

# High Efficiency

Pilot Operated Safety Valves

Series 820 – Modulate Action  
US Units



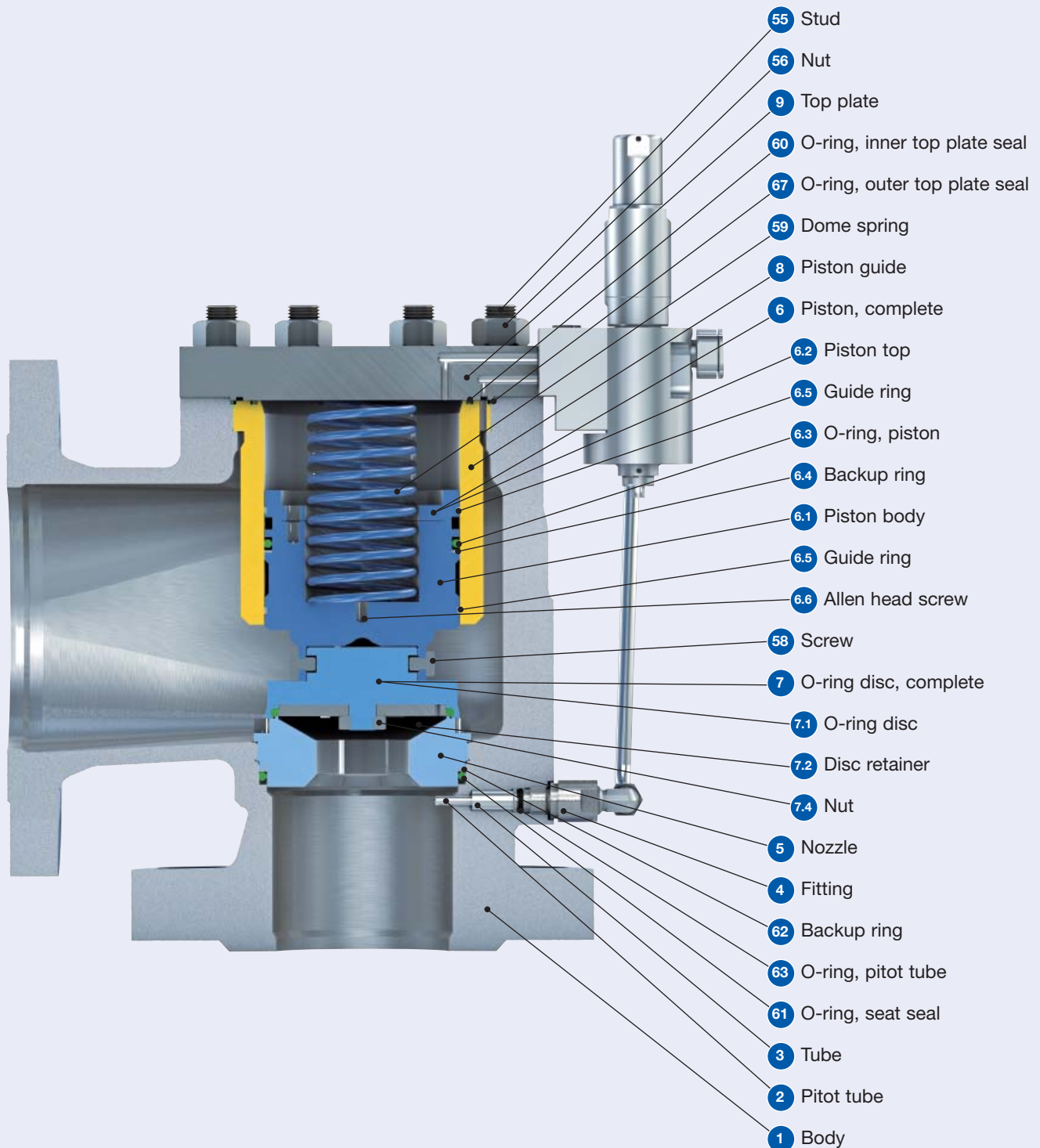
## Facts

**LESER**

[The-Safety-Valve.com](http://The-Safety-Valve.com)

## Materials Series 810, 820 Main Valve

Below is a schematic drawing of the parts layout for the LESER POSV main valve including both the Standard and Extra Orifice designs. For the related parts listing, see opposite page.



## Materials Series 810, 820 Main Valve

| Materials                              |                       |                                      |                                                                                                        |                                      |
|----------------------------------------|-----------------------|--------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------|
| Item                                   | Component             | Type 8112 / 8212                     | Type 8114 / 8214                                                                                       | Type 8113 / 8213                     |
| 1                                      | Body                  | 1.0619<br>SA 216 WCB                 | 1.4408<br>SA 351 CF8M                                                                                  | SA 352 LCB                           |
| 2                                      | Pitot tube            | 1.4404<br>316L                       | 1.4404<br>316L                                                                                         | 1.4404<br>316L                       |
| 3                                      | Tube                  | 1.4404<br>316L                       | 1.4404<br>316L                                                                                         | 1.4404<br>316L                       |
| 4                                      | Fitting               | 1.4404<br>316L                       | 1.4404<br>316L                                                                                         | 1.4404<br>316L                       |
| 5                                      | Nozzle                | 1.4404<br>316L                       | 1.4404<br>316L                                                                                         | 1.4404<br>316L                       |
| 6                                      | Piston, complete      | 1.4404<br>316L                       | 1.4404<br>316L                                                                                         | 1.4404<br>316L                       |
| 6.1                                    | Piston body           | 1.4404<br>316L                       | 1.4404<br>316L                                                                                         | 1.4404<br>316L                       |
| 6.2                                    | Piston top            | 1.4404<br>316L                       | 1.4404<br>316L                                                                                         | 1.4404<br>316L                       |
| 6.4                                    | Backup ring           | PTFE<br>PTFE                         | PTFE<br>PTFE                                                                                           | PTFE<br>PTFE                         |
| 6.5                                    | Guide ring            | PTFE with carbon<br>PTFE with carbon | PTFE with carbon<br>PTFE with carbon                                                                   | PTFE with carbon<br>PTFE with carbon |
| 6.6                                    | Allen head screw      | A4-70<br>Stainless steel             | A4-70<br>Stainless steel                                                                               | A4-70<br>Stainless steel             |
| 7                                      | O-ring disc, complete | 1.4404<br>316L                       | 1.4404<br>316L                                                                                         | 1.4404<br>316L                       |
| 7.1                                    | O-ring disc           | 1.4404<br>316L                       | 1.4404<br>316L                                                                                         | 1.4404<br>316L                       |
| 7.2                                    | Disc retainer         | 1.4404<br>316L                       | 1.4404<br>316L                                                                                         | 1.4404<br>316L                       |
| 7.4                                    | Nut                   | A4-70<br>Stainless steel             | A4-70<br>Stainless steel                                                                               | A4-70<br>Stainless steel             |
| 8                                      | Piston guide          | 1.4404<br>316L                       | 1.4404<br>316L                                                                                         | 1.4404<br>316L                       |
| 9                                      | Top plate             | 1.0460<br>SA 105                     | 1.4404<br>316L                                                                                         | 1.406<br>SA105                       |
| 55                                     | Stud                  | 1.7225<br>B7M                        | 1.4401<br>B8M                                                                                          | 1.7225<br>B7M                        |
| 56                                     | Nut                   | 1.7225<br>2H                         | 1.4401<br>8M                                                                                           | 1.7225<br>2HM                        |
| 58                                     | Screw                 | A4-70<br>Stainless steel             | A4-70<br>Stainless steel                                                                               | A4-70<br>Stainless steel             |
| 59                                     | Dome spring           | 1.4310<br>Stainless steel            | 1.4310<br>Stainless steel                                                                              | 1.4310<br>Stainless steel            |
| 62                                     | Backup ring           | PTFE<br>PTFE                         | PTFE<br>PTFE                                                                                           | PTFE<br>PTFE                         |
| Option code                            |                       |                                      |                                                                                                        |                                      |
| 6.3, 6.4,<br>7.3, 60,<br>61, 63,<br>67 | O-ring <sup>1)</sup>  | *<br>R05<br>R06                      | Viton® (FKM – Fluorocarbon)<br>Buna-EP® (EPDM – Ethylene-Propylene-Dine)<br>Kalrez® (FFKM – Perfluoro) |                                      |

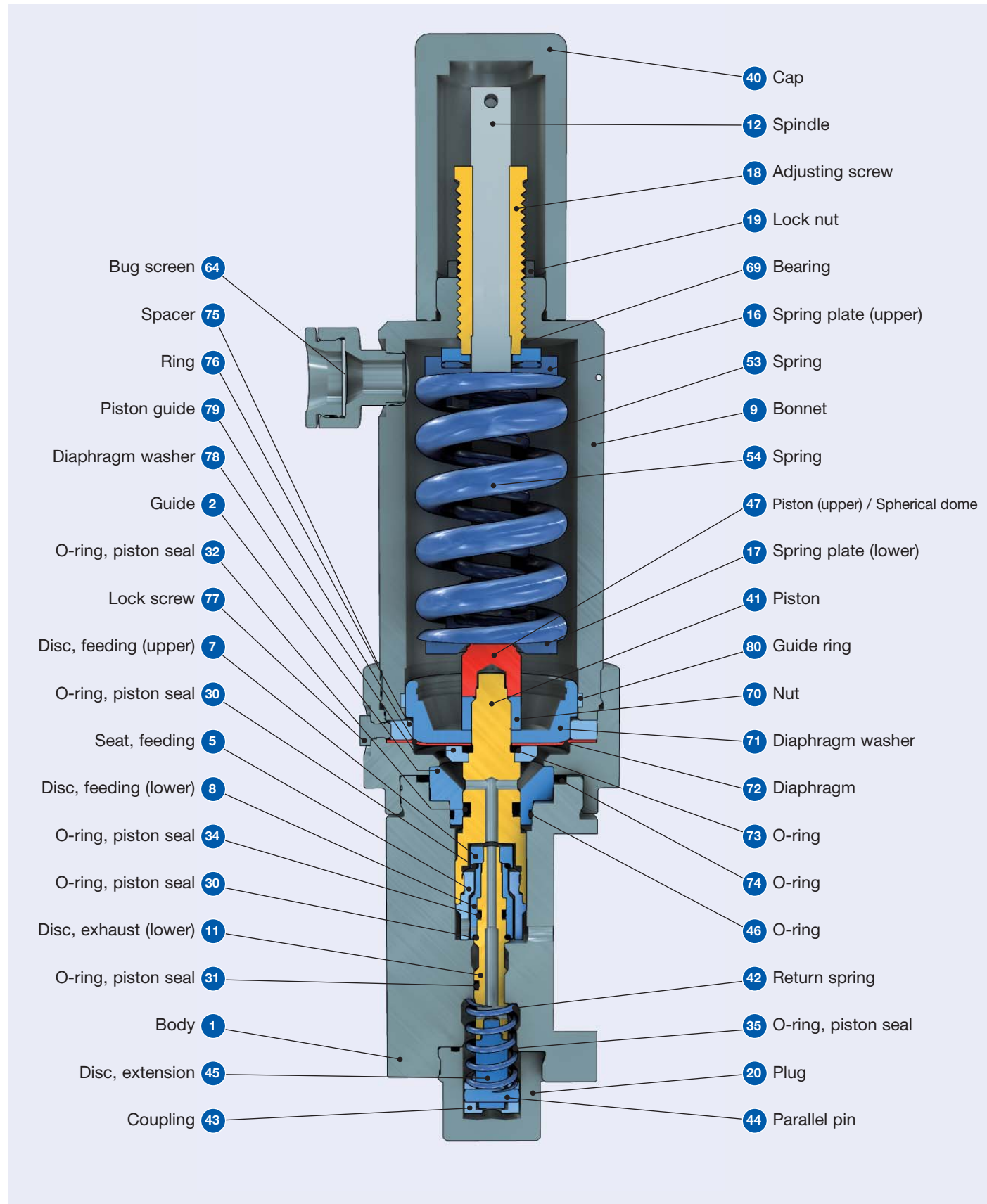
### Please notice:

- Modifications reserved by LESER.
- LESER can upgrade materials without notice.
- Every part can be replaced by other material acc. to customer specification.

<sup>1)</sup> For further soft seal materials refer to page 02/15

## Materials Series 820 Modulate Action Pilot Valve

Below is a schematic drawing of the parts layout for the LESER Series 820 – Modulate Action pilot valve.  
For the related parts listing, see opposite page.



