CATALOG FOR WOODCO USA® Brand
PRESSURE CONTROL EQUIPMENT

API flanges, double studded adapters, API hubs, flanged and studded drilling spools, spacer spools, adapter spools, studded crosses and tees, flange x union adapters, manifold equipment, wellhead equipment, and drill through equipment; many items of equipment made as one piece without fabrication or assembly welding (no welding). Flange and Hub Identification Worksheets, and copies of WOODCO USA API 6A, 16A, and 17D License Certificates, also included.

TRADEMARK

WOODCO USA®

REG. U.S. PATENT OFFICE

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WOODCO USA presents this catalog to gain your attention and secure your business
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* API Top Connectors, see Supplement 1 to this catalog.
1.0 General

This catalog provides information about the variety of pressure control fittings available from WOODCO USA. It presents equipment by names commonly used and provides illustrations for use as a reference to improve communications and avoid errors.

WOODCO USA manufactures products in accordance with API and/or national or international standards. The following figures illustrate unusual designs not specifically mentioned in the various sections of this catalog or API Specifications, but which otherwise meet design requirements. A surprising number of unusual configurations which conform to API specification requirements can bear the API Monogram.

1.1 Purpose

WOODCO USA wants this catalog to communicate in a manner that will properly and usefully inform buyers and users of pressure control equipment that WOODCO USA offers high quality, safe, interchangeable equipment that will contribute to their success. WOODCO USA wants to sell these products.

Figure 1.1 A

FLANGE X WELD NECK TEE

FLANGE END CONNECTION

WELD NECK CONNECTION

MEETS DESIGN CRITERIA OF API 6A. MAY BEAR THE API MONOGRAM AFTER HYDROSTATIC TESTING.

Figure 1.1 B

FLANGE X HUB OUTLET TEE

FLANGE END CONNECTION

MEETS DESIGN CRITERIA OF API 6A. THIS PRODUCT MAY BEAR THE API MONOGRAM.

Figure 1.1 C

WELD NECK FLANGE

FLANGES WITH WELD NECKS THAT CONFORM TO API SPECIFICATIONS MAY BEAR THE API MONOGRAM. (BUYERS MAY SPECIFY OTHER WELDNECK DIMENSIONS)

Figure 1.1 D

FLANGE X HUB TEE

HUB END CONNECTION

MEETS DESIGN CRITERIA OF API 6A. THIS PRODUCT MAY BEAR THE API MONOGRAM

FLANGE END CONNECTION

STUDDED OUTLET CONNECTION
1.2 Products

WOODCO USA provides the following standard products in all sizes and pressure ratings and meeting one or more specifications listed in section 1.4 of this catalog. Additionally, WOODCO USA can design and manufacture, or manufacture from the Buyers’ designs, specified products consistent with criteria designated in standards listed in section 1.4., e.g. tubing, bends, and other items to satisfy customer service needs and certifying authority requirements. Also see section 1.0 of this catalog.

Loose Connectors

Flanges:
- **Blind**
- **Target**
- **Test**
- **Instrument**
- **Threaded**
- **Weld Neck**

Adapter Flanges
- **Double Studded**
- **Single Studded**

Hubs:
- **Blind**
- **Target**
- **Test**
- **Threaded**
- **Weld Neck**

Spools, Adapter
- **Flange X Flange**
- **Flange X Studded**
- **Flange X Hub**
- **Flange X Union**
- **Hub X Hub**
- **Hub X Union**
- **Lubricator Adapter**

Spools, Drilling
- **Flange**
- **Studded**
- **Hub**

Spools, Spacer
- **Flange**
- **Hub**

Crosses and Tees
- **Studded**
- **Flange**
- **Hub**

Manifold Equipment
- **Weld Neck: Crosses, Tees, and Elbows**
- **Flange X Weld Neck Fittings**
- **Transmitter Flange**
- **Transmitter Manifold**
- **Buffer Manifold**

For equipment Made Without Assembly
Welding see Section 3.0

1.3 Application

WOODCO USA equipment described in this catalog meets appropriate API and other national and/or international standards for:

- Wellhead Equipment
- Drill Through Equipment
- Manifold Systems

1.4 Reference Standards

API SPEC 6A, Wellhead and Christmas Tree Equipment.

API SPEC 16A, Drill Through Equipment.

ANSI B16.5, Pipe Flanges and Flange Fittings.


ASME B & PV CODE, SECT VIII, DIV 1 AND DIV 2, Rules For Construction of Pressure Vessels.

ASME B & PV CODE, SECT IX, Welding and Brazing Qualifications.

MSS SP-44, Steel Pipe Line Flange Specifications

NACE MRO175 / ISO 15156, Standard Material Requirements.

1.5 Material

WOODCO USA has material specifications which meet or exceed the requirements of API and/or other national or international standards.
1.6 Quality
WOODCO USA defines “Product Quality” as conformance to specified requirements. Approved Vendors provide material, products, and services which conform to WOODCO USA and national and/or international standards. Receiving Inspection screens all incoming material before processing. Additional inspections during manufacturing and after final operations assure compliance with applicable standards. Buyers may request supplemental inspections required to meet special needs.

1.7 Standardization
WOODCO USA manufactures all products in compliance with applicable national and/or international standards. However, many standards, including API Specifications, allow options and do not define aspects of clearance. The following list provides a sampling of items of standardization adopted by WOODCO USA:

- Flange thickness tolerance allows stock for recutting ring grooves.
- Optional corrosion resistant ring grooves’ inlay depth allows stock for recutting ring grooves.
- Steel chemistry facilitates later weld repair.
- Raised faces omitted on studded flanges facilitates interchangeability of tap end studs.
- Studded flange faces equipped with tap end (double end) studs.
- WOODCO USA design criteria assures nut and wrench clearances.

