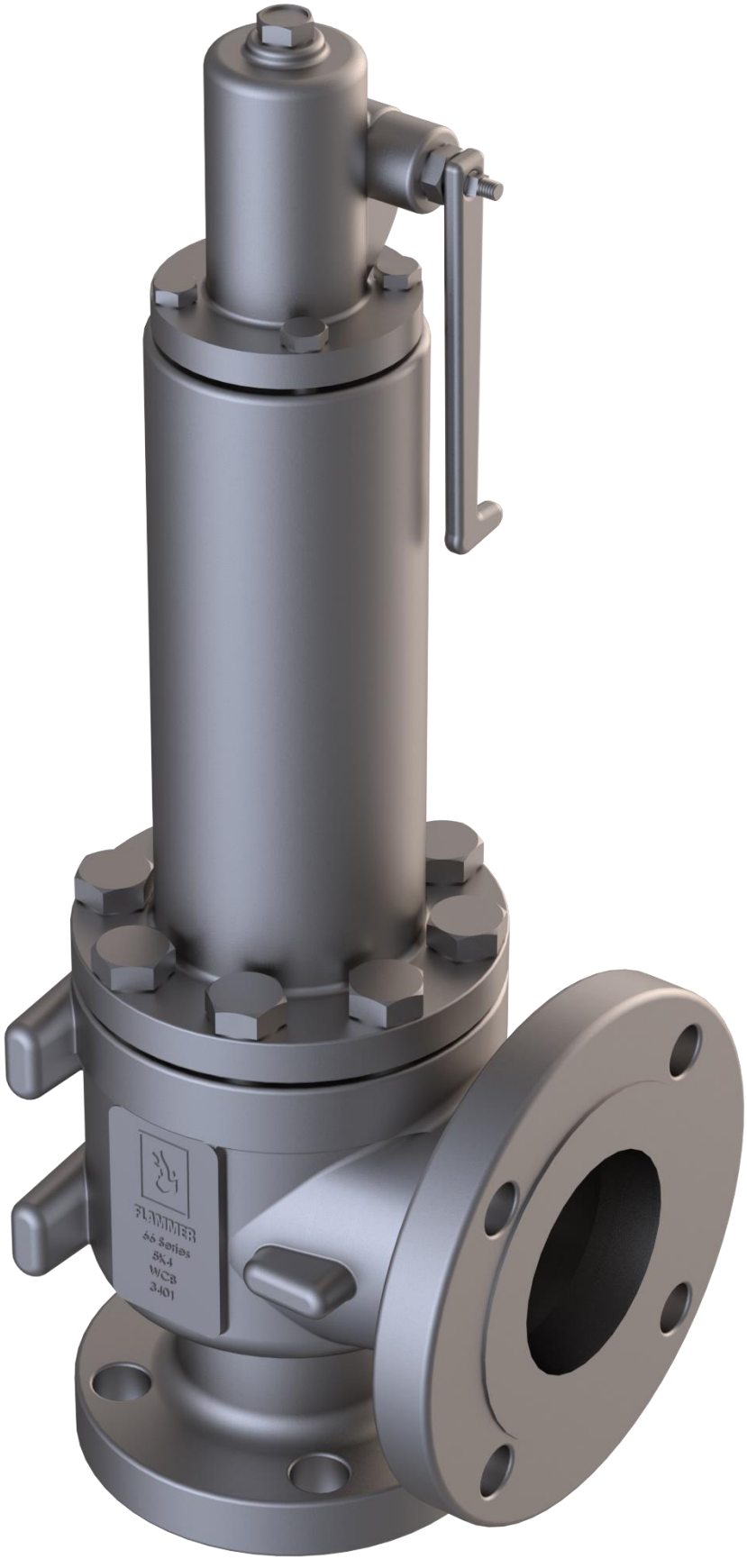
FLAMMER

# Safety Relief Valves

Series 66

Intelligent
Safety
Solutions



# Introducing
# Flammer Technologies Private LTD

Flammer provides critical service and safety valves, specialized pumps and service support to flow control and rotating equipment. Our world-wide reputation is based on engineering excellence applied to a comprehensive range of specialized products and effective customer support.

We have the capability to deliver complete valve solutions for major projects in the power generation, oil and gas exploration and general industrial sectors. Our global network of service operations specializes in the maintenance, upgrade and management of power and industrial assets at customer sites.

## Quality assurance

Flammer operates quality programs to cover the full scope of their activities. Comprehensive quality systems have been developed to serve the power, oil and gas and industrial markets which they serve.

The company holds approvals to or complies with:

- ASME Section III 'N', 'NPT', 'NV'
- ASME Section I
- ASME Section VIII
- EN ISO 9001: 2015
- EN ISO 14001: 2015
- OHSAS 45001: 2018
- API Q1 TO API LICENCES API 6D (6D-0182) AND API 6A (6A-0445)
- API STD 520
- API STD 526
- API STD 527
- API STD 2000
- ISO 4126

The Quality systems have been approved for the supply of products to meet the requirements of the Pressure Equipment Directive (PED) and compliance modules A, D1, H, B&D have been applied in categories I through IV respectively.

An ongoing commitment to customer care is met through the process of continuous improvement and the further development of our systems and processes towards meeting ISO 9001:2015.

## Material testing service available

- Non-destructive examination by radiography, ultrasonics, magnetic particle and liquid penetrant.
- Chemical analysis by computer controlled direct reading emission spectrometer.
- Mechanical testing for tensile properties at ambient and elevated temperatures, bend and hardness testing. Charpy testing at ambient, elevated and sub-zero temperatures.

## Valve testing facilities

All pressure containing items are hydrostatically, seal leakage and functionally tested. In addition, gas, packing emission, cryogenic and advanced functional testing can be arranged.

Further technical information can be obtained from our Web site: http://www.flammertech.com

Flammer Technologies manufactures the FLAMMER range of 66 Series pressuresafety valves and safety devices for oil and gas, petrochemical and chemical industries, pipelines, thermal and nuclear power plants, sugar refineries and pulp mills.

The FLAMMER range of products is manufactured in accordance with ASME, API and ISO standards and therefore can meet most of worldwide customers' requirements. The company holds approvals or complies with:
EN ISO 9001:2008 - EN ISO 14001:2004
OHSAS 45001: 2018
PED 97/23/EC Module B+D Category IV
ATEX 94/9/EC
ASME Section I - ASME Section VIII
API STD 520 - API STD 526 - API STD 527
API STD 2000
ISO 4126
SELO

Specifically, Flammer can design and manufacture special valves to meet specific project requirements.

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## Introduction

This catalogue describes FLAMMER'S 66 SERIES safety relief valves manufactured for use in refineries, petrochemical and chemical processes, piping, pressure vessels, heat exchangers, cryogenic plants, process steam, thermal relief, compression stations and pipelines.

FLAMMER'S 66 SERIES safety relief valves are designed and manufactured in accordance with API Std 526 and ASME Section VIII Division 1.

The FLAMMER's 66 Series also meets the requirements of ISO 4126 Part 1.

## General FLAMMER'S 66 SERIES High Performance Features

### High capacity and performances

FLAMMER'S 66 SERIES safety relief valves are designed on concepts of safety, high performance, interchangeability and simplicity.

These considerations led to the FLAMMER'S 66 SERIES line of valves, Standard (conventional), Balanced bellows, Steam service.

FLAMMER'S 66 SERIES valves are designed to meet the requirements of the ASME Code, Section VIII Div.1 and capacities have presented a high discharge coefficient.

FLAMMER'S 66 SERIES safety relief valves are suitable for air, gas or steam service as well as for liquids.