## Materials Series 820 Modulate Action Pilot Valve

| Materials |                       |                                    |                                    |
|-----------|-----------------------|------------------------------------|------------------------------------|
| Item      | Component             | Piston                             | Diaphragm                          |
| 1         | Body                  | 1.4404                             | 1.4404                             |
|           |                       | SA 479 316L                        | SA 479 316L                        |
| 2         | Guide                 | 1.4404                             | 1.4404                             |
|           |                       | 316L                               | 316L                               |
| 5         | Seat, feeding         | 1.4404                             | 1.4404                             |
|           |                       | 316L                               | 316L                               |
| 7         | Disc, feeding (upper) | 1.4404                             | 1.4404                             |
|           |                       | 316L                               | 316L                               |
| 8         | Disc, feeding (lower) | 1.4404                             | 1.4404                             |
|           |                       | 316L                               | 316L                               |
| 9         | Bonnet                | 1.4404                             | 1.4404                             |
|           |                       | SA 479 316L                        | SA 479 316L                        |
| 11        | Disc, exhaust (lower) | 1.4404                             | 1.4404                             |
|           |                       | 316L                               | 316L                               |
| 12        | Spindle               | 1.4404                             | 1.4404                             |
|           |                       | 316L                               | 316L                               |
| 16        | Spring plate (upper)  | 1.4122<br>Hardened stainless steel | 1.4122<br>Hardened stainless steel |
|           |                       | 1.4122<br>Hardened stainless steel | 1.4122<br>Hardened stainless steel |
| 17        | Spring plate (lower)  | 1.4404                             | 1.4404                             |
|           |                       | 316L                               | 316L                               |
| 18        | Adjusting screw       | 1.4404                             | 1.4404                             |
|           |                       | 316L                               | 316L                               |
| 19        | Lock nut              | 1.4404                             | 1.4404                             |
|           |                       | 316L                               | 316L                               |
| 20        | Plug                  | 1.4404                             | 1.4404                             |
|           |                       | 316L                               | 316L                               |
| 40        | Cap                   | 1.4404                             | 1.4404                             |
|           |                       | 316L                               | 316L                               |
| 41        | Piston                | 1.4404                             | 1.4404                             |
|           |                       | 316L                               | 316L                               |
| 42        | Return spring         | 2.4669                             | 2.4669                             |
|           |                       | INCONEL X750                       | INCONEL X750                       |
| 43        | Coupling              | 1.4404                             | 1.4404                             |
|           |                       | 316L                               | 316L                               |

| Materials |                  |                 |                 |
|-----------|------------------|-----------------|-----------------|
| Item      | Component        | Piston          | Diaphragm       |
| 44        | Parallel pin     | Stainless steel | Stainless steel |
|           |                  | Stainless steel | Stainless steel |
| 45        | Disc, extension  | 1.4404          | 1.4404          |
|           |                  | 316L            | 316L            |
| 47        | Piston (upper)   | 1.4404          | –               |
|           |                  | 316L            | –               |
| 47        | Spherical dome   | –               | 1.4404          |
|           |                  | –               | 316L            |
| 54        | Spring           | 1.4310          | 1.4310          |
|           |                  | Stainless steel | Stainless steel |
| 64        | Bug screen       | Plastic         | Plastic         |
|           |                  | Plastic         | Plastic         |
| 69        | Bearing          | 1.4404          | 1.4404          |
|           |                  | 316L            | 316L            |
| 70        | Nut              | –               | 1.4401          |
|           |                  | –               | Stainless steel |
| 71        | Diaphragm washer | –               | 1.4404          |
|           |                  | –               | 316L            |
| 72        | Diaphragm        | –               | FKM             |
|           |                  | –               |                 |
| 75        | Spacer           | –               | 1.4404          |
|           |                  | –               | 316L            |
| 76        | Ring             | –               | 1.4404          |
|           |                  | –               | 316L            |
| 77        | Lock screw       | –               | 1.4401          |
|           |                  | –               | Stainless steel |
| 78        | Diaphragm washer | –               | 1.4404          |
|           |                  | –               | 316L            |
| 80        | Guide ring       | –               | 1.4404          |
|           |                  | –               | 316L            |
| 81        | Backup ring      | PTFE            | –               |
|           |                  | –               | –               |
| 82        | Backup ring      | PTFE            | –               |
|           |                  | –               | –               |

| Materials                               |                      |             |                                           |
|-----------------------------------------|----------------------|-------------|-------------------------------------------|
| Item                                    | Component            | Option code |                                           |
| 30, 31,<br>32, 34,<br>35, 46,<br>73, 74 | O-ring <sup>1)</sup> | *           | Viton® (FKM – Fluorocarbon)               |
|                                         |                      | R05         | Buna-EP® (EPDM – Ethylene-Propylene-Dine) |
|                                         |                      | R06         | Kalrez® (FFKM – Perfluoro)                |

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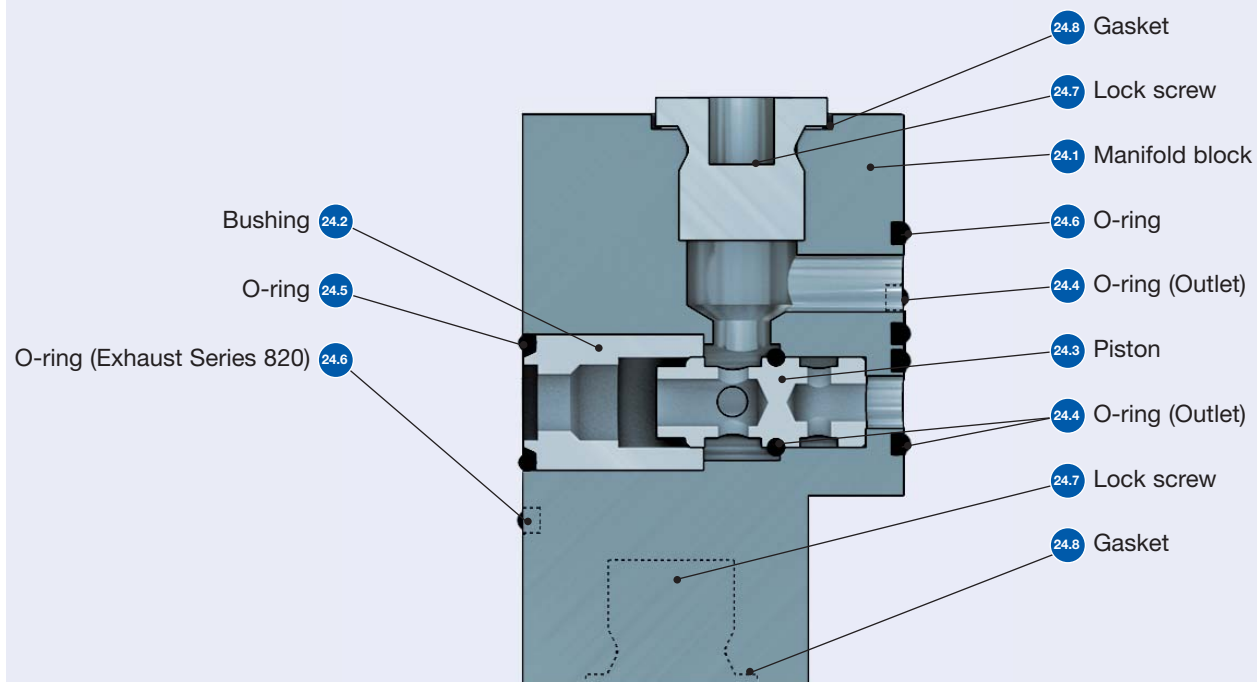
<sup>1)</sup> For further soft seal materials refer to page 02/15

# Product Description

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## Materials Series 810, 820 Manifold block

Below is a schematic drawing of the parts layout for the Manifold block.  
For the related parts listing, see opposite page.



## Materials Series 810, 820 Manifold block

| Materials              |                      |                 |
|------------------------|----------------------|-----------------|
| Item                   | Component            | Standard        |
|                        |                      |                 |
| 24.1                   | Manifold block       | 1.4404          |
|                        |                      | 316L            |
| 24.2                   | Bushing              | 1.4404          |
|                        |                      | 316L            |
| 24.3                   | Piston               | 1.4404          |
|                        |                      | 316L            |
| 24.7                   | Lock screw           | 1.4101          |
|                        |                      | Stainless steel |
| 24.8                   | Gasket               | 1.4101          |
|                        |                      | Stainless steel |
| Option code            |                      |                 |
| 24.4,<br>24.5,<br>24.6 | O-ring <sup>1)</sup> | *               |
|                        |                      | R05             |
|                        |                      | R06             |

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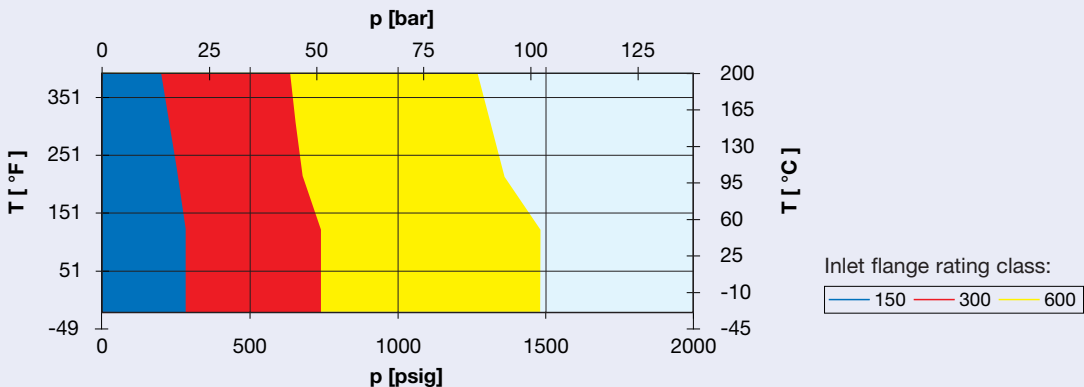
<sup>1)</sup> For further soft seal materials refer to page 02/15

3 Reference: Identifying the Flange Pressure Rating (ASME)

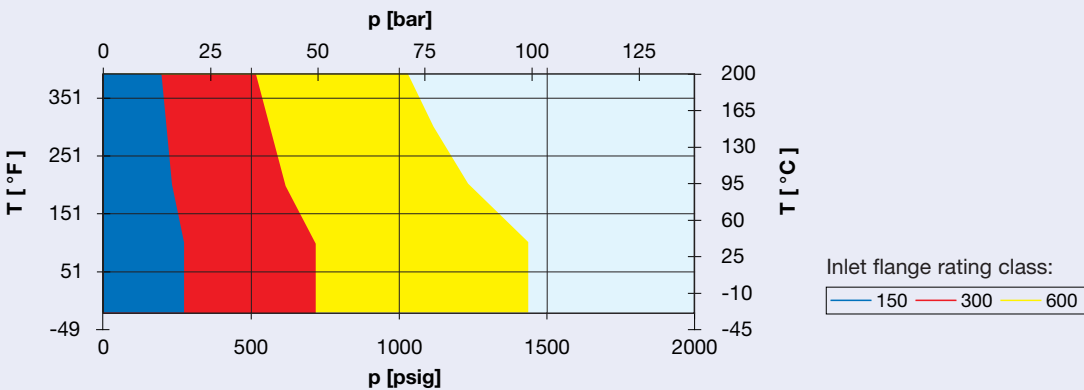
The following selection charts help you identify the flange pressure rating of your LESER safety valve based on the operating pressure and operating temperature of your plant depending on the required body material.

The flange pressure rating is shown inside the color-coded fields of each chart. For the numerical selection tables see opposite page.

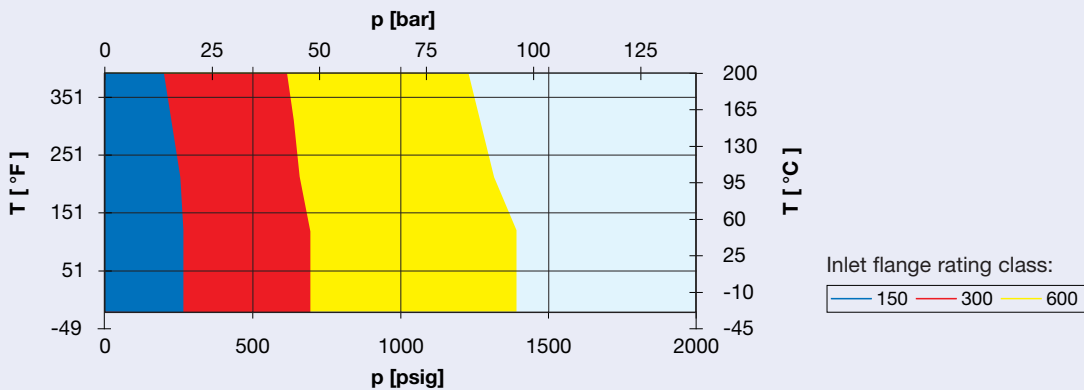
Body material: WCB



Body material: CF8M



Body material: LCB



## 4

### Reference: Identifying the Valve Code, Series 820, Orifice D – K+

In the selection charts below you identify the article number based on your flange pressure rating ("flange class"), connection size ("valve size") and orifice. If you

specified the Extra Orifice (or "Full bore" orifice) for your nozzle design, refer to row "Extra Orifice", otherwise use row "API Standard Orifice acc. to API 526".