2.0 Equipment
2.1 Flanges and Hubs (Loose Connectors)
WOODCO USA manufactures API Spec 6A Flanges and other Loose Connectors in all sizes and pressure ratings; and in all the common configurations as follows:

- **Blind** (with or without counterbore)
- **Target** (lead filled)
- **Test** (tapped through center or side)
- **Instrument** (through bolt spacer)
- **Threaded** (API tubing, casing, line pipe, or special)
- **Weld Neck** (API weld neck or customer specified weld neck)
- **Transmitter** (multiple tapped, see Section 2.7)
- **Adapter** (see Section 2.2)

Loose Connectors manufactured as Clamp Hubs shall conform to API Spec 16A. See WOODCO USA CATALOG FOR CLAMPS for information about clamps.

Hub connection equipment with API 6A monogram shall meet PSL 2 minimum requirements per API Spec 6A.

Refer to the following figures for examples of Loose Connector configurations:

**Figure 2.1 A**

6B BLIND FLANGE *

*6B FLANGES HAVE R RING GROOVES. (see tables in API SPEC. 6A)

**Figure 2.1 B**

6BX BLIND FLANGE **

OAL = T + J3, OR J4, MINIMUM AS SPECIFIED IN API SPECIFICATION 6A.

**6BX FLANGES HAVE BX RING GROOVES. (see tables in API SPEC. 6A)
To identify Hubs or to determine which Clamps fit which specific Hubs see: 4.2 Hub Identification Worksheet.

See Weld Neck dimensions that satisfy API requirements at: www.woodcousa.com.
2.2 Flanges, Adapter

WOODCO USA manufactures Adapter Flanges in all sizes and pressure ratings. Popular Adapter Flange configurations consist of:

- **Double Studded Adapter (DSA)**
- **Single Studded Adapter (SSA)**
- **Flange X Union Adapter**

Buyers may use Adapter Flanges for transition in nominal size and/or pressure rating. WOODCO USA Adapter Flanges have minimum overall heights, or customer specified thicknesses, consistent with design considerations.

Refer to the figures on the following page for examples of Adapter Flange configurations.
WOODCO USA offers Adapter Flanges and Adapter Spools below in combinations that allow the connection of API flanges to those flanges found in ANSI, ASTM, ASME, and MSS specifications.

2.3 Spools, Adapter

WOODCO USA manufactures Adapter Spools in every size and pressure rating. Adapter Spools have end connections that differ from one another in nominal size and/or pressure rating. Buyers may specify any combination of end connections as well as overall height or length (OAL). When specified “minimum height (or length)”, WOODCO USA Adapter Spools have minimum overall height (or length) consistent with adequate clearance to accommodate studs, nuts, wrenches, and clamps where applicable.

Refer to the following figures for examples of Adapter Spool configurations:

Hub X Union Adapter, See Fig 3.1 D
Lubricator Adapter, See Fig 3.1 E
2.4 Spools, Drilling and Diverter

WOODCO USA manufactures Drilling Spools in every size and pressure rating. Larger bore, lower pressure Flanged Drilling Spools have the designation, Diverter Spools. Drilling and Diverter spools usually have the same nominal end connections and the same nominal outlet connections.

WOODCO USA manufactures Drilling Spools with minimum overall height (OAL) and outlet extensions consistent with adequate clearance to accommodate studs, nuts, wrenches, and clamps where applicable. Buyers may specify any combination of end connections and outlet connections as well as overall height and outlet extension.

Refer to the figures on the following page for examples of Drilling Spool configurations:
Figure 2.4 A
FLANGED DRILLING (OR DIVERTER) SPOOL (FDS)

OAL = MINIMUM LENGTH TO PROVIDE ADEQUATE WORKING CLEARANCE. SPECIFY ADDITIONAL LENGTH IF REQUIRED.

H = SPECIFY THIS DIMENSION FOR OUTLETS NOT CENTERED BETWEEN END CONNECTIONS.

Figure 2.4 B
STUDDED DRILLING SPOOL (SDS) (FLANGE OUTLETS)

OAL = MINIMUM LENGTH TO PROVIDE ADEQUATE WORKING CLEARANCE. SPECIFY ADDITIONAL LENGTH IF REQUIRED.

H = SPECIFY THIS DIMENSION FOR OUTLETS NOT CENTERED BETWEEN END CONNECTIONS.

Figure 2.4 C
STUDDED DRILLING SPOOL (SDS) (STUDDED OUTLETS)

OAL = MINIMUM LENGTH TO PROVIDE ADEQUATE WORKING CLEARANCE. SPECIFY ADDITIONAL LENGTH IF REQUIRED.

H = SPECIFY THIS DIMENSION FOR OUTLETS NOT CENTERED BETWEEN END CONNECTIONS.

Figure 2.4 D
HUB DRILLING SPOOL (HDS)

OAL = MINIMUM LENGTH TO PROVIDE ADEQUATE WORKING CLEARANCE. SPECIFY ADDITIONAL LENGTH IF REQUIRED.