### Designed for trouble free operation

The FLAMMER'S 66 SERIES line has been designed to API Std 526 standard with an integral stainless-steel nozzle, a self-aligning top-guided disc and disc holder and a single nozzle adjusting ring for blowdown setting. All sliding surfaces are made of stainless steel from different grades providing sufficient difference of hardness to prevent seizing or galling and to increase precision.

The disc is designed to withstand high and low temperatures without leakage due to non-uniform thermal expansion. Its thickness is minimal, and it is self-aligning.

FLAMMER'S 66 SERIES valves, in the "Soft Seated Valve" version, are provided with a soft seat, made of materials such as fluorocarbon, nitrile or silicone for applications where premium tightness is required. The soft seat is designed so that it cannot blow out under pressure.

Full lift within 10% overpressure and short blowdown are achieved with the single adjustable nozzle ring design. The deflector provides a raising force to open the valve completely to permit full capacity flow. The form of the secondary orifice situated between the deflector and the adjusting ring can be modified to obtain the desired blowdown.

The single nozzle adjusting ring facilitates the setting of the valve. The design of this ring is such that it cannot affect the flow of the valve.

### A complete range of safety relief valves

The FLAMMER'S 66 SERIES line includes all orifices from D to T (Complying with API Std 526), plus two extra-large orifices V and W (Complying with ASME B&PVC Section VIII Div.1) and covers the range of 150 lbs. to 2500 lbs. flange ratings, from 1'' (DN 25) to 12'' (DN 300). The bodies and bonnets are madefrom castings, while corrosion resistant materials are used for the internal trim.

Materials are designed for service temperatures from -270°C to 538°C. Different bills of materials have been established to cover most of the possible applications, especially when corrosion is a consideration. Special alloys such as Duplex, Alloy 400 (Monel), Alloy C276, or other materials suitable for sour environments may be supplied on request.

### Designed for interchangeability

When starting up or maintaining a process plant, it is sometimes necessary to make modifications to the initial design and change valve configurations.

When the FLAMMER'S 66 SERIES line was designed, it was decided that the different versions of the basic valve were to be interchangeable.

Consequently, it is possible to convert any FLAMMER'S 66 SERIES design into another one with the minimum of additional parts.

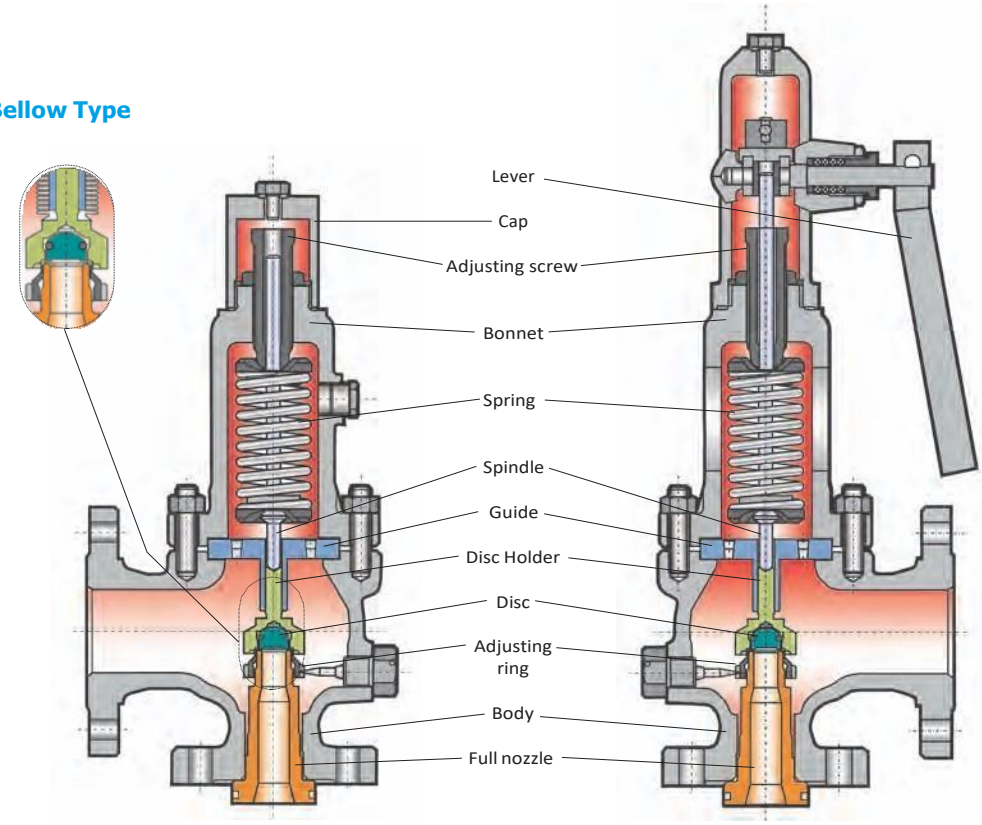
A conventional type may very easily be converted into a balanced bellows type just by adding a bellows sub-assembly.

To reduce inventory, steam valves use the same components as process valves.

### Metal to metal seat tightness and simple operation

The FLAMMER'S 66 SERIES metal-to-metal seated valves are carefully lapped and mirror-polished and lapping is controlled with optical flats. This lapping together with the disc design assures excellent tightness and easy maintenance.

**Balanced Bellow Type**




**Conventional type** **Steam type**

## Description

### FLAMMER'S 66 SERIES RANGE

- Confirms ASME Section VIII Div. 1
- Sizes: 1" x 2" to 8" x 10"
- API STD 526 orifices from D to T
- Effective orifice areas from D (0.865 $cm^2$) to T (452 $cm^2$)

### FLAMMER'S 66 SERIES - STANDARD

- Pressure (API STD 526) from 0.35 to 414 barg
- Pressure (ASME B16.34) from 0.35 to 430 barg
- Temperature from -196°C to +538°C
- Soft seat available for improved tightness

### FLAMMER'S 66 SERIES – BALANCED BELLOWS

- Pressure same as 66 Series – Standard Valves
- The balanced bellows isolate spring chamber from media and balance the valve against the back-pressure effects.

### FLAMMER'S 66 SERIES – FOR STEAM

- Pressure class 150# and 300#
- Pressure (ASME) from 0.35 barg to 45.9 barg
- Temperature up to +538°C
- Stellited nozzle
- Opened bonnet (small orifices) and yoke (large orifices)

**Table 1**

| FLAMMER'S 66 SERIES Inlet x Outlet Size Combinations (in.) Orifice Area (sq. in) | | | | | Inlet | Outlet |
|---|---|---|---|---|---|---|
| **Actual** | **0.134** | **0.273** | **0.373** | **0.589** | **Flange** | **Flange** |
| **API** | **0.110** | **0.196** | **0.307** | **0.503** | **Rating** | **Rating** |
| **ORIFICE** | **D** | **E** | **F** | **G** | **ASME B16.5** | **ASME B16.5** |
| | 1 x 2 | 1 x 2 | 1 ½ x 2 | 1 ½ x 3 | 150 | |
| | 1 x 2 | 1 x 2 | 1 ½ x 2 | 1 ½ x 3 | 300 | 1 |
| | 1 x 2 | 1 x 2 | 1 ½ x 2 | 1 ½ x 3 | 300 | 5 |
| | 1 x 2 | 1 x 2 | 1 ½ x 2 | 1 ½ x 3 | 600 | 0 |
| | 1 ½ x 2 | 1 ½ x 2 | 1 ½ x 3 | 1 ½ x 3 | 900 | |
| | 1 ½ x 2 | 1 ½ x 2 | 1 ½ x 3 | 2 x 3 | 1500 | 3 |
| | 1 ½ x 3 | 1 ½ x 3 | 1 ½ x 3 | 2 x 3 | 2500 | 0 0 |