#### Series 820 – Modulate Action, API Standard Orifice and Extra Orifice All Connection Sizes, Orifice D – K+, by Flange Pressure Rating

| DN <sub>L+O</sub>                       | 25 x 50 |   |   |   | 40 x 50  |   |   |   | 40 x 80  |   |   | 50 x 80 |   |   |    |
|-----------------------------------------|---------|---|---|---|----------|---|---|---|----------|---|---|---------|---|---|----|
| Valve size                              | 1" x 2" |   |   |   | 1½" x 2" |   |   |   | 1½" x 3" |   |   | 2" x 3" |   |   |    |
| API Standard Orifice<br>acc. to API 526 | D       | E | F |   | D        | E | F |   | G        | H |   | G       | H | J |    |
| Extra Orifice                           |         |   |   | G |          |   |   | H |          |   | J |         |   |   | K+ |

#### Body material: WCB 1.0619

##### Flange class Art.-No.

| 150 x 150 | 8212. | 0010 | 0020 | 0030 | 1820 | 0040 | 0050 | 0060 | 1830 | 0070 | 0080 | 1840 | 0090 | 0100 | 0110 | 1850 |
|-----------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 300 x 150 | 8212. | 0220 | 0230 | 0240 | 1900 | 0250 | 0260 | 0270 | 1910 | 0280 | 0290 | 1920 | 0300 | 0310 | 0320 | 1930 |
| 600 x 150 | 8212. | 0640 | 0650 | 0660 | 2060 | 0670 | 0680 | 0690 | 2070 | 0700 | 0710 | 2080 | 0720 | 0730 | 0740 | 2090 |

#### Body material: CF8M 1.4408

##### Flange class Art.-No.

| 150 x 150 | 8214. | 0010 | 0020 | 0030 | 1820 | 0040 | 0050 | 0060 | 1830 | 0070 | 0080 | 1840 | 0090 | 0100 | 0110 | 1850 |
|-----------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 300 x 150 | 8214. | 0220 | 0230 | 0240 | 1900 | 0250 | 0260 | 0270 | 1910 | 0280 | 0290 | 1920 | 0300 | 0310 | 0320 | 1930 |
| 600 x 150 | 8214. | 0640 | 0650 | 0660 | 2060 | 0670 | 0680 | 0690 | 2070 | 0700 | 0710 | 2080 | 0720 | 0730 | 0740 | 2090 |

#### Body material: LCB

##### Flange class Art.-No.

| 150 x 150 | 8213. | 0010 | 0020 | 0030 | 1820 | 0040 | 0050 | 0060 | 1830 | 0070 | 0080 | 1840 | 0090 | 0100 | 0110 | 1850 |
|-----------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 300 x 150 | 8213. | 0220 | 0230 | 0240 | 1900 | 0250 | 0260 | 0270 | 1910 | 0280 | 0290 | 1920 | 0300 | 0310 | 0320 | 1930 |
| 600 x 150 | 8213. | 0640 | 0650 | 0660 | 2060 | 0670 | 0680 | 0690 | 2070 | 0700 | 0710 | 2080 | 0720 | 0730 | 0740 | 2090 |

## 4

### Reference: Identifying the Valve Code, Series 820, Orifice J – T+

In the selection charts below you identify the article number based on your flange pressure rating ("flange class"), connection size ("valve size") and orifice. If you

specified the Extra Orifice (or "Full bore" orifice) for your nozzle design, refer to row "Extra Orifice", otherwise use row "API Standard Orifice acc. to API 526".

#### Series 820 – Modulate Action, API Standard Orifice and Extra Orifice All Connection Sizes, Orifice J – T+, by Flange Pressure Rating

| DN I+O                               | 80 x 100 |   |   |    | 100 x 150 |   |   |   |    | 150 x 200 |   |    | 200 x 250 |    |
|--------------------------------------|----------|---|---|----|-----------|---|---|---|----|-----------|---|----|-----------|----|
| Valve size                           | 3" x 4"  |   |   |    | 4" x 6"   |   |   |   |    | 6" x 8"   |   |    | 8" x 10"  |    |
| API Standard Orifice acc. to API 526 | J        | K | L |    | L         | M | N | P |    | Q         | R |    | T         |    |
| Extra Orifice                        |          |   |   | N+ |           |   |   |   | P+ |           |   | R+ |           | T+ |

#### Body material: WCB 1.0619

| Flange class | Art.-No. |      |      |      |      |      |      |      |      |      |      |      |      |           |
|--------------|----------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|
| 150 x 150    | 8212.    | 0120 | 0130 | 0140 | 1860 | 0150 | 0160 | 0170 | 0180 | 1870 | 0190 | 0200 | 1880 | 0210 1890 |
| 300 x 150    | 8212.    | 0330 | 0340 | 0350 | 1940 | 0360 | 0370 | 0380 | 0390 | 1950 | 0400 | 0410 | 1960 | 0420 1970 |
| 600 x 150    | 8212.    | 0750 | 0760 | 0770 | 2100 | 0780 | 0790 | 0800 | 0810 | 2110 | 0820 | 0830 | 2120 | 0840 2130 |

#### Body material: CF8M 1.4408

| Flange class | Art.-No. |      |      |      |      |      |      |      |      |      |      |      |      |           |
|--------------|----------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|
| 150 x 150    | 8214.    | 0120 | 0130 | 0140 | 1860 | 0150 | 0160 | 0170 | 0180 | 1870 | 0190 | 0200 | 1880 | 0210 1890 |
| 300 x 150    | 8214.    | 0330 | 0340 | 0350 | 1940 | 0360 | 0370 | 0380 | 0390 | 1950 | 0400 | 0410 | 1960 | 0420 1970 |
| 600 x 150    | 8214.    | 0750 | 0760 | 0770 | 2100 | 0780 | 0790 | 0800 | 0810 | 2110 | 0820 | 0830 | 2120 | 0840 2130 |

#### Body material: LCB

| Flange class | Art.-No. |      |      |      |      |      |      |      |      |      |      |      |      |           |
|--------------|----------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|
| 150 x 150    | 8213.    | 0120 | 0130 | 0140 | 1860 | 0150 | 0160 | 0170 | 0180 | 1870 | 0190 | 0200 | 1880 | 0210 1890 |
| 300 x 150    | 8213.    | 0330 | 0340 | 0350 | 1940 | 0360 | 0370 | 0380 | 0390 | 1950 | 0400 | 0410 | 1960 | 0420 1970 |
| 600 x 150    | 8213.    | 0750 | 0760 | 0770 | 2100 | 0780 | 0790 | 0800 | 0810 | 2110 | 0820 | 0830 | 2120 | 0840 2130 |

## 7

### Reference: Available Accessories

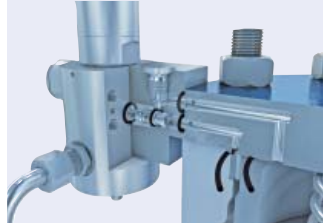
Specify one or more of the following option codes to order the required accessories for your LESER POSV.

#### Field test connection R26



Set pressure testing with external test medium

#### Backflow preventer (Standard)



Prevents return flow of the medium from the discharge into the system to be secured

#### Pilot supply filter R30



Filter to prevent plugging of the pilot

#### Manual blowdown R27 to atmosphere R24 into main valve outlet



Functional test of main valve piston

#### NACE sour gas application R70 MR0175/ISO 15156 MR0103

#### Remote Sensing R28



Actual operating pressure sensed to pilot.  
No influence of inlet pressure losses, stable function of POSV

#### Soft sealing POSV complete O-ring disc, Piston guide, Seat, Tubing, Cover R05: EPDM R06: FFKM R04: FKM (Standard = \*)

#### Main valve disc R71 metal sealing

#### Drain hole J19: G $\frac{1}{2}$ " R48: NPT $\frac{1}{2}$ "

#### Pilot lifting device R25

Mechanical lifting of pilot for verification of POSV operation

#### Pilot test gag R33

Blocking of operation in case of required hydrostatic testing of vessel

#### Blowdown adjusted to fixed value (for type 811 only) R44

Blowdown adjusted: Closing pressure difference as a fixed value between 2 – 15%. Standard adjustment between 3 – 7%