H = SPECIFY THIS DIMENSION FOR OUTLETS NOT CENTERED BETWEEN END CONNECTIONS.
2.5 Spools, Spacer (Riser Spools)

WOODCO USA manufactures Spacer Spools in all sizes and pressure ratings suitable for Well Head extension, B.O.P. spacing, and Choke, Kill, and Production Manifold applications. Spacer Spools usually have the same nominal end connections. Spacer Spool identification consists of naming each end connection and the overall length (outside of end connection face to outside of end connection face), e.g. 20-3/4” 3000 X 20-3/4” 3000 X 10’ O.A.L. Should a requirement for differing end connections occur, their identification consists of describing them in the same manner, e.g. 20-3/4” 3000 X 21-1/4” 2000 X 10’ O.A.L.

WOODCO USA Spacer Spools usually do not have outlets, but customers may specify outlets and/or lifting pad eyes.

Refer to the following figures for examples of Spacer Spool configurations:

**Figure 2.5 A**

FLANGE SPACER SPOOL (FSS)
(A) NOMINAL CONNECTION

OAL = LENGTH SPECIFIED

(B) NOMINAL CONNECTION

**Figure 2.5 B**

HUB SPACER SPOOL (HSS)

(A) NOMINAL CONNECTION

(B) NOMINAL CONNECTION

OAL = LENGTH SPECIFIED

**Figure 2.5 C**

FLANGE SPACER SPOOL WITH OUTLETS AND PAD EYES

OUTLET NOMINAL CONNECTION

(A) NOMINAL CONNECTION

H

(B) NOMINAL CONNECTION

OAL

For outlet and lifting pad eyes, specify H, A, and/or P as appropriate.

**CAUTION**

INSTALLATION OF LIFTING PAD EYES BY FIELD WELDING MAY CAUSE CRACKING OF SPOOL MATERIAL OR OTHERWISE ELIMINATE THE VALUE OF MANUFACTURING INSPECTIONS AND TRACEABILITY.

For alternate methods of lifting spools without Pad Eyes, see Figure 3.4 C, D, and E.
2.6 Crosses and Tees

Standard terminology for the connections and configurations of Crosses and Tees:

Refer to the run connections first. If run connections differ in nominal size, identify the larger connection, then the smaller.

Identify outlets after the run connections. If outlets on Crosses or Tees differ in nominal size, identify the largest outlet connection first and then list them in descending order of size. See Figures 2.6.1B and 2.6.1 D for examples of Crosses and Tees with more than the normal number of outlets.

2.6.1 Crosses and Tees, Studded

WOODCO USA manufactures Studded Crosses and Tees according to the designs and tables in API Spec 6A. When specific nominal sizes and combinations of nominal sizes do not appear in API Spec 6A, WOODCO USA shall manufacture Studded Crosses and Tees according to the design criteria provided in API Spec 6A.

Refer to the following figures for examples of Studded Cross and Tee configurations:
2.6.2 Crosses and Tees, Flange

WOODCO USA manufactures Flange Crosses and Tees according to the design requirements and face to centerline requirements of API Spec 6A. When specific nominal sizes and combinations of nominal sizes do not appear in API Spec 6A, WOODCO USA shall manufacture Flange Crosses and Tees according to the design criteria provided in API Spec 6A.

Refer to the figures on the right for examples of Flange Cross and Tee configurations:


See the Slide Rule for Flanged Cross, Tee, and Elbow Dimensions at: www.woodcousa.com.
2.6.3 Crosses and Tees, Hub

WOODCO USA manufactures Hub Connection Crosses and Tees in configurations identical to Flange Crosses and Tees. WOODCO USA has established dimensions for face-to-centerlines of all sizes of Hub Crosses and Tees. Clamp Hub Connection configurations shall conform to API Spec 16A. See The WOODCO USA Catalog For Clamps, for information about Clamps.

See the Slide Rule for WOODCO USA Hubbed Cross, Tee, and Elbow dimensions at: www.woodcousa.com.

2.7 Choke Manifold Equipment

WOODCO USA can supply a large variety of specialized Manifold Fittings. The following list with illustrations, provides a sampling of this “made to order” equipment:

- **Weld Neck: Crosses, Tees, and Elbows**
- **Flange X Weld Neck Fittings** (other than Weld Neck Flanges and Weld Neck Hubs, illustrated in Section 2.1 of this Catalog)
- **Transmitter Flanges**
- **Transmitter Manifolds**
- **Manifold Buffers**

Refer to the figures on the following two pages for examples of Manifold Equipment:
CONFIRMATION OF WELD NECK O.D. AND I.D. NEEDED TO ASSURE FIT UP OF MATING MATERIAL.

CONFIRMATION OF WELD NECK O.D. AND I.D. NEEDED TO ASSURE FIT UP OF MATING MATERIAL.

CONFIRMATION OF WELD NECK O.D. AND I.D. NEEDED TO ASSURE FIT UP OF MATING MATERIAL.
WOODCO USA can manufacture components, and assemble and test complete manifolds.
2.8 Test Rack Flanges and BOP Test Stumps

WOODCO USA offers a wide variety of test flanges and Blow Out Preventer (BOP) test stumps suitable for manufacturers test facilities or drillers testing operations. Loose test flanges may have multiple test port locations for pump-in and bleed-off as well as safety hoist rings to facilitate handling and mounting.

BOP test stumps may have base plates, side and bottom ports, and fixed or removable test mandrel retaining threads.

Test flanges or test stumps usually incorporate customer specified design requirements to meet customer specific needs. The following figures illustrate typical customer requested configurations for test flanges and test stumps.

