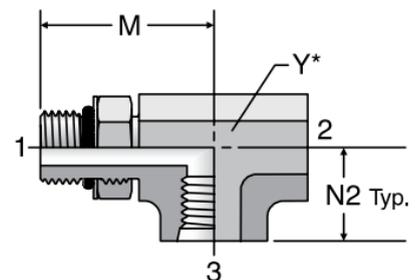
Example: M - M (or Metric - Metric)  
 Hydraulic Fitting, Adapter, SDE-M18xFM18-S

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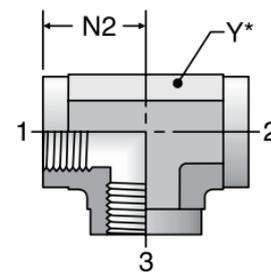
8.6 Tee - T:



Example: UN - UN - UN (or SAE ORB Branch Tee)  
 Hydraulic Fitting, Adapter, SDBT- $\frac{3}{4}$ -16UNxF $\frac{3}{4}$ -16UNxF $\frac{3}{4}$ -16UN-S

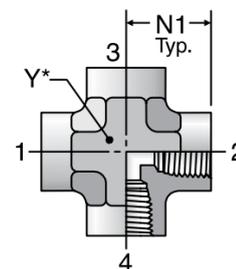


Example: UN - UN - UN (or SAE ORB Run Tee)  
 Hydraulic Fitting, Adapter, SDRT- $\frac{3}{4}$ -16UNxF $\frac{3}{4}$ -16UNxF $\frac{3}{4}$ -16UN-S



Example: G - G - G (or BSPP Branch Tee)  
 Hydraulic Fitting, Adapter, SDBT-FG $\frac{1}{2}$ xFG $\frac{1}{2}$ xFG $\frac{1}{2}$ -S

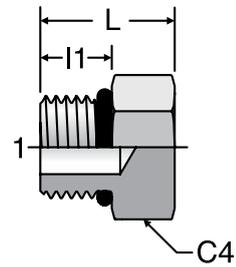
8.7 Cross - K:



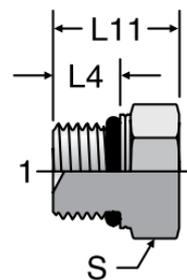
Example: G - G - G - G (or BSPP Cross)  
 Hydraulic Fitting, Adapter, SDBT-FG $\frac{1}{2}$ xFG $\frac{1}{2}$ xFG $\frac{1}{2}$ xFG $\frac{1}{2}$ -S

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8.8 Plug - PL:



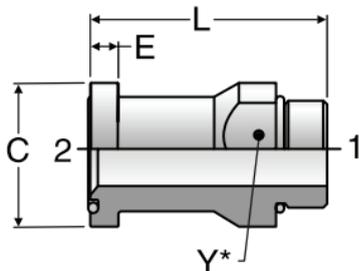
Example: UN (or SAE ORB plug)  
 Hydraulic Fitting, Adapter, PL-3/4-16UN-S



Example: M (or Metric plug)  
 Hydraulic Fitting, Adapter, PL-M18-S

8.9 Flange Head - FH:

Example: For a UN (or SAE ORB) hose connection - a straight flange head connector (FHS) for use with a 1 inch OD tube connection, i.e. a 1-5/16 inch UN threaded connection with a Code 61 end, in accordance with ISO 6162-1, is designated as follows:



Hydraulic Fitting, Adapter, **FHS-1-5/16UNxCode 61-S**

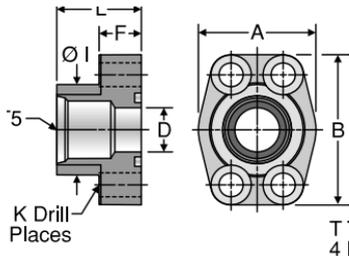
size code  
 Flange head designation

1-5/16"UN threads x Code 61 flange end  
 Flange head, straight

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### 8.10 Flange Port - P:

Example: For a UN (or SAE ORB) hose connection - a straight flange port connector (PS) for use with a 1 inch OD tube connection, i.e. a female 1-5/16 inch UN threaded connection with a Code 61 end, in accordance with ISO 6162-1, is designated as follows:

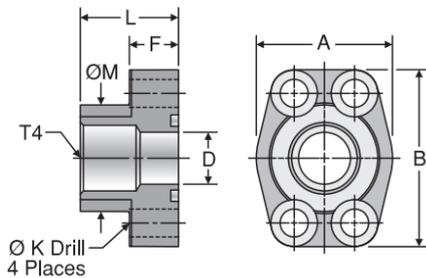


Hydraulic Fitting, Adapter, **PS-F1-5/16UNxCode 61-S**

size code  
 Flange head designation

1-5/16"UN threads x Code 61 flange end  
 Flange port, straight

Example: For a G thread (or BSPP) hose connection - a straight flange port connector (PS) for use with a 1 inch OD tube connection, i.e. a female G1" threaded connection with a Code 61 end, in accordance with ISO 6162-1, is designated as follows:



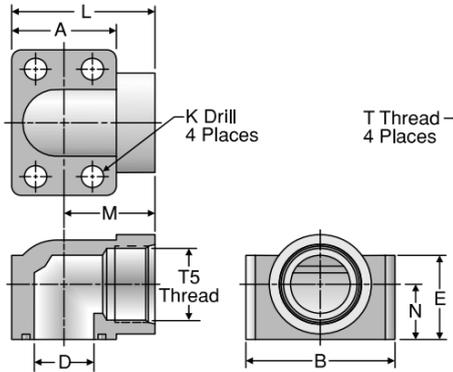
Hydraulic Fitting, Adapter, **PS-FG1xCode 61-S**

size code  
 Flange head designation

G1" (BSPP) threads x Code 61 flange end  
 Flange port, straight

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Example: For a UN (or SAE ORB) hose connection - a 90° elbow flange port connector (PE) for use with a 1 inch OD tube connection, i.e. a female 1-5/16 inch UN threaded connection with a Code 61 end, in accordance with ISO 6162-1, is designated as follows:



Hydraulic Fitting, Adapter, **PE-F1-5/16UNxCode 61-S**

Flange head designation size code

1-5/16"UN threads x Code 61 flange end  
 Flange port, straight

Note: For additional Code 61 and Code 62 flange components, refer to KGS 90103 for the designation of the flange clamps