## Dimensions and Weights – Series 810 and 820

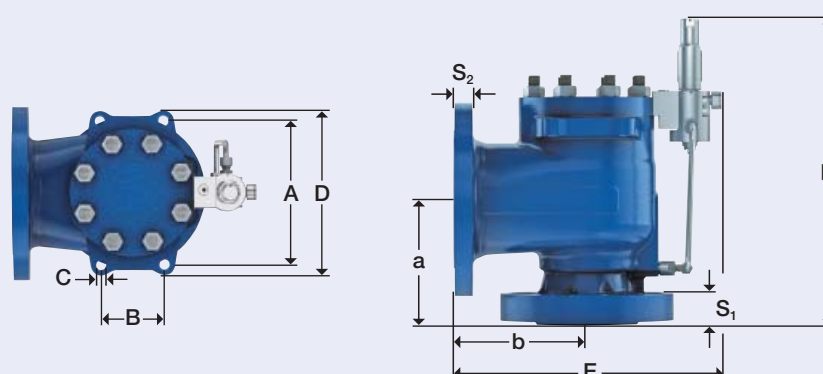
| US Units                             |  |  |  | Orifice D – K+                    |                                   |                                   |                                   |                                     |                                     |                                     |                                     |                                  |                                  |                                  |                                  |                                  |                                  |                                  |
|--------------------------------------|--|--|--|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| DN <sub>I+O</sub>                    |  |  |  | 25 x 50                           |                                   |                                   |                                   | 40 x 50                             |                                     |                                     |                                     | 40 x 80                          |                                  |                                  | 50 x 80                          |                                  |                                  |                                  |
| Valve size                           |  |  |  | 1" x 2"                           |                                   |                                   |                                   | 1½" x 2"                            |                                     |                                     |                                     | 1½" x 3"                         |                                  |                                  | 2" x 3"                          |                                  |                                  |                                  |
| API Standard orifice acc. to API 526 |  |  |  | D                                 | E                                 | F                                 |                                   | D                                   | E                                   | F                                   |                                     | G                                | H                                |                                  | G                                | H                                | J                                |                                  |
| Extra Orifice                        |  |  |  |                                   |                                   |                                   | G                                 |                                     |                                     |                                     | H                                   |                                  |                                  | J                                |                                  |                                  |                                  | K+                               |
| d <sub>0</sub> [inch]                |  |  |  | 0.433                             | 0.579                             | 0.724                             | 0.906                             | 0.433                               | 0.579                               | 0.724                               | 1.142                               | 0.929                            | 1.157                            | 1.406                            | 0.929                            | 1.157                            | 1.496                            | 1.890                            |
| A <sub>0</sub> [inch²]               |  |  |  | 0.147                             | 0.264                             | 0.412                             | 0.643                             | 0.147                               | 0.264                               | 0.412                               | 1.025                               | 0.677                            | 1.052                            | 1.552                            | 0.677                            | 1.052                            | 1.758                            | 2.806                            |
| Flange class 150 x 150               |  |  |  |                                   |                                   |                                   |                                   |                                     |                                     |                                     |                                     |                                  |                                  |                                  |                                  |                                  |                                  |                                  |
| a                                    |  |  |  | 4⅛                                | 4⅛                                | 4⅛                                | 4⅛                                | 4⅞                                  | 4⅞                                  | 4⅞                                  | 4⅞                                  | 5⅛                               | 5⅛                               | 5⅛                               | 5⅜                               | 5⅜                               | 5⅜                               | 5⅜                               |
| b                                    |  |  |  | 4½                                | 4½                                | 4½                                | 4½                                | 4¾                                  | 4¾                                  | 4¾                                  | 4¾                                  | 4⅞                               | 4⅞                               | 4⅞                               | 4⅞                               | 4⅞                               | 4⅞                               | 4⅞                               |
| H Series 810                         |  |  |  | 13                                | 13                                | 13                                | 13                                | 14 <sup>4</sup> / <sub>32</sub>     | 14 <sup>4</sup> / <sub>32</sub>     | 14 <sup>4</sup> / <sub>32</sub>     | 14 <sup>4</sup> / <sub>32</sub>     | 14 <sup>5</sup> / <sub>8</sub>   | 14 <sup>5</sup> / <sub>8</sub>   | 14 <sup>5</sup> / <sub>8</sub>   | 15 <sup>6</sup> / <sub>32</sub>  | 15 <sup>6</sup> / <sub>32</sub>  | 15 <sup>6</sup> / <sub>32</sub>  | 15 <sup>6</sup> / <sub>32</sub>  |
| H Series 820                         |  |  |  | 18                                | 18                                | 18                                | 18                                | 19⅛                                 | 19⅛                                 | 19⅛                                 | 19⅛                                 | 19 <sup>5</sup> / <sub>8</sub>   | 19 <sup>5</sup> / <sub>8</sub>   | 19 <sup>5</sup> / <sub>8</sub>   | 20 <sup>6</sup> / <sub>32</sub>  | 20 <sup>6</sup> / <sub>32</sub>  | 20 <sup>6</sup> / <sub>32</sub>  | 20 <sup>6</sup> / <sub>32</sub>  |
| S <sub>1</sub>                       |  |  |  | 25 <sup>25</sup> / <sub>32</sub>  | 25 <sup>25</sup> / <sub>32</sub>  | 25 <sup>25</sup> / <sub>32</sub>  | 25 <sup>25</sup> / <sub>32</sub>  | 17 <sup>17</sup> / <sub>32</sub>    | 17 <sup>17</sup> / <sub>32</sub>    | 17 <sup>17</sup> / <sub>32</sub>    | 17 <sup>17</sup> / <sub>32</sub>    | 17 <sup>17</sup> / <sub>32</sub> | 17 <sup>17</sup> / <sub>32</sub> | 17 <sup>17</sup> / <sub>32</sub> | 11 <sup>13</sup> / <sub>32</sub> | 11 <sup>13</sup> / <sub>32</sub> | 11 <sup>13</sup> / <sub>32</sub> | 11 <sup>13</sup> / <sub>32</sub> |
| S <sub>2</sub>                       |  |  |  | 30 <sup>30</sup> / <sub>32</sub>  | 30 <sup>30</sup> / <sub>32</sub>  | 30 <sup>30</sup> / <sub>32</sub>  | 30 <sup>30</sup> / <sub>32</sub>  | 30 <sup>30</sup> / <sub>32</sub>    | 30 <sup>30</sup> / <sub>32</sub>    | 30 <sup>30</sup> / <sub>32</sub>    | 30 <sup>30</sup> / <sub>32</sub>    | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   |
| A                                    |  |  |  | 5 <sup>5</sup> / <sub>8</sub>     | 5 <sup>5</sup> / <sub>8</sub>     | 5 <sup>5</sup> / <sub>8</sub>     | 5 <sup>5</sup> / <sub>8</sub>     | 6                                   | 6                                   | 6                                   | 6                                   | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   | 7 <sup>1</sup> / <sub>16</sub>   | 7 <sup>1</sup> / <sub>16</sub>   | 7 <sup>1</sup> / <sub>16</sub>   | 7 <sup>1</sup> / <sub>16</sub>   |
| B                                    |  |  |  | –                                 | –                                 | –                                 | –                                 | –                                   | –                                   | –                                   | –                                   | –                                | –                                | –                                | –                                | –                                | –                                | –                                |
| C                                    |  |  |  | 9 <sup>9</sup> / <sub>16</sub>    | 9 <sup>9</sup> / <sub>16</sub>    | 9 <sup>9</sup> / <sub>16</sub>    | 9 <sup>9</sup> / <sub>16</sub>    | 9 <sup>9</sup> / <sub>16</sub>      | 9 <sup>9</sup> / <sub>16</sub>      | 9 <sup>9</sup> / <sub>16</sub>      | 9 <sup>9</sup> / <sub>16</sub>      | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   |
| D                                    |  |  |  | 7 <sup>3</sup> / <sub>16</sub>    | 7 <sup>3</sup> / <sub>16</sub>    | 7 <sup>3</sup> / <sub>16</sub>    | 7 <sup>3</sup> / <sub>16</sub>    | 7 <sup>5</sup> / <sub>16</sub>      | 7 <sup>5</sup> / <sub>16</sub>      | 7 <sup>5</sup> / <sub>16</sub>      | 7 <sup>5</sup> / <sub>16</sub>      | 7 <sup>14</sup> / <sub>16</sub>  | 7 <sup>14</sup> / <sub>16</sub>  | 7 <sup>14</sup> / <sub>16</sub>  | 8 <sup>4</sup> / <sub>16</sub>   | 8 <sup>4</sup> / <sub>16</sub>   | 8 <sup>4</sup> / <sub>16</sub>   | 8 <sup>4</sup> / <sub>16</sub>   |
| E                                    |  |  |  | 11 5 <sup>5</sup> / <sub>32</sub> | 11 5 <sup>5</sup> / <sub>32</sub> | 11 5 <sup>5</sup> / <sub>32</sub> | 11 5 <sup>5</sup> / <sub>32</sub> | 11 21 <sup>21</sup> / <sub>32</sub> | 11 21 <sup>21</sup> / <sub>32</sub> | 11 21 <sup>21</sup> / <sub>32</sub> | 11 21 <sup>21</sup> / <sub>32</sub> | 11 <sup>31</sup> / <sub>32</sub> | 11 <sup>31</sup> / <sub>32</sub> | 11 <sup>31</sup> / <sub>32</sub> | 12 1 <sup>1</sup> / <sub>4</sub> | 12 1 <sup>1</sup> / <sub>4</sub> | 12 1 <sup>1</sup> / <sub>4</sub> | 12 1 <sup>1</sup> / <sub>4</sub> |
| m                                    |  |  |  | 49.6                              | 49.6                              | 49.6                              | 49.6                              | 59.5                                | 59.5                                | 59.5                                | 59.5                                | 68.3                             | 68.3                             | 68.3                             | 81.6                             | 81.6                             | 81.6                             | 81.6                             |
| Flange class 300 x 150               |  |  |  |                                   |                                   |                                   |                                   |                                     |                                     |                                     |                                     |                                  |                                  |                                  |                                  |                                  |                                  |                                  |
| a                                    |  |  |  | 4 <sup>3</sup> / <sub>8</sub>     | 4 <sup>3</sup> / <sub>8</sub>     | 4 <sup>3</sup> / <sub>8</sub>     | 4 <sup>3</sup> / <sub>8</sub>     | 4⅞                                  | 4⅞                                  | 4⅞                                  | 4⅞                                  | 5⅛                               | 5⅛                               | 5⅛                               | 5⅜                               | 5⅜                               | 5⅜                               | 5⅜                               |
| b                                    |  |  |  | 4½                                | 4½                                | 4½                                | 4½                                | 4¾                                  | 4¾                                  | 4¾                                  | 4¾                                  | 4⅞                               | 4⅞                               | 4⅞                               | 4⅞                               | 4⅞                               | 4⅞                               | 4⅞                               |