**Figure 2.8 A**
TEST FLANGE FOR TOP OR END CLOSURE WITH 2 TEST PORTS AND 4 LIFTING TAPS

**Figure 2.8 B**
BOP TEST STUMP ON BASE PLATE WITH TEST PORTS AND DRAIN PORT AND FIXED MANDREL RETAINING THREADS

**Figure 2.8 C**
BOP TEST STUMP ON BASE PLATE WITH TEST PORT AND DRAIN PORT AND CHANGEABLE MANDREL RETAINING THREADS
3.0 Equipment Made Without Assembly Welding

WOODCO USA manufactures all equipment “made without assembly welding” from forged steel, normalized and rough machined as necessary to remove excess stock before quenching and tempering. All heat treating performed using selected equipment to optimize uniformity of material properties and Brinell hardness.

“Made without assembly welding” means the part does not include welding as an assembly step. Welding may always come into play for cladding, overlay, inlay, and repair welding necessary because of service requirements or field damage. Users sometime use the expression “one piece construction” interchangeably with “made without assembly welding”.

Units of Flanged Pressure Control Equipment made without assembly welding have a practical maximum overall length of 10 feet.

WOODCO USA manufactures all Loose Connectors illustrated in the previous Section 2.0 without assembly welding.

Loose Connectors
Flanges:
  Blind
  Target
  Test
  Instrument
  Threaded

Loose Connectors (continued)
Adapter Flanges
  Double Studded
  Single Studded
Hubs:
  Blind
  Target
  Test
  Threaded

WOODCO USA can furnish all the following configurations of Pressure Control Equipment without assembly welding.

Spools, Adapter
  Flange X Flange
  Flange X Studded
  Flange X Hub
  Flange X Union (Lubricator Adapter)
  Hub X Hub
  Hub X Union

Spools, Drilling
  Flange X Studded
  Studded

Spools, Spacer
  Flange

Crosses and Tees
  Flange X Studded
  Studded

Manifold Equipment
  Crosses, Tees, and Elbows
  Transmitter Flange
  Transmitter Manifold
  Buffer Manifold
3.1 Flanges, Adapter (made without assembly welding)

**Figure 3.1 A**

DOUBLE STUDDED ADAPTER (DSA)
(A) NOMINAL CONNECTION

(B) NOMINAL CONNECTION

**Figure 3.1 B**

SINGLE STUDDED ADAPTER (SSA)
(A) NOMINAL CONNECTION

(B) NOMINAL CONNECTION

**Figure 3.1 C**

FLANGE X UNION ADAPTER, FEMALE

FLANGE X UNION ADAPTER, MALE

(A) - BODY WITH FEMALE CONNECTION

(B) - BODY WITH MALE CONNECTION

(C) - MALE UNION HALF, AVAILABLE AS BLIND, THREADED, OR WELD NECK

(D) - NUT

(E) - FEMALE UNION HALF, AVAILABLE AS BLIND, THREADED, OR WELD NECK

(F) - SEGMENTS AND RETAINER RING

**Figure 3.1 D**

HUB X UNION ADAPTER, FEMALE

HUB X UNION ADAPTER, MALE

(A) - BODY WITH FEMALE CONNECTION

(B) - BODY WITH MALE CONNECTION

(C) - MALE UNION HALF, AVAILABLE AS BLIND, THREADED, OR WELD NECK

(D) - NUT

(E) - FEMALE UNION HALF, AVAILABLE AS BLIND, THREADED, OR WELD NECK

(F) - SEGMENTS AND RETAINER RING

**Figure 3.1 E**

LUBRICATOR ADAPTER

See Supplement 1, API Top Connectors
3.2 Spools, Adapter (made without assembly welding)

**Figure 3.2 A**
FLANGE ADAPTER SPOOL

(A) NOMINAL CONNECTION

![Diagram](image)

OAL = MINIMUM LENGTH TO PROVIDE ADEQUATE WORKING CLEARANCE. SPECIFY ADDITIONAL LENGTH IF REQUIRED.

**Figure 3.2 B**
FLANGE X STUDDED ADAPTER SPOOL

(A) NOMINAL FLANGE CONNECTION

![Diagram](image)

OAL = MINIMUM LENGTH TO PROVIDE ADEQUATE WORKING CLEARANCE. SPECIFY ADDITIONAL LENGTH IF REQUIRED.

**Figure 3.2 C**
FLANGE X HUB ADAPTER SPOOL

(A) NOMINAL FLANGE CONNECTION

![Diagram](image)

OAL = MINIMUM LENGTH TO PROVIDE ADEQUATE WORKING CLEARANCE. SPECIFY ADDITIONAL LENGTH IF REQUIRED.

**Figure 3.2 D**
HUB X HUB ADAPTER SPOOL

(A) NOMINAL CONNECTION

![Diagram](image)

OAL = MINIMUM LENGTH TO PROVIDE ADEQUATE WORKING CLEARANCE. SPECIFY ADDITIONAL LENGTH IF REQUIRED.
3.3 Spools, Drilling (made without assembly welding)

**Figure 3.3 A**

**FLANGE X STUDDED DRILLING SPOOL (SDS)**  
(STUDDED OUTLETS)

**Figure 3.3 B**

**STUDDED DRILLING SPOOL (SDS)**  
(STUDDED OUTLETS)

---

**SPECIFY ALL NOMINAL CONNECTIONS**

**OAL** = MINIMUM LENGTH TO PROVIDE ADEQUATE WORKING CLEARANCE. OUTLETS SHOWN CENTERED. SPECIFY ADDITIONAL LENGTH IF REQUIRED.