**Table 2**

| FLAMMER'S 66 SERIES Inlet x Outlet Size Combinations (in.) Orifice Area (sq. in) | | | | | | | | | | | Inlet | Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Actual** | **0.881** | **1.457** | **2.097** | **3.284** | **4.093** | **4.987** | **7.215** | **12.91** | **17.81** | **28.87** | **Flange** | **Flange** |
| **API** | **0.785** | **1.287** | **1.838** | **2.853** | **3.6** | **4.34** | **6.38** | **11.05** | **16** | **26** | **Rating** | **Rating** |
| **ORIFICE** | **H** | **J** | **K** | **L** | **M** | **N** | **P** | **Q** | **R** | **T** | **ASME B16.5** | **ASME B16.5** |
| | 1 ½ x 3 | 2 x 3 | 3 x 4 | 3 x 4 | 4 x 6 | 4 x 6 | 4 x 6 | 6 x 8 | 6 x 8 | 8 x 10 | 150 | |
| | 1 ½ x 3 | 2 x 3 | 3 x 4 | 3 x 4 | 4 x 6 | 4 x 6 | 4 x 6 | 6 x 8 | 6 x 8 | 8 x 10 | 300 | 150 |
| | 2 x 3 | 3 x 4 | 3 x 4 | 4 x 6 | 4 x 6 | 4 x 6 | 4 x 6 | 6 x 8 | 6 x 10 | 8 x 10 | 300 | |
| | 2 x 3 | 3 x 4 | 3 x 4 | 4 x 6 | 4 x 6 | 4 x 6 | 4 x 6 | 6 x 8 | 6 x 10 | - | 600 | |
| | 2 x 3 | 3 x 4 | 3 x 6 | 4 x 6 | 4 x 6 | 4 x 6 | 4 x 6 | - | - | - | 900 | |
| | 2 x 3 | 3 x 4 | 3 x 6 | 4 x 6* | - | - | - | - | - | - | 1500 | 300 |
| | - | - | - | - | - | - | - | - | - | - | 2500 | |

**Note:** Inlet and outlet size combinations as well as Orifice sizesshown in the table above are compliant with API standard 526 – Fourth Edition, 1995 (and later).

* Supplied with a 150# outlet

## Design Information

### Set pressure limits and tolerances

Safety relief valves having a set pressure above 1 barg are covered by the requirements of ASME B&PV Code Section VIII Div.1:

- Capacity rated at 10% overpressure in critical discharge conditions, or 0.2 barg, whichever is greater.
- Adjustable blowdown between 5 to 7% of set pressure on compressible fluid.
- Set pressure tolerances:

± 0.13 bar for pressures up to 4.8 bar.
± 3% of set pressure for pressures above 4.8 bar.

- Seat tightness test performed at:

- 90% of set pressure for pressures above 3.45 bar.
- 0.35 bar below set pressure for pressures below 3.45 bar.

### Flange tolerances and dimensions

FLAMMER'S 66 SERIES safety relief valve flanges are machined to ASME B 16.5 (identical to EN 1759 flanges) except that the raised face dimension of the inlet flange is larger than ASME due to the full nozzle construction.

Centre to face dimensions comply with API Std 526. Flanges may be machined to various facings: raised face - large or small male or female face - large or small tongue or groove face - ring joint face, as well as to various finishes: spiral or concentric serrated, smooth finish, etc. Raised face with smooth finish (Ra 3.2 - 6.3 mm max) is standard.

Any other flange standard is available if specified (EN 1092, DIN 2501).

### Set pressure adjustment

Back pressure correction
Type P4 balanced bellows valves do not need any back pressure setting correction. Type "STANDARD" conventional valves operating against a constant back pressure are set without back pressure. The spring setting pressure (without back pressure) will then be the actual set pressure derated by the value of the constant back pressure.

### Set pressure modifications

The spring should not be re-set for any pressure higher than 5% above or below that for which the safety relief valve is marked (Code ASME Section VIII Div.1, UG126).

### Springs

A number is stamped on each valve spring where the size of the wire permits it. The spring number is also stamped on the nameplate. For proper operation and to assure correct alignment of parts, springs should be ordered complete with washers.

If the valve set pressure is to be changed, a new spring may be necessary and the following information should be given:

1 • Serial number or nominal valve size and type
2 • Set pressure and backpressure
3 • Fluid
4 • Maximum operating temperature

### Working pressure and set pressure

It is recommended to set the safety relief valves as high as possible above the maximum operating pressure.

The margin between the operating pressure and the set pressure should not fall below 10% of the set pressure in order to avoid undesired relief cycles or seat leakage.

For operating pressure very close to set pressure, it is advisable to use pilot operated valves.

### Seat tightness of safety relief valves

All FLAMMER'S 66 SERIES safety relief valves are individually tested according to API STD 527 and sealed prior to shipment.

### Test procedure

The valve is mounted vertically as indicated in the diagram below. Immediately after triggering, the pressure is maintained at 90% of set pressure or at set pressure less 0.35 barg for valves at less than 3.45 barg. Test pressure is applied for a minimum of 1 minute for valves of inlet sizes up to 2", 2 minutes for sizes 2 ½", 3" and 4", 5 minutes for sizes 6" and above.

### Tightness on air test bench

Air at atmospheric temperature is used as pressure medium. The leakage rate in bubbles per minute shall not exceed the numbers listed in Table 3 for metal/metal seated valves.

For soft seated valves, no leakage is authorized.

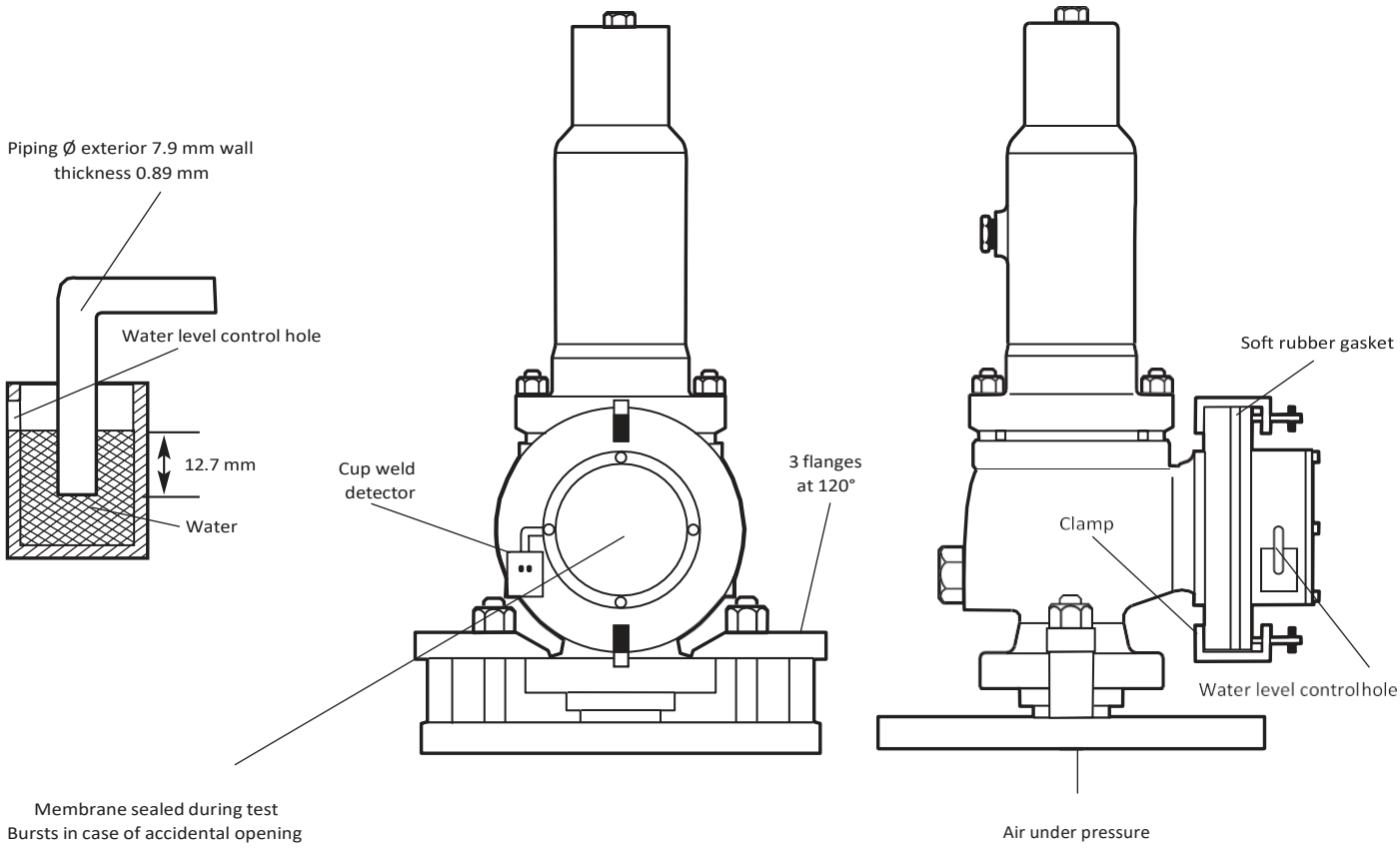
For steam valves tested on an air bench, the outlet flange is sealed and the body is filled with water up to 12.7 mm above the nozzle seat. Leakage criteria is equal to half that shown in Table 3.