| H Series 810                         |  |  |  | 13 <sup>7</sup> / <sub>32</sub>   | 13 <sup>7</sup> / <sub>32</sub>   | 13 <sup>7</sup> / <sub>32</sub>   | 13 <sup>7</sup> / <sub>32</sub>   | 14 <sup>4</sup> / <sub>32</sub>     | 14 <sup>4</sup> / <sub>32</sub>     | 14 <sup>4</sup> / <sub>32</sub>     | 14 <sup>4</sup> / <sub>32</sub>     | 14 <sup>5</sup> / <sub>8</sub>   | 14 <sup>5</sup> / <sub>8</sub>   | 14 <sup>5</sup> / <sub>8</sub>   | 15 <sup>6</sup> / <sub>32</sub>  | 15 <sup>6</sup> / <sub>32</sub>  | 15 <sup>6</sup> / <sub>32</sub>  | 15 <sup>6</sup> / <sub>32</sub>  |
| H Series 820                         |  |  |  | 18 <sup>2</sup> / <sub>8</sub>    | 18 <sup>2</sup> / <sub>8</sub>    | 18 <sup>2</sup> / <sub>8</sub>    | 18 <sup>2</sup> / <sub>8</sub>    | 19⅛                                 | 19⅛                                 | 19⅛                                 | 19⅛                                 | 19 <sup>5</sup> / <sub>8</sub>   | 19 <sup>5</sup> / <sub>8</sub>   | 19 <sup>5</sup> / <sub>8</sub>   | 20 <sup>6</sup> / <sub>32</sub>  | 20 <sup>6</sup> / <sub>32</sub>  | 20 <sup>6</sup> / <sub>32</sub>  | 20 <sup>6</sup> / <sub>32</sub>  |
| S <sub>1</sub>                       |  |  |  | 1 <sup>1</sup> / <sub>32</sub>    | 1 <sup>1</sup> / <sub>32</sub>    | 1 <sup>1</sup> / <sub>32</sub>    | 1 <sup>1</sup> / <sub>32</sub>    | 17 <sup>17</sup> / <sub>32</sub>    | 17 <sup>17</sup> / <sub>32</sub>    | 17 <sup>17</sup> / <sub>32</sub>    | 17 <sup>17</sup> / <sub>32</sub>    | 17 <sup>17</sup> / <sub>32</sub> | 17 <sup>17</sup> / <sub>32</sub> | 17 <sup>17</sup> / <sub>32</sub> | 11 <sup>13</sup> / <sub>32</sub> | 11 <sup>13</sup> / <sub>32</sub> | 11 <sup>13</sup> / <sub>32</sub> | 11 <sup>13</sup> / <sub>32</sub> |
| S <sub>2</sub>                       |  |  |  | 30 <sup>30</sup> / <sub>32</sub>  | 30 <sup>30</sup> / <sub>32</sub>  | 30 <sup>30</sup> / <sub>32</sub>  | 30 <sup>30</sup> / <sub>32</sub>  | 30 <sup>30</sup> / <sub>32</sub>    | 30 <sup>30</sup> / <sub>32</sub>    | 30 <sup>30</sup> / <sub>32</sub>    | 30 <sup>30</sup> / <sub>32</sub>    | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   |
| A                                    |  |  |  | 5 <sup>5</sup> / <sub>8</sub>     | 5 <sup>5</sup> / <sub>8</sub>     | 5 <sup>5</sup> / <sub>8</sub>     | 5 <sup>5</sup> / <sub>8</sub>     | 6                                   | 6                                   | 6                                   | 6                                   | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   | 7 <sup>1</sup> / <sub>16</sub>   | 7 <sup>1</sup> / <sub>16</sub>   | 7 <sup>1</sup> / <sub>16</sub>   | 7 <sup>1</sup> / <sub>16</sub>   |
| B                                    |  |  |  | –                                 | –                                 | –                                 | –                                 | –                                   | –                                   | –                                   | –                                   | –                                | –                                | –                                | –                                | –                                | –                                | –                                |
| C                                    |  |  |  | 9 <sup>9</sup> / <sub>16</sub>    | 9 <sup>9</sup> / <sub>16</sub>    | 9 <sup>9</sup> / <sub>16</sub>    | 9 <sup>9</sup> / <sub>16</sub>    | 9 <sup>9</sup> / <sub>16</sub>      | 9 <sup>9</sup> / <sub>16</sub>      | 9 <sup>9</sup> / <sub>16</sub>      | 9 <sup>9</sup> / <sub>16</sub>      | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   |
| D                                    |  |  |  | 7 <sup>3</sup> / <sub>16</sub>    | 7 <sup>3</sup> / <sub>16</sub>    | 7 <sup>3</sup> / <sub>16</sub>    | 7 <sup>3</sup> / <sub>16</sub>    | 7 <sup>5</sup> / <sub>16</sub>      | 7 <sup>5</sup> / <sub>16</sub>      | 7 <sup>5</sup> / <sub>16</sub>      | 7 <sup>5</sup> / <sub>16</sub>      | 7 <sup>14</sup> / <sub>16</sub>  | 7 <sup>14</sup> / <sub>16</sub>  | 7 <sup>14</sup> / <sub>16</sub>  | 8 <sup>4</sup> / <sub>16</sub>   | 8 <sup>4</sup> / <sub>16</sub>   | 8 <sup>4</sup> / <sub>16</sub>   | 8 <sup>4</sup> / <sub>16</sub>   |
| E                                    |  |  |  | 11 5 <sup>5</sup> / <sub>32</sub> | 11 5 <sup>5</sup> / <sub>32</sub> | 11 5 <sup>5</sup> / <sub>32</sub> | 11 5 <sup>5</sup> / <sub>32</sub> | 11 21 <sup>21</sup> / <sub>32</sub> | 11 21 <sup>21</sup> / <sub>32</sub> | 11 21 <sup>21</sup> / <sub>32</sub> | 11 21 <sup>21</sup> / <sub>32</sub> | 11 <sup>31</sup> / <sub>32</sub> | 11 <sup>31</sup> / <sub>32</sub> | 11 <sup>31</sup> / <sub>32</sub> | 12 1 <sup>1</sup> / <sub>4</sub> | 12 1 <sup>1</sup> / <sub>4</sub> | 12 1 <sup>1</sup> / <sub>4</sub> | 12 1 <sup>1</sup> / <sub>4</sub> |
| m                                    |  |  |  | 49.6                              | 49.6                              | 49.6                              | 49.6                              | 59.5                                | 59.5                                | 59.5                                | 59.5                                | 68.3                             | 68.3                             | 68.3                             | 81.6                             | 81.6                             | 81.6                             | 81.6                             |
| Flange class 600 x 150               |  |  |  |                                   |                                   |                                   |                                   |                                     |                                     |                                     |                                     |                                  |                                  |                                  |                                  |                                  |                                  |                                  |
| a                                    |  |  |  | 4 <sup>3</sup> / <sub>8</sub>     | 4 <sup>3</sup> / <sub>8</sub>     | 4 <sup>3</sup> / <sub>8</sub>     | 4 <sup>3</sup> / <sub>8</sub>     | 4⅞                                  | 4⅞                                  | 4⅞                                  | 4⅞                                  | 5⅛                               | 5⅛                               | 5⅛                               | 5⅜                               | 5⅜                               | 5⅜                               | 5⅜                               |
| b                                    |  |  |  | 4½                                | 4½                                | 4½                                | 4½                                | 4¾                                  | 4¾                                  | 4¾                                  | 4¾                                  | 4⅞                               | 4⅞                               | 4⅞                               | 4⅞                               | 4⅞                               | 4⅞                               | 4⅞                               |
| H Series 810                         |  |  |  | 13 <sup>7</sup> / <sub>32</sub>   | 13 <sup>7</sup> / <sub>32</sub>   | 13 <sup>7</sup> / <sub>32</sub>   | 13 <sup>7</sup> / <sub>32</sub>   | 14 <sup>4</sup> / <sub>32</sub>     | 14 <sup>4</sup> / <sub>32</sub>     | 14 <sup>4</sup> / <sub>32</sub>     | 14 <sup>4</sup> / <sub>32</sub>     | 14 <sup>5</sup> / <sub>8</sub>   | 14 <sup>5</sup> / <sub>8</sub>   | 14 <sup>5</sup> / <sub>8</sub>   | 15 <sup>6</sup> / <sub>32</sub>  | 15 <sup>6</sup> / <sub>32</sub>  | 15 <sup>6</sup> / <sub>32</sub>  | 15 <sup>6</sup> / <sub>32</sub>  |
| H Series 820                         |  |  |  | 18 <sup>2</sup> / <sub>8</sub>    | 18 <sup>2</sup> / <sub>8</sub>    | 18 <sup>2</sup> / <sub>8</sub>    | 18 <sup>2</sup> / <sub>8</sub>    | 19⅛                                 | 19⅛                                 | 19⅛                                 | 19⅛                                 | 19 <sup>5</sup> / <sub>8</sub>   | 19 <sup>5</sup> / <sub>8</sub>   | 19 <sup>5</sup> / <sub>8</sub>   | 20 <sup>6</sup> / <sub>32</sub>  | 20 <sup>6</sup> / <sub>32</sub>  | 20 <sup>6</sup> / <sub>32</sub>  | 20 <sup>6</sup> / <sub>32</sub>  |
| S <sub>1</sub>                       |  |  |  | 1 <sup>1</sup> / <sub>32</sub>    | 1 <sup>1</sup> / <sub>32</sub>    | 1 <sup>1</sup> / <sub>32</sub>    | 1 <sup>1</sup> / <sub>32</sub>    | 17 <sup>17</sup> / <sub>32</sub>    | 17 <sup>17</sup> / <sub>32</sub>    | 17 <sup>17</sup> / <sub>32</sub>    | 17 <sup>17</sup> / <sub>32</sub>    | 17 <sup>17</sup> / <sub>32</sub> | 17 <sup>17</sup> / <sub>32</sub> | 17 <sup>17</sup> / <sub>32</sub> | 11 <sup>13</sup> / <sub>32</sub> | 11 <sup>13</sup> / <sub>32</sub> | 11 <sup>13</sup> / <sub>32</sub> | 11 <sup>13</sup> / <sub>32</sub> |
| S <sub>2</sub>                       |  |  |  | 30 <sup>30</sup> / <sub>32</sub>  | 30 <sup>30</sup> / <sub>32</sub>  | 30 <sup>30</sup> / <sub>32</sub>  | 30 <sup>30</sup> / <sub>32</sub>  | 30 <sup>30</sup> / <sub>32</sub>    | 30 <sup>30</sup> / <sub>32</sub>    | 30 <sup>30</sup> / <sub>32</sub>    | 30 <sup>30</sup> / <sub>32</sub>    | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   | 1 <sup>5</sup> / <sub>32</sub>   |
| A                                    |  |  |  | 5 <sup>5</sup> / <sub>8</sub>     | 5 <sup>5</sup> / <sub>8</sub>     | 5 <sup>5</sup> / <sub>8</sub>     | 5 <sup>5</sup> / <sub>8</sub>     | 6                                   | 6                                   | 6                                   | 6                                   | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   | 7 <sup>1</sup> / <sub>16</sub>   | 7 <sup>1</sup> / <sub>16</sub>   | 7 <sup>1</sup> / <sub>16</sub>   | 7 <sup>1</sup> / <sub>16</sub>   |
| B                                    |  |  |  | –                                 | –                                 | –                                 | –                                 | –                                   | –                                   | –                                   | –                                   | –                                | –                                | –                                | –                                | –                                | –                                | –                                |
| C                                    |  |  |  | 9 <sup>9</sup> / <sub>16</sub>    | 9 <sup>9</sup> / <sub>16</sub>    | 9 <sup>9</sup> / <sub>16</sub>    | 9 <sup>9</sup> / <sub>16</sub>    | 9 <sup>9</sup> / <sub>16</sub>      | 9 <sup>9</sup> / <sub>16</sub>      | 9 <sup>9</sup> / <sub>16</sub>      | 9 <sup>9</sup> / <sub>16</sub>      | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   | 9 <sup>9</sup> / <sub>16</sub>   |
| D                                    |  |  |  | 7 <sup>3</sup> / <sub>16</sub>    | 7 <sup>3</sup> / <sub>16</sub>    | 7 <sup>3</sup> / <sub>16</sub>    | 7 <sup>3</sup> / <sub>16</sub>    | 7 <sup>5</sup> / <sub>16</sub>      | 7 <sup>5</sup> / <sub>16</sub>      | 7 <sup>5</sup> / <sub>16</sub>      | 7 <sup>5</sup> / <sub>16</sub>      | 7 <sup>14</sup> / <sub>16</sub>  | 7 <sup>14</sup> / <sub>16</sub>  | 7 <sup>14</sup> / <sub>16</sub>  | 8 <sup>4</sup> / <sub>16</sub>   | 8 <sup>4</sup> / <sub>16</sub>   | 8 <sup>4</sup> / <sub>16</sub>   | 8 <sup>4</sup> / <sub>16</sub>   |
| E                                    |  |  |  | 11 5 <sup>5</sup> / <sub>32</sub> | 11 5 <sup>5</sup> / <sub>32</sub> | 11 5 <sup>5</sup> / <sub>32</sub> | 11 5 <sup>5</sup> / <sub>32</sub> | 11 21 <sup>21</sup> / <sub>32</sub> | 11 21 <sup>21</sup> / <sub>32</sub> | 11 21 <sup>21</sup> / <sub>32</sub> | 11 21 <sup>21</sup> / <sub>32</sub> | 11 <sup>31</sup> / <sub>32</sub> | 11 <sup>31</sup> / <sub>32</sub> | 11 <sup>31</sup> / <sub>32</sub> | 12 1 <sup>1</sup> / <sub>4</sub> | 12 1 <sup>1</sup> / <sub>4</sub> | 12 1 <sup>1</sup> / <sub>4</sub> | 12 1 <sup>1</sup> / <sub>4</sub> |
| m                                    |  |  |  | 49.6                              | 49.6                              | 49.6                              | 49.6                              | 59.5                                | 59.5                                | 59.5                                | 59.5                                | 68.3                             | 68.3                             | 68.3                             | 81.6                             | 81.6                             | 81.6                             | 81.6                             |