*H* = SPECIFY ANY ADDITIONAL LENGTH AND THIS DIMENSION FOR OUTLETS NOT CENTERED BETWEEN END CONNECTIONS.
3.4 Spools, Spacer (Riser Spools made without assembly welding)

The central body diameter of longer spacer spools made without assembly welding may have a larger diameter to provide greater column strength. Larger diameters may still allow connecting bolt insertion from behind the flange.

As an alternate to welding pad eyes, Flange Spacer Spools may have flanges tapped on their O.D. to accept Safety Hoist Rings for lifting. WOODCO USA makes Safety Hoist Rings available as an extra cost accessory at customer request.

**Figure 3.4 A**
FLANGE SPACER SPOOL (FSS)
MINIMUM LENGTH

(A) NOMINAL CONNECTION

(B) NOMINAL CONNECTION
MIN = MINIMUM LENGTH TO PROVIDE ADEQUATE WORKING CLEARANCE

**Figure 3.4 B**
FLANGE SPACER SPOOL (FSS)
LENGTH TO 10 FEET

(A) NOMINAL CONNECTION

B) NOMINAL CONNECTION
OAL = LENGTH SPECIFIED

Any single Safety Hoist Ring used will have a capacity exceeding the weight of the spool.
3.5 Crosses and Tees (made without assembly welding).

Figure 3.5 A

FLANGE X STUDED CROSS  
(FLOW CROSS)  
OAL = MINIMUM OR LENGTH SPECIFIED

(A) RUN FACE  
NOMINAL CONNECTION

(B) RUN FACE  
NOMINAL CONNECTION

(C) OUTLET FACE  
NOMINAL CONNECTION

(D) OUTLET FACE  
NOMINAL CONNECTION

Figure 3.5 B

FLANGE X STUDED TEE  
(FLOW TEE)

OAL = MINIMUM OR LENGTH SPECIFIED

(A) RUN FACE  
NOMINAL CONNECTION

(B) RUN FACE  
NOMINAL CONNECTION

(C) OUTLET FACE  
NOMINAL CONNECTION

Figure 3.5 C

STUDED CROSS

(A) RUN FACE  
NOMINAL CONNECTION

(B) RUN FACE  
NOMINAL CONNECTION

(C) OUTLET FACE  
NOMINAL CONNECTION

(D) OUTLET FACE  
NOMINAL CONNECTION

Figure 3.5 D

STUDED TEE

(A) RUN FACE  
NOMINAL CONNECTION

(B) RUN FACE  
NOMINAL CONNECTION

(C) OUTLET FACE  
NOMINAL CONNECTION

WOODCO USA can manufacture many other customer specified configurations without assembly welding.

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3.6 Choke Manifold Equipment (made without assembly welding)

WOODCO USA can supply all types of manifold fittings made without assembly welding. A variety of studded and flanged parts can allow the assembly of almost any manifold configuration, including extensive buffer systems.

3.7 Special Purpose Equipment (made without assembly welding)

WOODCO USA can design special purpose equipment at customers request, or WOODCO USA can manufacture equipment to customer supplied specifications and drawings.
WOODCO USA can assist buyers in determining the detailed dimensions required for each individual configuration. WOODCO USA can manufacture components, and assemble and test complete equipment.
4.0 Worksheets

4.1 Flange Identification Worksheet

To identify Flange End nominal connections, obtain the information indicated on this form and provide this information to WOODCO USA, or see Flange Slide Rule Program at: www.woodcousa.com.

MEASURE OUTSIDE DIAMETER (O.D.) or CIRCUMFERENCE (Cir.) AND MEASURE BOLT CIRCLE (B.C.)

USING AN ACCURATE SCALE

MEASURE FROM INSIDE EDGE OF ONE HOLE TO OUTSIDE EDGE OF OPPOSITE HOLE.

MEASURE BOLT HOLE DIAMETER ON OPEN FACE FLANGES. (MEASURE BOLT DIAMETER ON STUDDED FACE FLANGES AND ADD 1/8” TO OBTAIN HOLE DIAMETER).

MEASURE BOLT HOLE DIAMETER AND COUNT NUMBER OF HOLES.

MEASURE RING GROOVE PITCH DIAMETER AND MEASURE THICKNESS

TOTAL THICKNESS (INCLUDE ANY RAISED FACE PRESENT)

MEASURE FROM INSIDE EDGE OF RING GROOVE ON ONE SIDE, TO OUTSIDE EDGE OF RING GROOVE ON OPPOSITE SIDE.

<table>
<thead>
<tr>
<th>FLG 1.</th>
<th>FLG 2.</th>
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<tbody>
<tr>
<td>O.D.</td>
<td>B.C.</td>
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<td></td>
<td>Thk.</td>
</tr>
<tr>
<td></td>
<td>Diam.</td>
</tr>
<tr>
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<td>NO.</td>
</tr>
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</tbody>
</table>

www.woodcousa.com
4.2 Hub Identification Worksheet

To determine the nominal size and pressure rating of any existing Hub Connection, measure the Hub dimensions indicated on the drawing below and provide this information to WOODCO USA, or See Hub Slide Rule Program at: www.woodcousa.com.

**USING AN ACCURATE SCALE**
MEASURE HUB OUTSIDE DIAMETER

**MEASURE RING GROOVE PITCH DIAMETER**

**MEASURE INSIDE DIAMETER**

**MEASURE HUB THICKNESS AT O.D.**

**THICKNESS AT O.D.**

NOTE: MEASURE RING GROOVE PITCH DIAMETER BY MEASURING FROM INSIDE EDGE OF RING GROOVE ON ONE SIDE, TO OUTSIDE EDGE OF RING GROOVE ON OPPOSITE SIDE.