### Tightness on liquid test bench

Water at atmospheric temperature is used as pressure medium. Leakage rate must be less than 0.39 $cm^3$/hr/mm of inlet orifice for metal/metal seated valves. For soft seated valves, no leakage is authorized.

### Tightness on steam test bench

No visible or audible leakage is authorized.




## Table 3

| Set pressure | | | Orifices less than or equal to F | | | Orifices larger than F | | |
|---|---|---|---|---|---|---|---|---|
| Barg | Psig | Mpag | Bubbles/minute | $Sm^3$/day | SCF/day | Bubbles/minute | $Sm^3$/day | SCF/day |
| 1.03-68.96 | 15-1000 | 0.103-6.896 | 40 | 0.017 | 0.60 | 20 | 0.0085 | 0.30 |
| 103 | 1500 | 10.3 | 60 | 0.026 | 0.90 | 30 | 0.013 | 0.45 |
| 130 | 2000 | 13.0 | 80 | 0.034 | 1.20 | 40 | 0.017 | 0.60 |
| 172 | 2500 | 17.2 | 100 | 0.043 | 1.50 | 50 | 0.021 | 0.75 |
| 207 | 3000 | 20.7 | 100 | 0.043 | 1.50 | 60 | 0.026 | 0.90 |
| 276 | 4000 | 27.6 | 100 | 0.043 | 1.50 | 80 | 0.034 | 1.20 |
| 385 | 5000 | 38.5 | 100 | 0.043 | 1.50 | 100 | 0.043 | 1.50 |
| 414 | 6000 | 41.4 | 100 | 0.043 | 1.50 | 100 | 0.043 | 1.50 |

## Storage

Safety relief valves are often stored at the site formany months before they are actually installed.

Unless they are properly stored and protected their performance may be adversely affected. The valves should therefore be left in their shipping boxes, in a vertical position and stored in a dry place until their installation.

## Installation

To avoid damage to valves at start up, piping connections, valve inlet and pressure bearing parts should be thoroughly cleaned and all foreign bodies should be eliminated.

### Inlet piping

The inside pipe diameter should be equal or superior to the inlet valve diameter. A valve should never be installed on a fitting with a smaller inside diameter than the inlet connection. The connection piping should be as short as possible.

The valve should be mounted vertically on the pipeinlet. The inlet flange bolts and studs should be drawn down evenly and in such a way as to avoid straining the valve body with possible distortion of the nozzle flange or misalignment of the valve parts. Compliance with the above recommendationswill assure proper valve operation.

### Outlet piping

The outlet piping should be simple and direct, atleast of the same diameter as the outlet and designed to minimize loads on the valve:

- Valve discharge loads
- Discharge pipe expansion loads
- Vibrations
- Discharge pipe misalignment causing static loads

## Reaction force calculation

The discharge of a pressure relief valve imposes a reactive load which is supported by the piping system. In some cases, all reactive loading due to the operation of the valve is transmitted to the valveand inlet piping.

The horizontal reaction force at the outlet of the valve discharging to atmosphere may be evaluatedby an approximation formula as follows:

$$F = K_F \times A \times P_1$$

A more precise calculation is provided with thevalve data sheet.

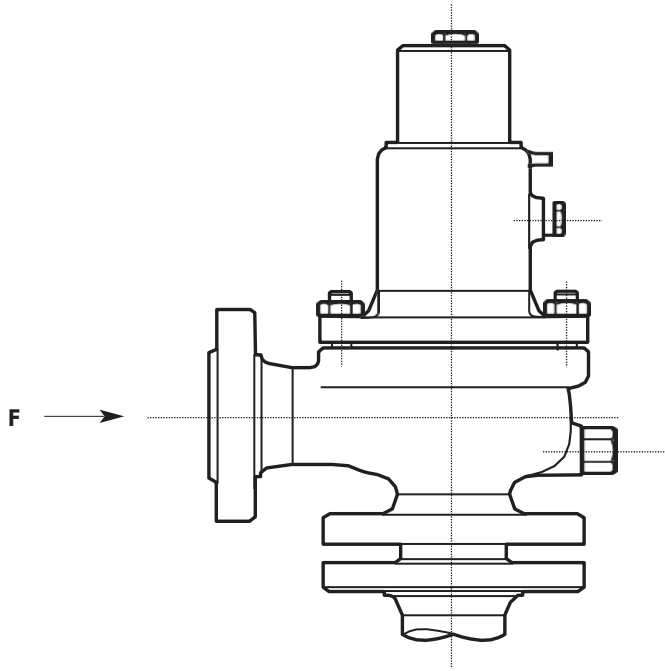
**Where:**

F = is the reactive force in daN

$K_F$ = is a factor which depends on the fluid andthe size of the outlet of the valve, as shown hereunder.

A = is the orifice area of the valve nozzle, in $cm^2$,to be found in the sizing section of this catalogue.

$P_1$ = is the absolute relieving pressure, includingoverpressure, in bar abs.




This formula includes both momentum and static pressure effects.

| VALUES OF $K_F$ | | |
|---|---|---|
| **Outlet DN** | **Fluid: air** | **Fluid: steam** |
| 2'' and 2 ½'' | 1.9 | 2.0 |
| 3'' and 4'' | 1.5 | 1.6 |
| 6'' | 1.3 | 1.3 |
| 8'' and over | 1.1 | 1.1 |

**Example:** For a valve of " T " orifice, outlet DN10'',
Set at 12.1 bar, operating on air with 10% overpressure:

$K_F$ = 1.1

A = 168$cm^2$

$P_1$ = (1.10 x 12.1 +1.013) = 14.32 bar abs

F = 2647 daN

## Balanced bellows safety relief valves

Balanced bellows valves should be used:

- When a double tightness barrier is required by the process fluid in the secondary pressure zone of the safety relief valve.
- When the valve is subjected to a back pressure between 10 and 50% of the set pressure.

When a conventional safety relief valve discharges against a back pressure, the opening pressure is the set pressure with atmospheric back pressure augmented by the actual superimposed back pressure just before the valve opens.

If the back pressure is variable, then the opening pressure of a conventional valve will also be variable.

To solve this problem, it is highly recommended to use a balanced bellows safety relief valve. The effective area of the bellows is substantially the same as the seating area of the disc on the nozzle and the bellows is vented to atmosphere through a hole drilled into the bonnet wall. The opening pressure of the safety relief valve is then independent of the back pressure.