d<sub>0</sub> = Actual discharge diameter [inch]  
 A<sub>0</sub> = Actual discharge area [inch<sup>2</sup>]  
 a = Center to face [inch]  
 b = Center to face [inch]  
 H = Heights [inch]  
 S<sub>1</sub> = Inlet flange thickness [inch]  
 S<sub>2</sub> = Outlet flange thickness [inch]

A = Bracket [inch]  
 B = Bracket [inch]  
 C = Hole diameter [inch]  
 D = Total width [inch]  
 E = Total length [inch]  
 m = Weight [lb]

## Dimensions and Weights – Series 810 and 820

| US Units                             |                                  | Orifice J – T+                   |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |  |
|--------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|--|
| DN I+O                               | 80 x 100                         |                                  |                                  |                                  | 100 x 150                        |                                  |                                  |                                  |                                  |                                  | 150 x 200                        |                                  |                                  | 200 x 250                        |  |
| Valve size                           | 3" x 4"                          |                                  |                                  |                                  | 4" x 6"                          |                                  |                                  |                                  |                                  |                                  | 6" x 8"                          |                                  |                                  | 8" x 10"                         |  |
| API Standard orifice acc. to API 526 | J                                | K                                | L                                |                                  | L                                | M                                | N                                | P                                |                                  | Q                                | R                                |                                  | T                                |                                  |  |
| Extra Orifice                        |                                  |                                  |                                  | N+                               |                                  |                                  |                                  |                                  | P+                               |                                  |                                  | R+                               |                                  | T+                               |  |
| d <sub>0</sub> [inch <sup>2</sup> ]  | 1.496                            | 1.772                            | 2.205                            | 2.953                            | 2.205                            | 2.480                            | 2.717                            | 3.268                            | 3.740                            | 4.331                            | 5.236                            | 5.591                            | 6.614                            | 7.087                            |  |
| A <sub>0</sub> [inch <sup>2</sup> ]  | 1.758                            | 2.465                            | 3.818                            | 6.848                            | 3.818                            | 4.832                            | 5.796                            | 8.386                            | 10.987                           | 14.730                           | 21.534                           | 24.547                           | 34.359                           | 39.443                           |  |
| Flange class 150 x 150               |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |  |
| a                                    | 6 <sup>1</sup> / <sub>8</sub>    | 6 <sup>1</sup> / <sub>8</sub>    | 6 <sup>1</sup> / <sub>8</sub>    | 6 <sup>1</sup> / <sub>8</sub>    | 7 <sup>3</sup> / <sub>4</sub>    | 7 <sup>3</sup> / <sub>4</sub>    | 7 <sup>3</sup> / <sub>4</sub>    | 7 <sup>3</sup> / <sub>4</sub>    | 7 <sup>3</sup> / <sub>4</sub>    | 9 <sup>7</sup> / <sub>16</sub>   | 9 <sup>7</sup> / <sub>16</sub>   | 9 <sup>7</sup> / <sub>16</sub>   | 10 <sup>7</sup> / <sub>8</sub>   | 10 <sup>7</sup> / <sub>8</sub>   |  |
| b                                    | 6 <sup>3</sup> / <sub>8</sub>    | 6 <sup>3</sup> / <sub>8</sub>    | 6 <sup>3</sup> / <sub>8</sub>    | 6 <sup>3</sup> / <sub>8</sub>    | 8 <sup>1</sup> / <sub>4</sub>    | 8 <sup>1</sup> / <sub>4</sub>    | 8 <sup>1</sup> / <sub>4</sub>    | 8 <sup>1</sup> / <sub>4</sub>    | 8 <sup>1</sup> / <sub>4</sub>    | 9 <sup>1</sup> / <sub>2</sub>    | 9 <sup>1</sup> / <sub>2</sub>    | 9 <sup>1</sup> / <sub>2</sub>    | 11                               | 11                               |  |
| H Series 810                         | 16 <sup>27</sup> / <sub>32</sub> | 16 <sup>27</sup> / <sub>32</sub> | 16 <sup>27</sup> / <sub>32</sub> | 16 <sup>27</sup> / <sub>32</sub> | 18 <sup>15</sup> / <sub>16</sub> | 18 <sup>15</sup> / <sub>16</sub> | 18 <sup>15</sup> / <sub>16</sub> | 18 <sup>15</sup> / <sub>16</sub> | 18 <sup>15</sup> / <sub>16</sub> | 22 <sup>27</sup> / <sub>32</sub> | 22 <sup>27</sup> / <sub>32</sub> | 22 <sup>27</sup> / <sub>32</sub> | 26 <sup>2</sup> / <sub>8</sub>   | 26 <sup>2</sup> / <sub>8</sub>   |  |
| H Series 820                         | 21 <sup>14</sup> / <sub>16</sub> | 21 <sup>14</sup> / <sub>16</sub> | 21 <sup>14</sup> / <sub>16</sub> | 21 <sup>14</sup> / <sub>16</sub> | 23 <sup>15</sup> / <sub>16</sub> | 23 <sup>15</sup> / <sub>16</sub> | 23 <sup>15</sup> / <sub>16</sub> | 23 <sup>15</sup> / <sub>16</sub> | 23 <sup>15</sup> / <sub>16</sub> | 27 <sup>13</sup> / <sub>16</sub> | 27 <sup>13</sup> / <sub>16</sub> | 27 <sup>13</sup> / <sub>16</sub> | 31 <sup>5</sup> / <sub>16</sub>  | 31 <sup>5</sup> / <sub>16</sub>  |  |
| S <sub>1</sub>                       | 1 <sup>7</sup> / <sub>16</sub>   | 1 <sup>7</sup> / <sub>16</sub>   | 1 <sup>7</sup> / <sub>16</sub>   | 1 <sup>7</sup> / <sub>16</sub>   | 1 <sup>15</sup> / <sub>16</sub>  | 1 <sup>15</sup> / <sub>16</sub>  | 1 <sup>15</sup> / <sub>16</sub>  | 1 <sup>15</sup> / <sub>16</sub>  | 1 <sup>15</sup> / <sub>16</sub>  | 2 <sup>2</sup> / <sub>32</sub>   | 2 <sup>2</sup> / <sub>32</sub>   | 2 <sup>2</sup> / <sub>32</sub>   | 1 <sup>12</sup> / <sub>16</sub>  | 1 <sup>12</sup> / <sub>16</sub>  |  |
| S <sub>2</sub>                       | 1 <sup>2</sup> / <sub>16</sub>   | 1 <sup>2</sup> / <sub>16</sub>   | 1 <sup>2</sup> / <sub>16</sub>   | 1 <sup>2</sup> / <sub>16</sub>   | 1 <sup>3</sup> / <sub>16</sub>   | 1 <sup>3</sup> / <sub>16</sub>   | 1 <sup>3</sup> / <sub>16</sub>   | 1 <sup>3</sup> / <sub>16</sub>   | 1 <sup>3</sup> / <sub>16</sub>   | 1 <sup>27</sup> / <sub>32</sub>  | 1 <sup>27</sup> / <sub>32</sub>  | 1 <sup>27</sup> / <sub>32</sub>  | 1 <sup>6</sup> / <sub>16</sub>   | 1 <sup>6</sup> / <sub>16</sub>   |  |
| A                                    | 8 <sup>25</sup> / <sub>32</sub>  | 8 <sup>25</sup> / <sub>32</sub>  | 8 <sup>25</sup> / <sub>32</sub>  | 8 <sup>25</sup> / <sub>32</sub>  | 9 <sup>13</sup> / <sub>16</sub>  | 9 <sup>13</sup> / <sub>16</sub>  | 9 <sup>13</sup> / <sub>16</sub>  | 9 <sup>13</sup> / <sub>16</sub>  | 9 <sup>13</sup> / <sub>16</sub>  | 12 <sup>19</sup> / <sub>32</sub> | 12 <sup>19</sup> / <sub>32</sub> | 12 <sup>19</sup> / <sub>32</sub> | 14 <sup>1</sup> / <sub>32</sub>  | 14 <sup>1</sup> / <sub>32</sub>  |  |
| B                                    | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   |  |
| C                                    | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  |  |
| D                                    | 10 <sup>6</sup> / <sub>32</sub>  | 10 <sup>6</sup> / <sub>32</sub>  | 10 <sup>6</sup> / <sub>32</sub>  | 10 <sup>6</sup> / <sub>32</sub>  | 12                               | 12                               | 12                               | 12                               | 12                               | 15                               | 15                               | 15                               | 16 <sup>30</sup> / <sub>32</sub> | 16 <sup>30</sup> / <sub>32</sub> |  |
| E                                    | 14 <sup>9</sup> / <sub>16</sub>  | 14 <sup>9</sup> / <sub>16</sub>  | 14 <sup>9</sup> / <sub>16</sub>  | 14 <sup>9</sup> / <sub>16</sub>  | 17                               | 17                               | 17                               | 17                               | 17                               | 20 <sup>25</sup> / <sub>32</sub> | 20 <sup>25</sup> / <sub>32</sub> | 20 <sup>25</sup> / <sub>32</sub> | 22 <sup>3</sup> / <sub>32</sub>  | 22 <sup>3</sup> / <sub>32</sub>  |  |
| m                                    | 130.1                            | 130.1                            | 130.1                            | 130.1                            | 196.2                            | 196.2                            | 196.2                            | 196.2                            | 196.2                            | 429.9                            | 429.9                            | 429.9                            | 579.8                            | 579.8                            |  |
| Flange class 300 x 150               |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |  |
| a                                    | 6 <sup>1</sup> / <sub>8</sub>    | 6 <sup>1</sup> / <sub>8</sub>    | 6 <sup>1</sup> / <sub>8</sub>    | 6 <sup>1</sup> / <sub>8</sub>    | 7 <sup>3</sup> / <sub>4</sub>    | 7 <sup>3</sup> / <sub>4</sub>    | 7 <sup>3</sup> / <sub>4</sub>    | 7 <sup>3</sup> / <sub>4</sub>    | 7 <sup>3</sup> / <sub>4</sub>    | 9 <sup>7</sup> / <sub>16</sub>   | 9 <sup>7</sup> / <sub>16</sub>   | 9 <sup>7</sup> / <sub>16</sub>   | 10 <sup>7</sup> / <sub>8</sub>   | 10 <sup>7</sup> / <sub>8</sub>   |  |
| b                                    | 6 <sup>3</sup> / <sub>8</sub>    | 6 <sup>3</sup> / <sub>8</sub>    | 6 <sup>3</sup> / <sub>8</sub>    | 6 <sup>3</sup> / <sub>8</sub>    | 8 <sup>1</sup> / <sub>4</sub>    | 8 <sup>1</sup> / <sub>4</sub>    | 8 <sup>1</sup> / <sub>4</sub>    | 8 <sup>1</sup> / <sub>4</sub>    | 8 <sup>1</sup> / <sub>4</sub>    | 9 <sup>1</sup> / <sub>2</sub>    | 9 <sup>1</sup> / <sub>2</sub>    | 9 <sup>1</sup> / <sub>2</sub>    | 11                               | 11                               |  |
| H Series 810                         | 16 <sup>27</sup> / <sub>32</sub> | 16 <sup>27</sup> / <sub>32</sub> | 16 <sup>27</sup> / <sub>32</sub> | 16 <sup>27</sup> / <sub>32</sub> | 18 <sup>15</sup> / <sub>16</sub> | 18 <sup>15</sup> / <sub>16</sub> | 18 <sup>15</sup> / <sub>16</sub> | 18 <sup>15</sup> / <sub>16</sub> | 18 <sup>15</sup> / <sub>16</sub> | 22 <sup>27</sup> / <sub>32</sub> | 22 <sup>27</sup> / <sub>32</sub> | 22 <sup>27</sup> / <sub>32</sub> | 26 <sup>7</sup> / <sub>8</sub>   | 26 <sup>7</sup> / <sub>8</sub>   |  |
| H Series 820                         | 21 <sup>14</sup> / <sub>16</sub> | 21 <sup>14</sup> / <sub>16</sub> | 21 <sup>14</sup> / <sub>16</sub> | 21 <sup>14</sup> / <sub>16</sub> | 23 <sup>15</sup> / <sub>16</sub> | 23 <sup>15</sup> / <sub>16</sub> | 23 <sup>15</sup> / <sub>16</sub> | 23 <sup>15</sup> / <sub>16</sub> | 23 <sup>15</sup> / <sub>16</sub> | 27 <sup>13</sup> / <sub>16</sub> | 27 <sup>13</sup> / <sub>16</sub> | 27 <sup>13</sup> / <sub>16</sub> | 31 <sup>14</sup> / <sub>16</sub> | 31 <sup>14</sup> / <sub>16</sub> |  |
| S <sub>1</sub>                       | 1 <sup>7</sup> / <sub>16</sub>   | 1 <sup>7</sup> / <sub>16</sub>   | 1 <sup>7</sup> / <sub>16</sub>   | 1 <sup>7</sup> / <sub>16</sub>   | 1 <sup>15</sup> / <sub>16</sub>  | 1 <sup>15</sup> / <sub>16</sub>  | 1 <sup>15</sup> / <sub>16</sub>  | 1 <sup>15</sup> / <sub>16</sub>  | 1 <sup>15</sup> / <sub>16</sub>  | 2 <sup>2</sup> / <sub>32</sub>   | 2 <sup>2</sup> / <sub>32</sub>   | 2 <sup>2</sup> / <sub>32</sub>   | 1 <sup>12</sup> / <sub>16</sub>  | 1 <sup>12</sup> / <sub>16</sub>  |  |
| S <sub>2</sub>                       | 1 <sup>2</sup> / <sub>16</sub>   | 1 <sup>2</sup> / <sub>16</sub>   | 1 <sup>2</sup> / <sub>16</sub>   | 1 <sup>2</sup> / <sub>16</sub>   | 1 <sup>3</sup> / <sub>16</sub>   | 1 <sup>3</sup> / <sub>16</sub>   | 1 <sup>3</sup> / <sub>16</sub>   | 1 <sup>3</sup> / <sub>16</sub>   | 1 <sup>3</sup> / <sub>16</sub>   | 1 <sup>27</sup> / <sub>32</sub>  | 1 <sup>27</sup> / <sub>32</sub>  | 1 <sup>27</sup> / <sub>32</sub>  | 1 <sup>6</sup> / <sub>16</sub>   | 1 <sup>6</sup> / <sub>16</sub>   |  |
| A                                    | 8 <sup>25</sup> / <sub>32</sub>  | 8 <sup>25</sup> / <sub>32</sub>  | 8 <sup>25</sup> / <sub>32</sub>  | 8 <sup>25</sup> / <sub>32</sub>  | 9 <sup>13</sup> / <sub>16</sub>  | 9 <sup>13</sup> / <sub>16</sub>  | 9 <sup>13</sup> / <sub>16</sub>  | 9 <sup>13</sup> / <sub>16</sub>  | 9 <sup>13</sup> / <sub>16</sub>  | 12 <sup>19</sup> / <sub>32</sub> | 12 <sup>19</sup> / <sub>32</sub> | 12 <sup>19</sup> / <sub>32</sub> | 14 <sup>1</sup> / <sub>32</sub>  | 14 <sup>1</sup> / <sub>32</sub>  |  |
| B                                    | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   |  |
| C                                    | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  |  |
| D                                    | 10 <sup>6</sup> / <sub>32</sub>  | 10 <sup>6</sup> / <sub>32</sub>  | 10 <sup>6</sup> / <sub>32</sub>  | 10 <sup>6</sup> / <sub>32</sub>  | 12                               | 12                               | 12                               | 12                               | 12                               | 15                               | 15                               | 15                               | 16 <sup>30</sup> / <sub>32</sub> | 16 <sup>30</sup> / <sub>32</sub> |  |
| E                                    | 14 <sup>9</sup> / <sub>16</sub>  | 14 <sup>9</sup> / <sub>16</sub>  | 14 <sup>9</sup> / <sub>16</sub>  | 14 <sup>9</sup> / <sub>16</sub>  | 17                               | 17                               | 17                               | 17                               | 17                               | 20 <sup>25</sup> / <sub>32</sub> | 20 <sup>25</sup> / <sub>32</sub> | 20 <sup>25</sup> / <sub>32</sub> | 22 <sup>3</sup> / <sub>32</sub>  | 22 <sup>3</sup> / <sub>32</sub>  |  |
| m                                    | 130.1                            | 130.1                            | 130.1                            | 130.1                            | 196.2                            | 196.2                            | 196.2                            | 196.2                            | 196.2                            | 429.9                            | 429.9                            | 429.9                            | 579.8                            | 579.8                            |  |
| Flange class 600 x 150               |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |  |
| a                                    | 6 <sup>3</sup> / <sub>8</sub>    | 6 <sup>3</sup> / <sub>8</sub>    | 6 <sup>3</sup> / <sub>8</sub>    | 6 <sup>3</sup> / <sub>8</sub>    | 7 <sup>3</sup> / <sub>4</sub>    | 7 <sup>3</sup> / <sub>4</sub>    | 7 <sup>3</sup> / <sub>4</sub>    | 7 <sup>3</sup> / <sub>4</sub>    | 7 <sup>3</sup> / <sub>4</sub>    | 9 <sup>11</sup> / <sub>16</sub>  | 9 <sup>11</sup> / <sub>16</sub>  | 9 <sup>11</sup> / <sub>16</sub>  | 11 <sup>11</sup> / <sub>16</sub> | 11 <sup>11</sup> / <sub>16</sub> |  |
| b                                    | 6 <sup>3</sup> / <sub>8</sub>    | 6 <sup>3</sup> / <sub>8</sub>    | 6 <sup>3</sup> / <sub>8</sub>    | 6 <sup>3</sup> / <sub>8</sub>    | 8 <sup>1</sup> / <sub>4</sub>    | 8 <sup>1</sup> / <sub>4</sub>    | 8 <sup>1</sup> / <sub>4</sub>    | 8 <sup>1</sup> / <sub>4</sub>    | 8 <sup>1</sup> / <sub>4</sub>    | 9 <sup>1</sup> / <sub>2</sub>    | 9 <sup>1</sup> / <sub>2</sub>    | 9 <sup>1</sup> / <sub>2</sub>    | 11                               | 11                               |  |
| H Series 810                         | 17 <sup>3</sup> / <sub>32</sub>  | 17 <sup>3</sup> / <sub>32</sub>  | 17 <sup>3</sup> / <sub>32</sub>  | 17 <sup>3</sup> / <sub>32</sub>  | 18 <sup>15</sup> / <sub>16</sub> | 18 <sup>15</sup> / <sub>16</sub> | 18 <sup>15</sup> / <sub>16</sub> | 18 <sup>15</sup> / <sub>16</sub> | 18 <sup>15</sup> / <sub>16</sub> | 23 <sup>2</sup> / <sub>32</sub>  | 23 <sup>2</sup> / <sub>32</sub>  | 23 <sup>2</sup> / <sub>32</sub>  | 27 <sup>1</sup> / <sub>8</sub>   | 27 <sup>1</sup> / <sub>8</sub>   |  |
| H Series 820                         | 22 <sup>1</sup> / <sub>16</sub>  | 22 <sup>1</sup> / <sub>16</sub>  | 22 <sup>1</sup> / <sub>16</sub>  | 22 <sup>1</sup> / <sub>16</sub>  | 23 <sup>15</sup> / <sub>16</sub> | 23 <sup>15</sup> / <sub>16</sub> | 23 <sup>15</sup> / <sub>16</sub> | 23 <sup>15</sup> / <sub>16</sub> | 23 <sup>15</sup> / <sub>16</sub> | 28 <sup>1</sup> / <sub>16</sub>  | 28 <sup>1</sup> / <sub>16</sub>  | 28 <sup>1</sup> / <sub>16</sub>  | 32 <sup>2</sup> / <sub>16</sub>  | 32 <sup>2</sup> / <sub>16</sub>  |  |
| S <sub>1</sub>                       | 1 <sup>10</sup> / <sub>16</sub>  | 1 <sup>10</sup> / <sub>16</sub>  | 1 <sup>10</sup> / <sub>16</sub>  | 1 <sup>10</sup> / <sub>16</sub>  | 1 <sup>15</sup> / <sub>16</sub>  | 1 <sup>15</sup> / <sub>16</sub>  | 1 <sup>15</sup> / <sub>16</sub>  | 1 <sup>15</sup> / <sub>16</sub>  | 1 <sup>15</sup> / <sub>16</sub>  | 2 <sup>9</sup> / <sub>32</sub>   | 2 <sup>9</sup> / <sub>32</sub>   | 2 <sup>9</sup> / <sub>32</sub>   | 2 <sup>10</sup> / <sub>16</sub>  | 2 <sup>10</sup> / <sub>16</sub>  |  |
| S <sub>2</sub>                       | 1 <sup>2</sup> / <sub>16</sub>   | 1 <sup>2</sup> / <sub>16</sub>   | 1 <sup>2</sup> / <sub>16</sub>   | 1 <sup>2</sup> / <sub>16</sub>   | 1 <sup>3</sup> / <sub>16</sub>   | 1 <sup>3</sup> / <sub>16</sub>   | 1 <sup>3</sup> / <sub>16</sub>   | 1 <sup>3</sup> / <sub>16</sub>   | 1 <sup>3</sup> / <sub>16</sub>   | 1 <sup>27</sup> / <sub>32</sub>  | 1 <sup>27</sup> / <sub>32</sub>  | 1 <sup>27</sup> / <sub>32</sub>  | 1 <sup>6</sup> / <sub>16</sub>   | 1 <sup>6</sup> / <sub>16</sub>   |  |
| A                                    | 8 <sup>25</sup> / <sub>32</sub>  | 8 <sup>25</sup> / <sub>32</sub>  | 8 <sup>25</sup> / <sub>32</sub>  | 8 <sup>25</sup> / <sub>32</sub>  | 9 <sup>13</sup> / <sub>16</sub>  | 9 <sup>13</sup> / <sub>16</sub>  | 9 <sup>13</sup> / <sub>16</sub>  | 9 <sup>13</sup> / <sub>16</sub>  | 9 <sup>13</sup> / <sub>16</sub>  | 12 <sup>19</sup> / <sub>32</sub> | 12 <sup>19</sup> / <sub>32</sub> | 12 <sup>19</sup> / <sub>32</sub> | 14 <sup>1</sup> / <sub>32</sub>  | 14 <sup>1</sup> / <sub>32</sub>  |  |
| B                                    | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 4 <sup>11</sup> / <sub>32</sub>  | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   | 6 <sup>5</sup> / <sub>16</sub>   |  |
| C                                    | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  | 2 <sup>23</sup> / <sub>32</sub>  |  |
| D                                    | 10 <sup>6</sup> / <sub>32</sub>  | 10 <sup>6</sup> / <sub>32</sub>  | 10 <sup>6</sup> / <sub>32</sub>  | 10 <sup>6</sup> / <sub>32</sub>  | 12                               | 12                               | 12                               | 12                               | 12                               | 15                               | 15                               | 15                               | 16 <sup>30</sup> / <sub>32</sub> | 16 <sup>30</sup> / <sub>32</sub> |  |
| E                                    | 14 <sup>9</sup> / <sub>16</sub>  | 14 <sup>9</sup> / <sub>16</sub>  | 14 <sup>9</sup> / <sub>16</sub>  | 14 <sup>9</sup> / <sub>16</sub>  | 17                               | 17                               | 17                               | 17                               | 17                               | 20 <sup>25</sup> / <sub>32</sub> | 20 <sup>25</sup> / <sub>32</sub> | 20 <sup>25</sup> / <sub>32</sub> | 22 <sup>3</sup> / <sub>32</sub>  | 22 <sup>3</sup> / <sub>32</sub>  |  |
| m                                    | 130.1                            | 130.1                            | 130.1                            | 130.1                            | 196.2                            | 196.2                            | 196.2                            | 196.2                            | 196.2                            | 429.9                            | 429.9                            | 429.9                            | 579.8                            | 579.8                            |  |