<table>
<thead>
<tr>
<th>HUB OUTSIDE DIAMETER</th>
<th>RING GROOVE PITCH DIAMETER</th>
<th>HUB THICKNESS</th>
<th>BORE INSIDE DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUB 1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HUB 2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HUB 3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HUB 4.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To obtain more complete information about Hub Connection Equipment, see the WOODCO USA Catalog for Pressure Control Equipment at: www.woodcousa.com.
Appendix A

A 1.0 General

WOODCO USA urges Buyers to choose to deal only with API Licensed Manufacturers.

See Appendix B for a statement on Why you should look for the API Monogram and License number on API products.

A 2.0 API Spec 6A

Pressure Control Equipment

Buyers should specify on each purchase order for API Spec 6A Pressure Control Equipment that:

“All items on this purchase order shall comply with every detail of all the applicable sections of API Spec 6A.”

Additionally, if the manufacturer chosen as supplier holds an API Spec 6A License, add these words:

“The API Monogram and the Manufacturers’ License number shall appear on each and every piece of equipment when allowed by API.”

Buyers should describe the equipment by terms and nominal size and pressure ratings appearing in API Spec 6A. Descriptions for each or all equipment items should also include:

PSL (Product Specification Level) 1, 2, 3, 3G, or 4. (See A 3.0)

Service Temperature

Minimum temperature represents the lowest ambient temperature that the equipment may experience. Maximum temperature represents the highest temperature of the fluid that may flow through the equipment.

### Guide to Order Placement

<table>
<thead>
<tr>
<th>Temperature Classification *</th>
<th>Operating Range (Degrees Fahrenheit [°F])</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>-75 to 180</td>
</tr>
<tr>
<td>L</td>
<td>-50 to 180</td>
</tr>
<tr>
<td>N</td>
<td>-50 to 140</td>
</tr>
<tr>
<td>P</td>
<td>-20 to 180</td>
</tr>
<tr>
<td>R</td>
<td>Room Temperature</td>
</tr>
<tr>
<td>S</td>
<td>0 to 140</td>
</tr>
<tr>
<td>T</td>
<td>0 to 180</td>
</tr>
<tr>
<td>U</td>
<td>0 to 250</td>
</tr>
<tr>
<td>V</td>
<td>35 to 250</td>
</tr>
<tr>
<td>X**</td>
<td>0 to 350</td>
</tr>
<tr>
<td>Y**</td>
<td>0 to 650</td>
</tr>
</tbody>
</table>

* PURCHASER MAY COMBINE TEMPERATURE CLASSES e.g. KU, -75 TO 250 °F

** MAY REQUIRE DERATING

### Material class

#### Minimum Material Requirements

**Body & Flange**

<table>
<thead>
<tr>
<th>Material class</th>
<th>AA-General Service</th>
<th>BB-General Service</th>
<th>CC-General Service</th>
<th>DD-Sour Service a</th>
<th>EE-Sour Service a</th>
<th>FF-Sour Service a</th>
<th>HH-Sour Service a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon or low alloy steel</td>
<td>Carbon or low alloy steel</td>
<td>Stainless steel</td>
<td>Carbon or low alloy steel</td>
<td>Carbon or low alloy steel</td>
<td>Stainless steel</td>
<td>CRA bcd</td>
<td></td>
</tr>
</tbody>
</table>

a As defined by NACE Standard MR0175/ISO 15156.
b In compliance with NACE Standard MR-01-75/ISO 15156.
c CRA required on retained fluid wetted surfaces only; CRA cladding of low allow or stainless steel permitted.
d CRA as defined in API 6A latest edition. NACE MR0175/ISO 15156 definition of CRA does not apply.

#### Supplemental Requirements

Buyers should clearly define, at the time of order, any requirements which exceed or differ from API Spec 6A.
Appendix A (continued)

Documentation

Buyers should specifically request any desired documentation, as applicable, at the time of order, such as:

Certificate of Compliance with API Spec 6A and/or the terms of the purchase order.

Material Test Reports

Heat Treat Records

Non-destructive Test Reports:
- PT - Liquid Penetrant Examination
- MT - Magnetic Particle Examination
- UT - Ultrasonic Volumetric Examination
- RT - Radiographic Volumetric Examination

Hydrostatic Test Report and/or Chart Recording of Hydrostatic Test (API Spec 6A omits hydrostatic test of Loose Connectors for all PSL’s).

A 3.0 Product Specification Level

API Spec 6A specifically states, product specification levels do not apply to ring gaskets or studs and nuts.

A summary of what PSL’s designate follows:

**PSL-1**

- Equipment meets the minimum requirements of API Spec 6A for:
  - Design
  - Specification
  - Qualification, CVN testing for service temperature -50° F and below.

**PSL-1 Continued**

- Process
- Inspection
- Hydrostatic Test (except for Loose Connectors).

**PSL-2**

- Equipment meets all the requirements of API Spec 6A PSL-1 and:
  - Controls the limits of variance between the material qualification test coupon and the production material. CVN testing for service temperature -20° F and below.
  - Volumetric inspection of welds (RT or UT).
  - Magnetic particle inspection of accessible well wetted surfaces.