Back pressure limits for "P4" balanced bellows safety relief valves are shown in the appropriate section of this catalogue.

The design of the FLAMMER'S 66 SERIES safety relief valve is such that a conventional "STANDARD" valve can easily be converted into a balanced bellows "P4" valve just by adding a bellows (part n°19) and removing the vent plug in the bonnet.

Bellows valves type "P4" are available for orifices D to W.

Balanced bellows valves at low set pressure (i.e. below 1.5 barg) should be avoided in small orifices.

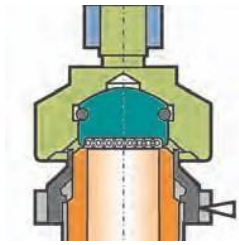
## Soft seated valves

A soft seated FLAMMER'S 66 SERIES safety relief valve is available for special applications where premium tightness is required or where the operating pressure is very close to the set pressure of the safety relief valve.

The 66 Series' Soft Seated Valve seat design is unique: an elastomer seat is molded into a groove machined in the valve disc. This design prevents soft seat blowout under the effect of pressure. Metal seat is provided on the external seating area.

With this configuration, the recognized maximum set pressure is 100 barg. For pressures above this value, it is possible to use the soft ring design (see cryogenic material on page 14) limited to 200 barg.

A wide variety of soft materials is available for various mediums and temperature ranges. Fluorocarbon is the standard material, suitable for major applications between -18 and +200°C. Silicone, Buna-N (nitrile), Ethylene-Propylene or other materials are available on another design. Other materials, such as resins, are available with another design (see cryogenic materials on page 14).



The 66 Series' Soft Seated Valve is bubble tight at 90% of set pressure and meets API STD 527 tightness standard at 95% of the set pressure. Nevertheless, it is not recommended to get the operating pressure higher than 93% of the set pressure as per API and ASME requirements. The operating pressure has to be lower than the blowdown (-7% to set pressure).

The compatibility of the fluid with the elastomer should be carefully considered by the purchaser. Full information about the various elastomers to be used on Star soft is available from the factory.

| | Fluorocarbon (Dipolymer) | Silicone |
|---|---|---|
| Min. T° | -18°C | -60°C |
| Max. T° | +200°C | +200°C |
| Compatible fluids (on Starsoft) | Air<br>Carbon Dioxide<br>Chlorine Water<br>Crude Oil (<121°C)<br>Detergent Solutions<br>Fuel Oil<br>Gasoline<br>HC Gas<br>Helium<br>Natural Gas<br>Phosphoric Acid<br>Propane<br>Sulfur Chloride (aqu.)<br>Sulfuric Acid (<60%)<br>Sulfuric Acid (100%)<br>Water | Air<br>Ammonia Gas<br>Detergent Solutions<br>Liquid Oxygen<br>Natural Gas<br>Water |

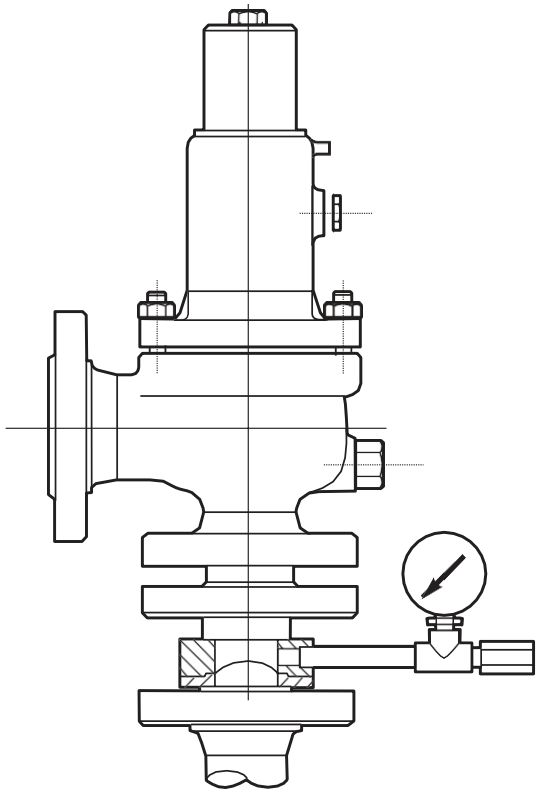
## Rupture discs and safety valves combination

A rupture disc can be installed upstream of a safety relief valve either as protection against highly corrosive fluid or in order to guarantee complete tightness.

This assembly requires the following arrangements:

- A fragmenting type disc must not be used
- The disc must burst cleanly and leave no obstruction for the fluid once it is broken
- The dimensions of the disc must not be inferior to the inlet DN of the valve
- It must be possible to monitor the space between the rupture disc and the disc of the safety valve all the time and this space must be linked to the atmosphere for as long as the disc has not burst, by means of an excess flow valve. It may also be equipped with a vent valve and a pressure gauge.
- For installation governed by the ASME Code, the combination must be flow tested, and the assigned derating factor applied, or, alternatively for non-tested combinations a 0.9 derating factor must be applied.

A rupture disc can also be mounted at the outlet of a safety relief valve.



## Materials and Construction

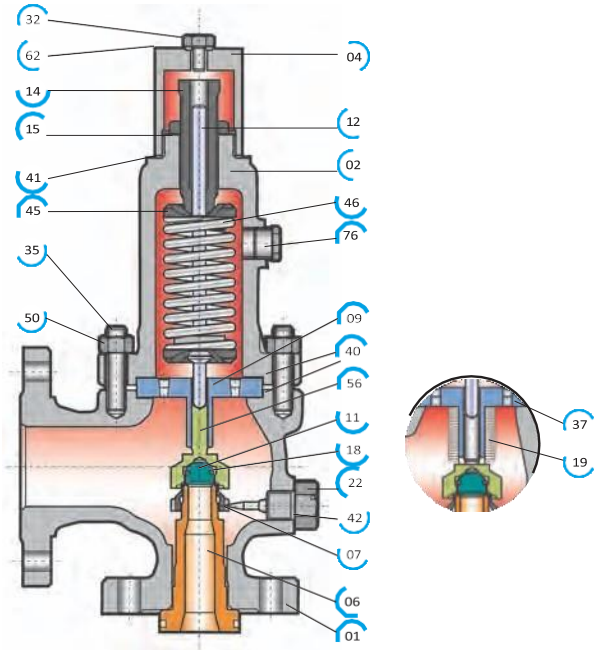
### Comparison of various materials

ASME or ASTM designations of material will prevail in this catalogue

This table shows the basic specification of the various materials as well as the corresponding grade in European standards.