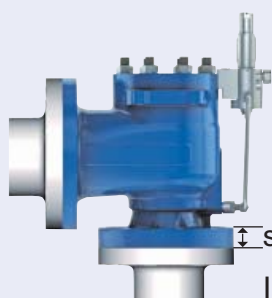
## Screw Dimensions acc. to ASME B16.5

The flange thickness of the inlet and outlet flanges of the Pilot Operated Safety Valve (POSV) may differ from the standard. Therefore stud-bolts for the flange connections may also be longer than stated in ASME B16.5. To simplify the calculation of the correct bolt length, the

quantity and sizes of the stud-bolts and nuts for the inlet and outlet flange connections are given below. The listed screw dimensions are rounded to standard dimensions. The connection flanges are based on the ASME B16.5 standard.

| US Units                             |                                    |                                |   | Orifice D – K+ |       |       |       |          |       |       |       |          |       |       |         |       |       |       |
|--------------------------------------|------------------------------------|--------------------------------|---|----------------|-------|-------|-------|----------|-------|-------|-------|----------|-------|-------|---------|-------|-------|-------|
| DN I+O                               |                                    |                                |   | 25 x 50        |       |       |       | 40 x 50  |       |       |       | 40 x 80  |       |       | 50 x 80 |       |       |       |
| Size                                 |                                    |                                |   | 1" x 2"        |       |       |       | 1½" x 2" |       |       |       | 1½" x 3" |       |       | 2" x 3" |       |       |       |
| API Standard orifice acc. to API 526 |                                    |                                |   | D              | E     | F     |       | D        | E     | F     |       | G        | H     |       | G       | H     | J     |       |
| Extra Orifice                        |                                    |                                |   |                |       |       | G     |          |       |       | H     |          |       | J     |         |       |       | K+    |
| d <sub>0</sub> [inch]                |                                    |                                |   | 0.433          | 0.579 | 0.724 | 0.906 | 0.433    | 0.579 | 0.724 | 1.142 | 0.929    | 1.157 | 1.406 | 0.929   | 1.157 | 1.496 | 1.890 |
| A <sub>0</sub> [inch²]               |                                    |                                |   | 0.147          | 0.264 | 0.412 | 0.643 | 0.147    | 0.264 | 0.412 | 1.025 | 0.677    | 1.052 | 1.552 | 0.677   | 1.052 | 1.758 | 2.806 |
| Flange class 150 x 150               |                                    |                                |   |                |       |       |       |          |       |       |       |          |       |       |         |       |       |       |
| Inlet                                | Qty                                | Stud bolts                     |   | 4              | 4     | 4     | 4     | 4        | 4     | 4     | 4     | 4        | 4     | 4     | 4       | 4     | 4     | 4     |
|                                      |                                    | Nuts                           |   | 8              | 8     | 8     | 8     | 8        | 8     | 8     | 8     | 8        | 8     | 8     | 8       | 8     | 8     | 8     |
|                                      | Stud bolt diameter nut size [inch] |                                | ½ | ½              | ½     | ½     | ½     | ½        | ½     | ½     | ½     | ½        | ½     | ½     | ⅝       | ⅝     | ⅝     | ⅝     |
|                                      | Bolt dim                           | Raised face flange type [inch] |   | ¾              | ¾     | ¾     | ¾     | ½        | ½     | ½     | ½     | ½        | ½     | ½     | 4       | 4     | 4     | 4     |
|                                      |                                    | Ring type joint flange [inch]  |   | ¾              | ¾     | ¾     | ¾     | ½        | ½     | ½     | ½     | ½        | ½     | ½     | 4¼      | 4¼    | 4¼    | 4¼    |
| Outlet                               | Qty                                | Stud bolts                     |   | 4              | 4     | 4     | 4     | 4        | 4     | 4     | 4     | 4        | 4     | 4     | 4       | 4     | 4     | 4     |
|                                      |                                    | Nuts                           |   | 8              | 8     | 8     | 8     | 8        | 8     | 8     | 8     | 8        | 8     | 8     | 8       | 8     | 8     | 8     |
|                                      | Bolt size [inch]                   |                                | ⅝ | ⅝              | ⅝     | ⅝     | ⅝     | ⅝        | ⅝     | ⅝     | ⅝     | ⅝        | ⅝     | ⅝     | ⅝       | ⅝     | ⅝     | ⅝     |
|                                      | Bolt dim                           | Raised face flange type [inch] |   | ¾              | ¾     | ¾     | ¾     | ¾        | ¾     | ¾     | ¾     | 4        | 4     | 4     | 4       | 4     | 4     | 4     |
|                                      |                                    | Ring type joint flange [inch]  |   | 4              | 4     | 4     | 4     | 4        | 4     | 4     | 4     | 4¼       | 4¼    | 4¼    | 4¼      | 4¼    | 4¼    | 4¼    |
| Flange class 300 x 150               |                                    |                                |   |                |       |       |       |          |       |       |       |          |       |       |         |       |       |       |
| Inlet                                | Qty                                | Stud bolts                     |   | 4              | 4     | 4     | 4     | 4        | 4     | 4     | 4     | 4        | 4     | 4     | 8       | 8     | 8     | 8     |
|                                      |                                    | Nuts                           |   | 8              | 8     | 8     | 8     | 8        | 8     | 8     | 8     | 8        | 8     | 8     | 16      | 16    | 16    | 16    |
|                                      | Bolt size [inch]                   |                                | ⅝ | ⅝              | ⅝     | ⅝     | ¾     | ¾        | ¾     | ¾     | ¾     | ¾        | ¾     | ¾     | ⅝       | ⅝     | ⅝     | ⅝     |
|                                      | Bolt dim                           | Raised face flange type [inch] |   | ¾              | ¾     | ¾     | ¾     | 4¼       | 4¼    | 4¼    | 4¼    | 4¼       | 4¼    | 4¼    | 4¼      | 4¼    | 4¼    | 4¼    |
|                                      |                                    | Ring joint flange [inch]       |   | ¾              | ¾     | ¾     | ¾     | 4½       | 4½    | 4½    | 4½    | 4½       | 4½    | 4½    | 4¼      | 4¼    | 4¼    | 4¼    |
| Outlet                               | Qty                                | Stud bolts                     |   | 4              | 4     | 4     | 4     | 4        | 4     | 4     | 4     | 4        | 4     | 4     | 4       | 4     | 4     | 4     |
|                                      |                                    | Nuts                           |   | 8              | 8     | 8     | 8     | 8        | 8     | 8     | 8     | 8        | 8     | 8     | 8       | 8     | 8     | 8     |
|                                      | Bolt size [inch]                   |                                | ⅝ | ⅝              | ⅝     | ⅝     | ⅝     | ⅝        | ⅝     | ⅝     | ⅝     | ⅝        | ⅝     | ⅝     | ⅝       | ⅝     | ⅝     | ⅝     |
|                                      | Bolt dim                           | Raised face flange type [inch] |   | ¾              | ¾     | ¾     | ¾     | ¾        | ¾     | ¾     | ¾     | 4        | 4     | 4     | 4       | 4     | 4     | 4     |
|                                      |                                    | Ring type joint flange [inch]  |   | 4              | 4     | 4     | 4     | 4        | 4     | 4     | 4     | 4¼       | 4¼    | 4¼    | 4¼      | 4¼    | 4¼    | 4¼    |
| Flange class 600 x 150               |                                    |                                |   |                |       |       |       |          |       |       |       |          |       |       |         |       |       |       |
| Inlet                                | Qty                                | Stud bolts                     |   | 4              | 4     | 4     | 4     | 4        | 4     | 4     | 4     | 4        | 4     | 4     | 8       | 8     | 8     | 8     |
|                                      |                                    | Nuts                           |   | 8              | 8     | 8     | 8     | 8        | 8     | 8     | 8     | 8        | 8     | 8     | 16      | 16    | 16    | 16    |
|                                      | Bolt size [inch]                   |                                | ⅝ | ⅝              | ⅝     | ⅝     | ¾     | ¾        | ¾     | ¾     | ¾     | ¾        | ¾     | ¾     | ⅝       | ⅝     | ⅝     | ⅝     |
|                                      | Bolt dim                           | Raised face flange type [inch] |   | 4              | 4     | 4     | 4     | ¾        | ¾     | ¾     | ¾     | ¾        | ¾     | ¾     | 4½      | 4½    | 4½    | 4½    |
|                                      |                                    | Ring type joint flange [inch]  |   | 4              | 4     | 4     | 4     | ¾        | ¾     | ¾     | ¾     | ¾        | ¾     | ¾     | ¾       | ¾     | ¾     | ¾     |
| Outlet                               | Qty                                | Stud bolts                     |   | 4              | 4     | 4     | 4     | 4        | 4     | 4     | 4     | 4        | 4     | 4     | 4       | 4     | 4     | 4     |
|                                      |                                    | Nuts                           |   | 8              | 8     | 8     | 8     | 8        | 8     | 8     | 8     | 8        | 8     | 8     | 8       | 8     | 8     | 8     |
|                                      | Bolt size [inch]                   |                                | ⅝ | ⅝              | ⅝     | ⅝     | ⅝     | ⅝        | ⅝     | ⅝     | ⅝     | ⅝        | ⅝     | ⅝     | ⅝       | ⅝     | ⅝     | ⅝     |
|                                      | Bolt dim                           | Raised face flange type [inch] |   | ¾              | ¾     | ¾     | ¾     | ¾        | ¾     | ¾     | ¾     | 4        | 4     | 4     | 4       | 4     | 4     | 4     |
|                                      |                                    | Ring type joint flange [inch]  |   | 4              | 4     | 4     | 4     | 4        | 4     | 4     | 4     | 4¼       | 4¼    | 4¼    | 4¼      | 4¼    | 4¼    | 4¼    |

