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

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
STUDDED OUTLET CONNECTION
MEETS DESIGN CRITERIA OF API 6A. THIS PRODUCT MAY BEAR THE API MONOGRAM.
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:
See Weld Neck dimensions that satisfy API requirements at: www.woodcousa.com.

To identify Hubs or to determine which Clamps fit which specific Hubs see: 4.2 Hub Identification Worksheet.
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:

#### Figure 2.3 A

**FLANGE ADAPTER SPOOL**

(A) NOMINAL CONNECTION

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

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

OAL = LENGTH SPECIFIED

**Figure 2.5 B**

**HUB SPACER SPOOL (HSS)**

(A) NOMINAL CONNECTION

OAL = LENGTH SPECIFIED

(B) NOMINAL CONNECTION

**Figure 2.5 C**

**FLANGE SPACER SPOOL WITH OUTLETS AND PAD EYES**

OUTLET NOMINAL CONNECTION

(A) NOMINAL CONNECTION

H

P

OAL

(B) NOMINAL CONNECTION

FOR OUTLET AND LIFTING PAD EYES, SPECIFY H, A, AND/OR P AS APPROPRIATE.

**CAUTION**

FIELD INSTALLATION OF LIFTING PAD EYES USING UNQUALIFIED WELDING PROCEDURES 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:

* S MEANS SPECIAL CONFIGURATION.

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.

Figure 2.6.3 A
HUB TEE

Figure 2.6.3 B
HUB CROSS

(A) RUN HUB
NOMINAL CONNECTION
(B) RUN HUB
NOMINAL CONNECTION
(C) OUTLET HUB
NOMINAL CONNECTION
(D) OUTLET HUB
NOMINAL CONNECTION

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:
Figure 2.7 A
WELD NECK CROSS

(A) RUN WELD NECK
NOMINAL SIZE O.D./I.D.

(B) RUN WELD NECK
NOMINAL SIZE O.D./I.D.

(C) OUTLET WELD NECK
NOMINAL SIZE O.D./I.D.

(D) OUTLET WELD NECK
NOMINAL SIZE O.D./I.D.

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

Figure 2.7 B
WELD NECK ELBOW

(A) WELD NECK
NOMINAL SIZE O.D./I.D.

(B) WELD NECK
NOMINAL SIZE O.D./I.D.

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

Figure 2.7 C
FLANGE X WELD NECK TEE

(A) RUN FLANGE
NOMINAL CONNECTION

(B) RUN WELD NECK
NOMINAL SIZE O.D./I.D.

(C) OUTLET FLANGE
NOMINAL CONNECTION

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

Figure 2.7 D
TRANSmitter FLANGE

TAPPED THREAD

NOMINAL INLET CONNECTION
WOODCO USA can assist buyers in determining the detailed dimensions required for each individual manifold configuration.

WOODCO USA can manufacture components, and assemble and test complete manifolds.

See page 24 for similar equipment made without welding.
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

(A) - BODY WITH FEMALE CONNECTION
(B) - O-RING
(C) - BLANKING PLUG
(D) - NUT
(E) - RETAINER RING
(F) - AUTOCLAVE PLUG

LUBRICATOR CONNECTION CROSSOVER ADAPTERS AVAILABLE.
### 3.2 Spools, Adapter (made without assembly welding)

**Figure 3.2 A**

**FLANGE ADAPTER SPOOL**

(A) NOMINAL CONNECTION

(B) NOMINAL CONNECTION

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

(B) NOMINAL STUDDED CONNECTION

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

(B) NOMINAL HUB CONNECTION

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

(B) NOMINAL CONNECTION

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**

**STUDED DRILLING SPOOL (SDS)**
*(STUDED OUTLETS)*

**OAL** = MINIMUM LENGTH EQUAL TO LARGEST OUTLET NOMINAL FLANGE DIAMETER PLUS ANY REQUIREMENT FOR NECESSARY STUD THREAD ENGAGEMENT. 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 C

FLANGE SPACER SPOOL (FSS) WITH HOIST RING ON 2 FLANGES FOR HORIZONTAL LIFT

SPOOLS MAY HAVE 3 TAPPED LOCATIONS TO ALLOW HORIZONTAL AND VERTICAL LIFT

Figure 3.4 E

HEAVY DUTY SAFETY HOIST RING

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 STUDDED CROSS
(FLOW CROSS)
OAL = MINIMUM OR LENGTH SPECIFIED

Figure 3.5 B
FLANGE X STUDDED TEE
(FLOW TEE)
OAL = MINIMUM OR LENGTH SPECIFIED

Figure 3.5 C
STUDED CROSS

Figure 3.5 D
STUDED TEE

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

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.

![Figure 3.6 A](image)

STUDED MODULAR MANIFOLD BUFFER TOP VIEW

![Figure 3.6 B](image)

HORIZONTAL (SIDE VIEW) CUTAWAY

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.