### Table 4

| Type of Material | US Standard | European Standard & Grade | UNS |
|---|---|---|---|
| **Castings** | | | |
| Carbon steel for high temperature service | SA 216 Gr WCC | GP280GH EN 10213-2 | J02503 |
| Killed carbon steel for temperatures down to -46°C | SA 352 Gr LCC | G20Mn5QT EN 10213-3 | J02505 |
| Carbon steel for very high temperature service | SA 217 Gr WC6 | G17CrMo5-5 EN 10213-2 | J12072 |
| Carbon steel for very high temperature service | SA 217 Gr WC9 | - | J21890 |
| Austenitic stainless steel | SA 351 Gr CF3M | GxCrNiMo19.11.2 EN 10213-4 | J92800 |
| Austenitic stainless steel | SA 351 Gr CF8 | Gx5CrNi19.10 EN 10213-4 | J92600 |
| **Forgings and bars** | | | |
| Martensitic stainless steel 13 Cr | SA 479 Ty 410 | X12Cr13 EN 10088-3 | S41000 |
| Ferritic stainless steel 17 Cr - 2Ni | SA 479 Ty 431 | X17CrNi16.2 EN 10088-3 | |
| Precipitation hardened stainless steel (17/4 PH) | SA 564 Ty 630 | X5CrNiCuNb16.4 EN 10088-3 | S17400 |
| Austenitic stainless steel 18 Cr - 10 Ni | SA 479 Ty 304 | X5CrNi18.10 EN 10088-3 | S30400 |
| Austenitic stainless steel 18 Cr - 10 Ni - 3 Mo | SA 479 Ty 316L | X2CrNiMo17.12.2 EN 10088-3 | S31603 |
| Austenitic stainless steel 15 Cr - 25 Ni - 1.25 Mo | SA 638 Gr 660 | Z6NCTDV 25-15 EN 10088-3 | S66286 |
| **Bolting** | | | |
| Alloy steel 1 Cr - 1/4 Mo | SA 193 Gr B7 | 42CrMo4 Pr EN 10269 | |
| Low temperature alloy steel | SA 320 Gr L7 | 42CrMo4 Pr EN 10269 | |
| Austenitic stainless steel 18 Cr - 10 Ni | SA 193 Gr B8 | X6CrNi18.10 Pr EN 10629 | |
| Carbon steel nuts | SA 194 Gr 2H | C45E 1 Pr EN 10269 | |
| Stainless steel nuts 18 Cr - 8 Ni | SA 194 Gr 8 | X4CrNi18.10 Pr 10269 | |
| Carbon steel nuts for low temperature | SA 194 Gr 4 | - | |




## 66 Series conventional and balanced types

**Materials for standard applications, high temperature, low temperature and corrosive fluids.**

For maximum resistance in particularly severe environmental conditions, see the FLAMMER'S 66 SERIES Balanced Bellows Valve specially designed for this application. (see corrosive service application)

For hot water applications where flashing can occur downstream of the seat and nozzle, the bellows type P450 is recommended. (see steam valve).

| Notes | Part N° | Part Name | Standard Materials -29°C to +427°C Material code 30 | Standard Materials for Low Temperature -45°C to -29°C Material code 19 | Standard Materials for Corrosive and Low Temperature down to -60°C Material code 16 | Standard Materials for High Temperature up to 538°C Material code 32 |
|---|---|---|---|---|---|---|
| | 01 | Body | SA 216 Gr WCC | SA 352 Gr LCC | SA 351 Gr CF8M | SA 217 Gr WC6 |
| | 02 | Bonnet | SA 216 Gr WCC | SA 352 Gr LCC | SA 351 Gr CF8M | SA 217 Gr WC6 |
| | 04 | Cap | CARBON STEEL | CARBON STEEL | SS 316L | CARBON STEEL |
| 1 | 06 | Nozzle | SS 316L | SS 316L | SS 316L | SS 316 |
| 1 | 07 | Adjusting ring | A 351 Gr CF3M | A 351 Gr CF3M | A 351 Gr CF3M | A 351 Gr CF3M |
| 1 | 09 | Guide | SS 431 | SS 431 | SS 316L | SS 431 |
| 1 | 11 | Disc | SS 17/4 PH | SS 17/4 PH | SS 316L stellited | SS 316 stellited |
| | 12 | Spindle | SS 410 | SS 410 | SS 316L | SS 410 |
| | 14 | Adjusting screw | SS 410 | SS 410 | SS 316L | SS 410 |
| | 15 | Adjusting screw locknut | SS 316L | SS 316L | SS 316L | SS 316L |
| 1 | 18 | Retaining ring | SS | SS | SS | SS |
| 1,2,3 | 19 | Balanced Bellows | SS 316L | SS 316L | SS 316L | SS 316L |
| | 22 | Adjusting ring screw | SS 316L | SS 316L | SS 316L | SS 316L |
| | 35 | Bonnet stud | A 193 Gr B7 | A 320 Gr L7 | A 193 Gr B8 | A 193 Gr B16 |
| 2,3 | 37 | Bellows plate | SS 316L | SS 316L | SS 316L | SS 316L |
| 1 | 40 | Body/bonnet gasket | SS | SS | SS | SS |
| 1 | 41 | Bonnet/cap gasket | SS | SS | SS | SS |
| 1 | 42 | Adjusting ring screw gasket | SS | SS | SS | SS |
| 1 | 45 | Spring washers (upper & lower) | CARBON STEEL | CARBON STEEL | SS 316L | CARBON STEEL |
| 1 | 46 | Spring | ALLOY STEEL (4) | ALLOY STEEL (4) | SS 316 (5) | ALLOY |
| | 50 | Nut | A 194 Gr 2H | A 194 Gr 4 | A 194 Gr 8 | A 194 Gr 2H |
| 3 | 56 | Disc holder | SS 316L | SS 316L | SS 316L | SS 316L |

**Notes:**

1. Recommended spare parts
2. Bellows type only
3. Bellows sub-assembly
4. Aluminized alloy steel 50CV4
5. 316 up to 300°C - 17.4 PH up to 427 °C - ALLOY up to 538°C
6. Nozzle and disc are SS 316L stellated for pressure class 900 and above

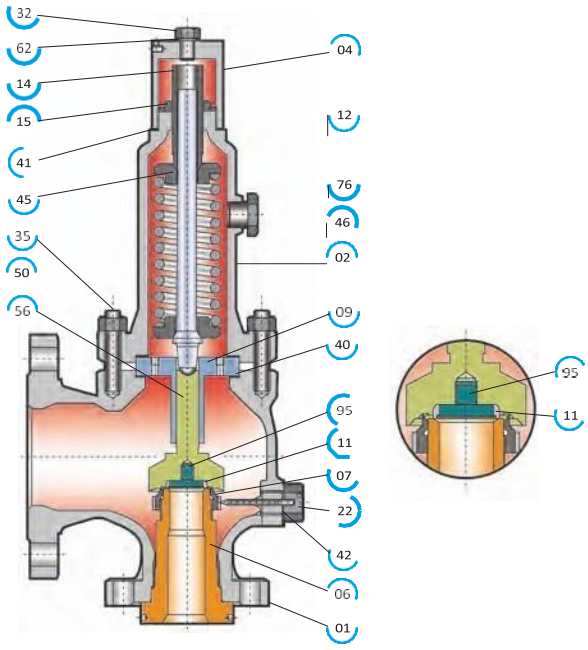
## STANDARD conventional and BALANCED BELLOW types

### Materials for Cryogenic and Liquefied Natural Gas.

Liquefied Natural Gas and more generally cryogenic applications require special features for the internal materials.

End-users and contractors must be aware that any leakage on cryogenic applications could create an ice ball around the seat and affect the pressure safety valve reliability.