Outlet



Inlet

## Screw Dimensions acc. to ASME B16.5

| US Units                             |                                    |                                |     | Orifice J – T+ |       |       |       |           |       |       |       |           |        |        |           |        |        |
|--------------------------------------|------------------------------------|--------------------------------|-----|----------------|-------|-------|-------|-----------|-------|-------|-------|-----------|--------|--------|-----------|--------|--------|
| DN I+O                               |                                    |                                |     | 80 x 100       |       |       |       | 100 x 150 |       |       |       | 150 x 200 |        |        | 200 x 250 |        |        |
| Size                                 |                                    |                                |     | 3" x 4"        |       |       |       | 4" x 6"   |       |       |       | 6" x 8"   |        |        | 8" x 10"  |        |        |
| API Standard orifice acc. to API 526 |                                    |                                |     | J              | K     | L     |       | L         | M     | N     | P     |           | Q      | R      |           | T      |        |
| Extra Orifice                        |                                    |                                |     |                |       |       | N+    |           |       |       |       | P+        |        |        | R+        |        | T+     |
| d <sub>0</sub> [inch]                |                                    |                                |     | 1.496          | 1.772 | 2.205 | 2.953 | 2.205     | 2.480 | 2.717 | 3.268 | 3.740     | 4.331  | 5.236  | 5.591     | 6.614  | 7.087  |
| A <sub>0</sub> [inch²]               |                                    |                                |     | 1.758          | 2.465 | 3.818 | 6.848 | 3.818     | 4.832 | 5.796 | 8.386 | 10.987    | 14.730 | 21.534 | 24.547    | 34.359 | 39.443 |
| Flange class 150 x 150               |                                    |                                |     |                |       |       |       |           |       |       |       |           |        |        |           |        |        |
| Inlet                                | Qty                                | Stud bolts                     |     | 4              | 4     | 4     | 4     | 8         | 8     | 8     | 8     | 8         | 8      | 8      | 8         | 8      | 8      |
|                                      |                                    | Nuts                           |     | 8              | 8     | 8     | 8     | 16        | 16    | 16    | 16    | 16        | 16     | 16     | 16        | 16     | 16     |
|                                      | Stud bolt diameter nut size [inch] |                                | 5/8 | 5/8            | 5/8   | 5/8   | 5/8   | 5/8       | 5/8   | 5/8   | 5/8   | 5/8       | 3/4    | 3/4    | 3/4       | 3/4    | 3/4    |
|                                      | Bolt dim                           | Raised face flange type [inch] |     | 4 1/2          | 4 1/2 | 4 1/2 | 4 1/2 | 4 3/4     | 4 3/4 | 4 3/4 | 4 3/4 | 4 3/4     | 5 1/2  | 5 1/2  | 5 1/2     | 6      | 6      |
|                                      |                                    | Ring type joint flange [inch]  |     | 4 3/4          | 4 3/4 | 4 3/4 | 4 3/4 | 5         | 5     | 5     | 5     | 5         | 5 3/4  | 5 3/4  | 5 3/4     | 6 1/4  | 6 1/4  |
| Outlet                               | Qty                                | Stud bolts                     |     | 8              | 8     | 8     | 8     | 8         | 8     | 8     | 8     | 8         | 8      | 8      | 8         | 12     | 12     |
|                                      |                                    | Nuts                           |     | 16             | 16    | 16    | 16    | 16        | 16    | 16    | 16    | 16        | 16     | 16     | 16        | 24     | 24     |
|                                      | Bolt size [inch]                   |                                | 5/8 | 5/8            | 5/8   | 5/8   | 3/4   | 3/4       | 3/4   | 3/4   | 3/4   | 3/4       | 3/4    | 3/4    | 3/4       | 7/8    | 7/8    |
|                                      | Bolt dim                           | Raised face flange type [inch] |     | 4              | 4     | 4     | 4     | 4 1/2     | 4 1/2 | 4 1/2 | 4 1/2 | 4 1/2     | 5 1/4  | 5 1/4  | 5 1/4     | 5 1/4  | 5 1/4  |
|                                      |                                    | Ring type joint flange [inch]  |     | 4 1/4          | 4 1/4 | 4 1/4 | 4 1/4 | 4 3/4     | 4 3/4 | 4 3/4 | 4 3/4 | 4 3/4     | 5 1/2  | 5 1/2  | 5 1/2     | 5 1/2  | 5 1/2  |
| Flange class 300 x 150               |                                    |                                |     |                |       |       |       |           |       |       |       |           |        |        |           |        |        |
| Inlet                                | Qty                                | Stud bolts                     |     | 8              | 8     | 8     | 8     | 8         | 8     | 8     | 8     | 8         | 12     | 12     | 12        | 12     | 12     |
|                                      |                                    | Nuts                           |     | 16             | 16    | 16    | 16    | 16        | 16    | 16    | 16    | 16        | 24     | 24     | 24        | 24     | 24     |
|                                      | Bolt size [inch]                   |                                | 3/4 | 3/4            | 3/4   | 3/4   | 3/4   | 3/4       | 3/4   | 3/4   | 3/4   | 3/4       | 3/4    | 3/4    | 3/4       | 7/8    | 7/8    |
|                                      | Bolt dim                           | Raised face flange type [inch] |     | 5              | 5     | 5     | 5     | 5 1/2     | 5 1/2 | 5 1/2 | 5 1/2 | 5 1/2     | 6      | 6      | 6         | 7      | 7      |
|                                      |                                    | Ring type joint flange [inch]  |     | 5 1/2          | 5 1/2 | 5 1/2 | 5 1/2 | 5 3/4     | 5 3/4 | 5 3/4 | 5 3/4 | 5 3/4     | 6 1/4  | 6 1/4  | 6 1/4     | 7 1/4  | 7 1/4  |
| Outlet                               | Qty                                | Stud bolts                     |     | 8              | 8     | 8     | 8     | 8         | 8     | 8     | 8     | 8         | 8      | 8      | 8         | 12     | 12     |
|                                      |                                    | Nuts                           |     | 16             | 16    | 16    | 16    | 16        | 16    | 16    | 16    | 16        | 16     | 16     | 16        | 24     | 24     |
|                                      | Bolt size [inch]                   |                                | 5/8 | 5/8            | 5/8   | 5/8   | 3/4   | 3/4       | 3/4   | 3/4   | 3/4   | 3/4       | 3/4    | 3/4    | 3/4       | 7/8    | 7/8    |
|                                      | Bolt dim                           | Raised face flange type [inch] |     | 4              | 4     | 4     | 4     | 4 1/2     | 4 1/2 | 4 1/2 | 4 1/2 | 4 1/2     | 5 1/4  | 5 1/4  | 5 1/4     | 5 1/4  | 5 1/4  |
|                                      |                                    | Ring type joint flange [inch]  |     | 4 1/4          | 4 1/4 | 4 1/4 | 4 1/4 | 4 3/4     | 4 3/4 | 4 3/4 | 4 3/4 | 4 3/4     | 5 1/2  | 5 1/2  | 5 1/2     | 5 1/2  | 5 1/2  |
| Flange class 600 x 150               |                                    |                                |     |                |       |       |       |           |       |       |       |           |        |        |           |        |        |
| Inlet                                | Qty                                | Stud bolts                     |     | 8              | 8     | 8     | 8     | 8         | 8     | 8     | 8     | 8         | 8      | 8      | 8         | 12     | 12     |
|                                      |                                    | Nuts                           |     | 16             | 16    | 16    | 16    | 16        | 16    | 16    | 16    | 16        | 24     | 24     | 24        | 24     | 24     |
|                                      | Bolt size [inch]                   |                                | 3/4 | 3/4            | 3/4   | 3/4   | 7/8   | 7/8       | 7/8   | 7/8   | 7/8   | 7/8       | 1      | 1      | 1         | 1 1/8  | 1 1/8  |
|                                      | Bolt dim                           | Raised face flange type [inch] |     | 5 1/2          | 5 1/2 | 5 1/2 | 5 1/2 | 6 1/4     | 6 1/4 | 6 1/4 | 6 1/4 | 6 1/4     | 7 1/2  | 7 1/2  | 7 1/2     | 8 1/2  | 8 1/2  |
|                                      |                                    | Ring type joint flange [inch]  |     | 5 1/2          | 5 1/2 | 5 1/2 | 5 1/2 | 6 1/2     | 6 1/2 | 6 1/2 | 6 1/2 | 6 1/2     | 7 1/2  | 7 1/2  | 7 1/2     | 8 1/2  | 8 1/2  |
| Outlet                               | Qty                                | Stud bolts                     |     | 8              | 8     | 8     | 8     | 8         | 8     | 8     | 8     | 8         | 8      | 8      | 8         | 12     | 12     |
|                                      |                                    | Nuts                           |     | 16             | 16    | 16    | 16    | 16        | 16    | 16    | 16    | 16        | 16     | 16     | 16        | 24     | 24     |
|                                      | Bolt size [inch]                   |                                | 5/8 | 5/8            | 5/8   | 5/8   | 3/4   | 3/4       | 3/4   | 3/4   | 3/4   | 3/4       | 3/4    | 3/4    | 3/4       | 7/8    | 7/8    |
|                                      | Bolt dim                           | Raised face flange type [inch] |     | 4              | 4     | 4     | 4     | 4 1/2     | 4 1/2 | 4 1/2 | 4 1/2 | 4 1/2     | 5 1/4  | 5 1/4  | 5 1/4     | 5 1/4  | 5 1/4  |
|                                      |                                    | Ring type joint flange [inch]  |     | 4 1/4          | 4 1/4 | 4 1/4 | 4 1/4 | 4 3/4     | 4 3/4 | 4 3/4 | 4 3/4 | 4 3/4     | 5 1/2  | 5 1/2  | 5 1/2     | 5 1/2  | 5 1/2  |