![Figure 3.7 A](image)

STUDED 45° 4-WAY CROSS

![Figure 3.7 B](image)

5 WAY CROSS - 4 WAY STUDED WITH FLANGE TOP OUTLET
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.)**

**MEASURE BOLT HOLE DIAMETER AND COUNT NUMBER OF HOLES**

**MEASURE OUTSIDE DIAMETER (FOR INACCESSIBLE FLANGE FACES, MEASURE CIRCUMFERENCE OF FLANGE WITH A TAPE MEASURE AND DIVIDE THIS MEASUREMENT BY 3.1416 [π] TO GET THE O.D.).**

**TO MEASURE B.C., MEASURE FROM INSIDE EDGE OF ONE HOLE TO OUTSIDE EDGE OF OPPOSITE HOLE.**

**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>
</tr>
</thead>
<tbody>
<tr>
<td>OUTSIDE DIAMETER (O.D.)</td>
<td>BOLT CIRCLE (B.C.)</td>
</tr>
</tbody>
</table>

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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.

![Diagram of Hub Identification]

**Using a Scale or Tape Measure**

1. Measure Hub Outside Diameter (O.D.)
2. Measure Ring Groove Pitch Diameter (P.D.)
3. Measure Hub Thickness
4. Measure Inside Diameter (I.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>Minimum Material Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA-General Service</td>
<td>Carbon or low alloy steel</td>
</tr>
<tr>
<td>BB-General Service</td>
<td>Carbon or low alloy steel</td>
</tr>
<tr>
<td>CC-General Service</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>DD-Sour Service a</td>
<td>Carbon or low alloy steel b</td>
</tr>
<tr>
<td>EE-Sour Service a</td>
<td>Carbon or low alloy steel b</td>
</tr>
<tr>
<td>FF-Sour Service a</td>
<td>Stainless steel b</td>
</tr>
<tr>
<td>HH-Sour Service a</td>
<td>CRA bcd</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).

---

**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.

---

**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.
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
or
Page 26, Hub Identification Worksheet.


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
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:

Online Orders: www.techstreet.com
Appendix A (continued)

Order Placement Worksheet

DESCRIPTION OF PRODUCT

API 6A PRODUCT

API 6A MONOGRAM REQUIRED

PRODUCT SPECIFICATION LEVEL

PSL 1 _______ PSL 2 _______

PSL 3 _______ PSL 3G _______ PSL 4 _______

SERVICE TEMPERATURE

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

<table>
<thead>
<tr>
<th>Temperature Classification</th>
<th>Operating Range (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
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<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)

- 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  
- EE-Sour Service*: Carbon or low alloy steel
- FF-Sour Service*: Stainless steel  
- HH-Sour Service*: CRA  

* 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... PT, MT, UT, RT

(WOODCO USA furnishes documentation without request)

HYDROSTATIC TEST REPORTS...

HYDROSTATIC TEST RECORD CHART

** Not required for API 6A Loose Connectors.

www.woodcousa.com

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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.

Fig. B.1

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

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

WOODCO USA presents this catalog to secure your business.

Catalog for WOODCO USA® Brand Pressure Control Equipment

Phone: 713-672-9491

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 C

Certificate of Authority to use the Official API Monogram

License Number: 6A-0091

The American Petroleum Institute hereby grants to

WOODCO USA
773 McCarty Drive
Houston, TX

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 Q1® and API-6A and in accordance with the provisions of the License Agreement.

In all cases where the Official API Monogram is applied, the API Monogram shall be used in conjunction with this certificate number: 6A-0091

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: Chokes, Blind and Test Flanges, Tees and Crosses, Threaded Connectors, Top Connectors, Adapter Spools and Spacer Spools, Check Valves at PSL 1, PSL 2, PSL 3

OMS Exclusions: No Exclusions identified as Applicable

Effective Date: NOVEMBER 1, 2019
Expiration Date: APRIL 15, 2021

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

Vice President of Global Industry Services
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, TX

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 Q1® and API-16A and in accordance with the provisions of the License Agreement.

In all cases where the Official API Monogram is applied, the API Monogram shall 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: Hub and Clamp Connectors, Adapters and Drilling Spools

GMS Exclusions: No Exclusions Identified as Applicable

Effective Date: APRIL 15, 2018
Expiration Date: APRIL 15, 2021

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

Executive Vice President

[Image of Certificate of Authority]
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, TX

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 02® and API-17D and in accordance with the provisions of the License Agreement.

In all cases where the Official API Monogram is applied, the API Monogram shall 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: Flanged Connectors, Other End Connectors (Including Clamp Hub-type) at PSL 2, PSL 3.

QMS Exclusions: No Exclusions Identified as Applicable

Effective Date: APRIL 15, 2018
Expiration Date: APRIL 15, 2021

To verify the authenticity of this license, go to www.api.org/compositecert.
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Please direct all questions to: sitemaster@woodcousa.com

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