In order to prevent any leakage due to seat damage, FLAMMER recommend the use of soft seat.




| Notes | Part N° | Part Name | Materials for Cryogenic and LNG below -46°C Material code 10 |
|---|---|---|---|
| | 01 | Body | SA 351 Gr CF8M |
| | 02 | Bonnet | SA 351 Gr CF8M |
| | 04 | Cap | SS 316L |
| 1 | 06 | Nozzle | SS 316L |
| 1 | 07 | Adjusting ring | A 351 Gr CF3M |
| 1 | 09 | Guide | SS 316L |
| 1 | 11 | Disc | (Soft Disc Table) |
| | 12 | Spindle | SS 316L |
| | 14 | Adjusting screw | SS 316L |
| | 15 | Adjusting screw locknut | SS 316L |
| 1,2,3 | 19 | Balanced Bellows | SS 316L |
| | 22 | Adjusting ring screw | SS 316L |
| | 35 | Bonnet stud | A 320 Gr B8 |
| 2,3 | 37 | Bellows plate | SS 316L |
| 1 | 40 | Body/bonnet gasket | SS 316L |
| 1 | 41 | Bonnet/cap gasket | SS 316L |
| 1 | 42 | Adjusting ring screw gasket | SS 316L |
| 1 | 45 | Spring washers (upper & lower) | SS 316L |
| 1 | 46 | Spring | SS 316L |
| | 50 | Nut | A 194 Gr 8 |
| 3 | 56 | Disc holder | SS 316L |
| | 62 | Plug Gasket | SS 316L |
| | 76 | Plug | SS 316L |
| | 95 | Disc Retainer | SS 316L |

### Soft Disc Table

| Set Pressure (barg) | Seat Material |
|---|---|
| 1 < SP < 26 | PTFE |
| 26 < SP < 66 | PCTFE |
| 66 < SP < 200 | PEEK |

**Notes:**

1. Recommended spare parts
2. Bellows type only
3. Bellows sub-assembly
4. Nozzle and disc are SS 316L stellited for pressure class 900 and above

## Conventional and Balanced bellow types

### Corrosive and sour gas service

Many process streams in oil and gas industry contain enough H2S to cause sulfide stress cracking (SSC) in susceptible materials. It exists in two different domains in which two different standards may be applicable:

- Oil and Gas production: NACE MR0175/ISO 15156
  - Part 1 - 2001: General principles for selection of cracking-resistant materials
  - Part 2 - 2003: Cracking-resistant carbon and low alloy steels, and the use of cast irons.
  - Part 3 - 2003: Cracking-resistant CRAs (corrosion-resistant alloys) and other alloys.
- Oil and gas refining: NACE MR0103

The last revisions of NACE MR0175/15156 shows results of the inadequacy of some standard materials commonly used in the oil and gas industry. We then highlight this point and ask the end-user to clearly specify the condition of use (fluid details, pressure, temperature) in order to be able to select acceptable materials.

FLAMMER manufactures a large variety of valves used in sour service. Based on our experience and the last edition of the standards, the definition of the actual critical components in a pressure safety valve should be mutually agreed between the purchaser and Flammer Technologies Private LTD.

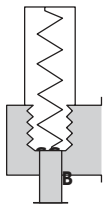
Please note, materials are applicable for NACE MR0175 / ISO 15156 according to the different paragraphs of the standard. As a first approach, we can note the following:

| Materials | Paragraph |
|---|---|
| SA 352 Gr LCC | MR0175 / ISO 15156-2 ¶ A2-1-2 |
| SA 216 Gr WCC | MR0175 / ISO 15156-2 ¶ A2-1-2 |
| SA 217 Gr WC6 | MR0175 / ISO 15156-2 ¶ A2-1-2 |
| SA 479 Gr 316L | MR0175 / ISO 15156-3 ¶ A2-2 Table 2 |
| UNS S31803 | MR0175 / ISO 15156-3 ¶ A7-2 Table 24 |
| UNS N06625 | MR0175 / ISO 15156-3 ¶ A4-2 Table 13 |
| UNS N07750 | MR0175 / ISO 15156-3 ¶ A2-9 Table 36 |

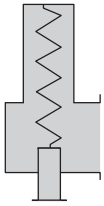
As an example of selection, we can advise the following valve configuration. The conditions here are not so restrictive: temperature limited to 149˚C (300˚F):


SGA for FLAMMER's 66 Series Standard and Balanced Bellow: The backpressure side (secondary pressure zone) of the valve is not pressurized under the conditions defined in the NACE specificationand therefore not subject to the specification.

| Part | SGA | Applicable paragraph | |
|---|---|---|---|
| 01 | Body | SA 216 Gr WCC | MR0175/ISO 15156-2 § A2-1-2 |
| 06/11 | Nozzle / Disc | SA 479 Gr 316L | MR0175/ISO 15156-2 § A2-1-2 |
| | Other parts | Standard | |




SGB for FLAMMER's 66 Series Balanced Bellow: The backpressure side of the valve is limited by the bellows. The NACE specification will apply to the wet components located in this area.



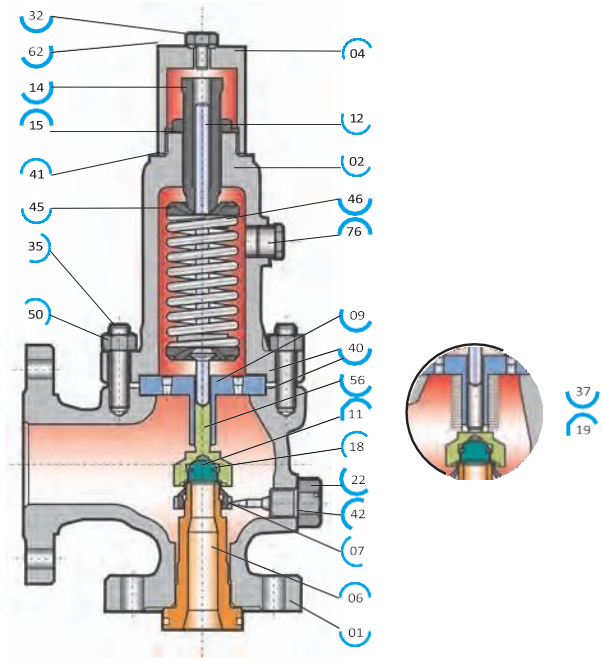
SGB for FLAMMER's 66 Series Standard: : The overall valve is subject to the NACE specification.

| Part | SGB | Applicable paragraph | |
|---|---|---|---|
| 01 | Body | SA 216 Gr WCC | MR0175/ISO 15156-2 § A2-1-2 |
| 02 | Bonnet | SA 216 Gr WCC | MR0175/ISO 15156-2 § A2-1-2 |
| 06/11 | Nozzle / Disc | SA 479 Gr 316L | MR0175/ISO 15156-3 § A2-2 Table A2 |
| 19 | Balanced Bellows (if appl.) | UNS N06625 (ALLOY 625) | MR0175/ISO 15156-3 § A4-2 Table A13 |
| 46 | Standard Spring<br>Balanced Bellow Spring | UNS N07750 (ALLOY X750)<br>Or SS304 | MR0175/ISO 15156-3 § A9-2 Table A36 |
| | Other parts | Standard | |