**PSL-3**

- Equipment meets all the requirements of API Spec 6A PSL-2 and:
  - Restricts the tolerance of material chemistry.
  - Increases the maximum size of the material qualification test coupon in relation to the section thickness of the equipment components. CVN testing for all service temperatures.
  - Volumetric inspection of all material in body, bonnets, flanges & stems.
  - Wet Magnetic Particle inspection of all accessible surfaces.
  - Hydrostatic Test time extended (except for Loose Connectors).

**PSL-3G** includes all the requirements of PSL 3 plus additional practices described in API 6A, Annex A. PSL-3G designates an additional gas-testing requirement of assembled equipment.
Appendix A (continued)

**PSL-4** Equipment meets all the requirements of API Spec 6A PSL-3 and:

Increases the maximum size of the material qualification test coupon in relation to the section thickness of the equipment components.

Prohibits welding except for overlay/inlay of corrosion resistant alloy on well wetted surfaces.

Gas testing of assembled equipment.

**A 4.0 Order Placement Worksheet**

WOODCO USA provides a worksheet on Page 31 of this catalog for the convenience of buyers of either API Spec 6A or API Spec 16A equipment. Buyers may print and use this form directly or it may serve as a draft for buyers who want to have such a document on proprietary forms.

For the convenience of buyers who may need to identify connections in the field, see:

- Page 25, [Flange Identification Worksheet](#)
- Page 26, [Hub Identification Worksheet](#)

On the internet at: [www.woodcousa.com](http://www.woodcousa.com)

See also: [Web Site Tools](#)
- [Flange Slide Rule Program](#)
- [Hub Slide Rule Program](#)

**A 5.0 The API Spec 6A Document**

WOODCO USA furnishes the information concerning API Spec 6A in this appendix as a reference only. Buyers interested in becoming familiar with API Spec 6A may obtain a copy of the document by contacting:

Global Engineering Documents:
Phone Orders: 1-800-854-7179 (Toll-free in the U.S. and Canada)
303-397-7956 (Local and International)
Fax Orders: 303-397-2740
Online Orders: [www.global.ihs.com](http://www.global.ihs.com)

Product Number: GX06A19
A 5.0 API Spec 16A

Pressure Control Equipment

Buyers should specify on each purchase order for API Spec 16A Pressure Control Fittings that:

“All items on this purchase order shall comply with every detail of all applicable sections of API Spec 16A.”

Additionally, if the manufacturer chosen as supplier holds an API Spec 16A License, add these words:

“The API Monogram and the Manufacturers’ License number shall appear on each and every piece of equipment when allowed by API.”

Buyers should describe the equipment by terms and nominal size and pressure ratings appearing in API Spec 16A. Descriptions for each or all equipment items should also include:

Service Temperature

Minimum temperature represents the lowest ambient temperature that the equipment may experience. Maximum temperature represents the highest temperature of the fluid that may flow through the equipment without derating.

<table>
<thead>
<tr>
<th>Temperature Classification</th>
<th>Operating Range (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-75</td>
<td>-75 to 250</td>
</tr>
<tr>
<td>T-20</td>
<td>-20 to 250</td>
</tr>
<tr>
<td>T-0</td>
<td>0 to 250</td>
</tr>
</tbody>
</table>

Supplemental Requirements

Buyers should clearly define, at the time of order, any requirements which exceed or differ from API Spec 16A.

A 6.0 Order Placement Worksheet

WOODCO USA provides a Worksheet on the following page of this catalog for the convenience of buyers of either API Spec 6A or API Spec 16A equipment. Buyers may print and use this form directly or it may serve as a draft for buyers who want to have such a document on proprietary forms.

For the convenience of buyers who may need to identify connections in the field, see:

Page 25, Flange Identification Worksheet

or

Page 26, Hub Identification Worksheet.


See also: Web Site Tools
Flange Slide Rule Program
Hub Slide Rule Program

A 7.0 The API Spec 16A Document

WOODCO USA furnishes the information concerning API Spec 16A in this appendix as a reference only. Buyers interested in becoming familiar with API Spec 16A may obtain a copy of the document by contacting:

Global Engineering Documents:
Phone Orders:
1-800-854-7179 (Toll-free in the U.S. and Canada)
303-397-7956 (Local and International)
Fax Orders: 303-397-2740
Online Orders: www.global.ihs.com
Product Number: GX16A03
### Order Placement Worksheet

#### DESCRIPTION OF PRODUCT

<table>
<thead>
<tr>
<th>DESCRIPTION OF PRODUCT</th>
</tr>
</thead>
</table>

#### API 6A PRODUCT

<table>
<thead>
<tr>
<th>API 6A PRODUCT</th>
</tr>
</thead>
</table>

#### API 6A MONOGRAM REQUIRED

<table>
<thead>
<tr>
<th>PRODUCT SPECIFICATION LEVEL</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PSL 1</th>
<th>PSL 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSL 3</td>
<td>PSL 3G</td>
</tr>
</tbody>
</table>

#### Service Temperature

(Circle one or two to cover temperature range required).

<table>
<thead>
<tr>
<th>Temperature Classification</th>
<th>Operating Range (°F)</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>X**</td>
<td>0 to 350</td>
</tr>
<tr>
<td>Y**</td>
<td>0 to 650</td>
</tr>
</tbody>
</table>

* Purchaser may combine temperature classes e.g. KU, -75 to 250 °F
** May require derating

#### Material Class

(Circle one)

<table>
<thead>
<tr>
<th>MATERIAL CLASS</th>
</tr>
</thead>
</table>

| AA-General Service | Carbon or low alloy steel |
| BB-General Service | Carbon or low alloy steel |
| CC-General Service | Stainless steel |
| DD-Sour Service *  | Carbon or low alloy steel b |
| EE-Sour Service *  | Carbon or low alloy steel b |
| FF-Sour Service *  | Stainless steel b |
| HH-Sour Service *  | CRA bcd |

* As defined by NACE Standard MR0175/ISO 15156
** In compliance with NACE Standard MR-01-75/ISO 15156.

#### Supplemental Requirements

(Specify any stainless steel or "CRA" inlay of ring grooves, lifting eyes, etc.)

#### Documentation Required (Check all that apply)

- Certificate of Compliance*
- Material Test Report
- Heat Treat Records
- Non-Destructive Test Reports

* Required for API Spec 16A Equipment bearing the API Monogram.

** Not required for API 6A Loose Connectors.
Appendix B

WHY YOU SHOULD LOOK FOR THE API MONOGRAM AND LICENSE NUMBER ON “API” PRODUCTS.

Manufacturers who want to apply the API monogram on their equipment and materials must apply to API for a license to do so. If API determines, through a Quality System Survey, that these manufacturers have the capability to produce products that consistently conform to API specifications, API shall license these manufacturers to use the API monogram and their license number on specific products made at specific locations. Although any manufacturer may claim that its products meet API specifications without monogramming them, only manufacturers with a license from API can apply the API monogram to their products.

WHEN THE API MONOGRAM, IN CONJUNCTION WITH THE MANUFACTURER’S LICENSE NUMBER, ACTUALLY APPEARS ON THE PRODUCT, IT CONSTITUTES A WARRANTY BY THE LICENSED MANUFACTURER (LICENSEE) TO THE AMERICAN PETROLEUM INSTITUTE AND TO THE PURCHASER OF SUCH EQUIPMENT OR MATERIALS: THAT THIS PRODUCT COMPLIES IN EVERY DETAIL WITH THE APPLICABLE STANDARDS AND SPECIFICATIONS. NO SUCH WARRANTY TO API EXISTS WHEN THE MONOGRAM DOES NOT APPEAR.

API DOES NOT RECOGNIZE CLAIMS ABOUT API-SPECIFIED PRODUCTS TO WHICH MANUFACTURERS DO NOT APPLY THE MONOGRAM. USERS WHO WANT AN “API STANDARD PRODUCT” FROM AN API LICENSED MANUFACTURER SHOULD REQUIRE IN THEIR PURCHASE ORDER THAT THE MONOGRAM AND THE MANUFACTURER’S LICENSE NUMBER APPEAR ON THE PRODUCT ITSELF.

Product marking with License Number in conjunction with monogram

API Monogram applied to or on the product by Licensee.

Applicable API specification for the Monogrammed product, e.g. 6A.

License Number issued by API, identifying the Manufacturer and the Licensed facility.

6A XXXX

The API evaluation and licensing system has superiority to other quality system evaluations -- such as ISO 9000 -- because API evaluators have product knowledge and have the capability to verify that the manufacturer’s quality system, if applied, assures a product that meets API specifications. In contrast, other systems do not require evaluators to have product knowledge.

WOODCO USA has license certificates, API 6A, 16A, 17D, and 7K. For a list of manufacturers API has licensed to date, see The API Composite List, Latest Edition, updated weekly, on-line at http://compositelist.api.org/.
Appendix D

Certificate of Authority to use the Official API Monogram

License Number: 16A-0004

The American Petroleum Institute hereby grants to

WOODCO USA
773 McCarty Drive
Houston, Texas

the right to use the Official API Monogram® on manufactured products under the conditions in the official publications of the American Petroleum Institute entitled API Spec 5L® and API Spec 16A and in accordance with the provisions of the License Agreement.

In all cases where the Official API Monogram is applied, the API Monogram should be used in conjunction with this certificate number: 16A-0004

The American Petroleum Institute reserves the right to revoke this authorization to use the Official API Monogram for any reason satisfactory to the Board of Directors of the American Petroleum Institute.

The scope of this license includes the following: Drilling Spools, Adapters, Loops Connections, Clamps

QMS Exclusions: No Exclusions identified as Applicable

Effective Date: APRIL 15, 2012
Expiration Date: APRIL 15, 2015

To verify the authenticity of this license, go to www.api.org/compositelist.
Appendix E

Certificate of Authority to use the Official API Monogram

License Number: 17D-0040

The American Petroleum Institute hereby grants to

WOODCO USA
773 McCarty Drive
Houston, Texas

the right to use the Official API Monogram® on manufactured products under the conditions in the official publications of the American Petroleum Institute entitled API Spec 6L® and API Spec 17D

and in accordance with the provisions of this License Agreement:

In all cases where the Official API Monogram is applied, the API Monogram should be used in conjunction with this certificate number: 17D-0040

The American Petroleum Institute reserves the right to revoke this authorization to use the Official API Monogram for any reason satisfactory to the Board of Directors of the American Petroleum Institute.

The scope of this license includes the following products: Flanged Connectors, Threaded Connectors; Other End Connectors (including Clamp Hub-type) at PSL 2 and 3.

QMS Exclusions: No Exclusions identified as Applicable

Effective Date: APRIL 15, 2012
Expiration Date: APRIL 15, 2015

To verify the authenticity of this license, go to www.api.org/composelst.

American Petroleum Institute

Director of Global Industry Services
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Please direct all questions to: sitemaster@woodcousa.com

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