## STANDARD conventional and BALANCED BELLOW types

### NICKEL COPPER ALLOY

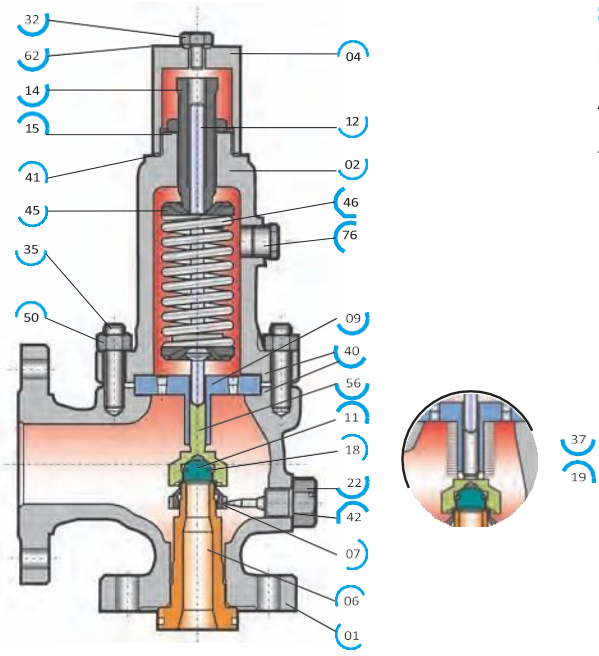
Application: corrosive fluid




| Notes | Part N° | Part Name | NICKEL COPPER ALLOY | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | ST, BB Material code M1 | Bellow type Only | | Standard (ST) and Balanced Bellow (BB) | | |
| | | | | Material code M2 | Material code M3 | Material code M4 | Material code M5 | Material code M6 |
| | 01 | Body | SA 216 Gr WCC (5) | SA 216 Gr WCC (5) | SA 216 Gr WCC (5) | ALLOY 400 | ALLOY 400 | ALLOY 400 |
| | 02 | Bonnet | SA 216 Gr WCC (5) | SA 216 Gr WCC (5) | SA 216 Gr WCC (5) | SA 216 Gr WCC (5) | ALLOY 400 | ALLOY 400 |
| | 04 | Cap | CARBON STEEL | CARBON STEEL | CARBON STEEL | CARBON STEEL | ALLOY 400 | ALLOY 400 |
| 1 | 06 | Nozzle | ALLOY 500 | ALLOY 500 | ALLOY 500 | ALLOY 500 | ALLOY 500 | ALLOY 500 |
| 1 | 07 | Adjusting ring | A 351 Gr CF3M | A 351 Gr CF3M | ALLOY 400 | ALLOY 400 | ALLOY 400 | ALLOY 400 |
| 1 | 09 | Guide | SS 431 | SS 431 | SS 431 | SS 431 | ALLOY 400 | ALLOY 400 |
| 1 | 11 | Disc | ALLOY 500 | ALLOY 500 | ALLOY 500 | ALLOY 500 | ALLOY 500 | ALLOY 500 |
| | 12 | Spindle | SS 410 | SS 410 | SS 410 | SS 410 | ALLOY 400 | ALLOY 400 |
| | 14 | Adjusting screw | SS 410 | SS 410 | SS 410 | SS 410 | ALLOY 400 | ALLOY 400 |
| | 15 | Adjusting screw locknut | SS 316L | SS 316L | SS 316L | SS 316L | ALLOY 400 | ALLOY 400 |
| 1 | 18 | Retaining ring | ALLOY 625 | ALLOY 625 | ALLOY 625 | ALLOY 625 | ALLOY 625 | ALLOY 625 |
| 1,2,3 | 19 | Balanced Bellows | SS 316L | ALLOY 400 | ALLOY 400 | ALLOY 400 | ALLOY 400 | ALLOY 400 |
| | 22 | Adjusting ring screw | SS 316L | SS 316L | ALLOY 400 | ALLOY 400 | ALLOY 400 | ALLOY 400 |
| | 35 | Bonnet stud | A 193 Gr B7 | A 193 Gr B7 | A 193 Gr B7 | A 193 Gr B7 | A 193 Gr B8 | A 193 Gr B8 |
| 2,3 | 37 | Bellows plate | SS 316L | MONEL | ALLOY 400 | ALLOY 400 | ALLOY 400 | ALLOY 400 |
| 1 | 40 | Body/bonnet gasket | SS | SS | ALLOY 400 | ALLOY 400 | ALLOY 400 | ALLOY 400 |
| 1 | 41 | Bonnet/cap gasket | SS | SS | ALLOY 400 | ALLOY 400 | ALLOY 400 | ALLOY 400 |
| 1 | 42 | Adjusting ring screw gasket | SS | SS | ALLOY 400 | ALLOY 400 | ALLOY 400 | ALLOY 400 |
| 1 | 45 | Spring washers (upper & lower) | CARBON STEEL | CARBON STEEL | CARBON STEEL | CARBON STEEL | ALLOY 400 | ALLOY 400 |
| 1 | 46 | Spring | ALLOY ST. (4) | ALLOY ST. (4) | ALLOY ST. (4) | ALLOY ST. (4) | ALLOY 400 | ALLOY X750 |
| | 50 | Nut | A 194 Gr 2H | A 194 Gr 2H | A 194 Gr 2H | A 194 Gr 2H | A 194 Gr 8 | A 194 Gr 8 |
| 3 | 56 | Disc holder | SS 316L | SS 316L | ALLOY 400 | ALLOY 400 | ALLOY 400 | ALLOY 400 |

**Notes:**

1. Recommended spare parts
2. Bellows type only
3. Bellows sub-assembly
4. Aluminized steel 50CV4
5. Carbon content less than 0.25%, HRC < 22
6. Standard is Alloy 400 UNS J24135 for castings, UNS N04400 for internals accepted that nozzle and disc is UNS N05500.




## STANDARD (ST) conventional and BALANCED BELLOW (BB) types

### ALLOY C

Application: corrosive fluid

| Notes | Part N° | Part Name | ALLOY C | | | | |
|---|---|---|---|---|---|---|---|
| | | | ST, BB | BB Only | | ST, BB | |
| | | | Material code H1 | Material code H2 | Material code H3 | Material code H4 | Material code H6 |
| | 01 | Body | SA 216 Gr WCC (6) | SA 216 Gr WCC (6) | SA 216 Gr WCC (6) | ALLOY C | ALLOY C |
| | 02 | Bonnet | SA 216 Gr WCC (6) | SA 216 Gr WCC (6) | SA 216 Gr WCC (6) | SA 216 Gr WCC (6) | ALLOY C |
| | 04 | Cap | CARBON STEEL (6) | CARBON STEEL (6) | CARBON STEEL (6) | CARBON STEEL (6) | ALLOY C |
| 1 | 06 | Nozzle | ALLOY C | ALLOY C | ALLOY C | ALLOY C | ALLOY C |
| 1 | 07 | Adjusting ring | A 351 Gr CF3M | A 351 Gr CF3M | ALLOY C | ALLOY C | ALLOY C |
| 1 | 09 | Guide | SS 431 | SS 431 | SS 431 | SS 431 | ALLOY C |
| 1 | 11 | Disc | ALLOY C | ALLOY C | ALLOY C | ALLOY C | ALLOY C |
| | 12 | Spindle | SS 410 | SS 410 | SS 410 | SS 410 | ALLOY C |
| | 14 | Adjusting screw | SS 410 | SS 410 | SS 410 | SS 410 | ALLOY C |
| | 15 | Adjusting screw locknut | SS 316L | SS 316L | SS 316L | SS 316L | ALLOY C |
| 1 | 18 | Retaining ring | ALLOY 625 | ALLOY 625 | ALLOY 625 | ALLOY 625 | ALLOY 625 |
| 1,2,3 | 19 | Balanced Bellows | SS 316L | ALLOY C | ALLOY C | ALLOY C | ALLOY C |
| | 22 | Adjusting ring screw | SS 316L | SS 316L | ALLOY C | ALLOY C | ALLOY C |
| | 35 | Bonnet stud | A 193 Gr B7 | A 193 Gr B7 | A 193 Gr B7 | A 193 Gr B7 | A 193 Gr B8 |
| 2,3 | 37 | Bellows plate | SS 316L | ALLOY C | ALLOY C | ALLOY C | ALLOY C |
| 1 | 40 | Body/bonnet gasket | SS | SS | ALLOY 400 | ALLOY 400 | ALLOY 400 |
| 1 | 41 | Bonnet/cap gasket | SS | SS | ALLOY 400 | ALLOY 400 | ALLOY 400 |
| 1 | 42 | Adjusting ring screw gasket | SS | SS | ALLOY 400 | ALLOY 400 | ALLOY 400 |
| 1 | 45 | Spring washers (upper & lower) | CARBON STEEL | CARBON STEEL | CARBON STEEL | CARBON STEEL | ALLOY C |
| 1 | 46 | Spring | ALLOY ST. (4) | ALLOY ST. (4) | ALLOY ST. (4) | ALLOY ST. (4) | ALLOY X750 (5) |
| | 50 | Nut | A 194 Gr 2H | A 194 Gr 2H | A 194 Gr 2H | A 194 Gr 2H | A 194 Gr 8 |
| 3 | 56 | Disc holder | SS 316L | SS 316L | ALLOY C | ALLOY C | ALLOY C |

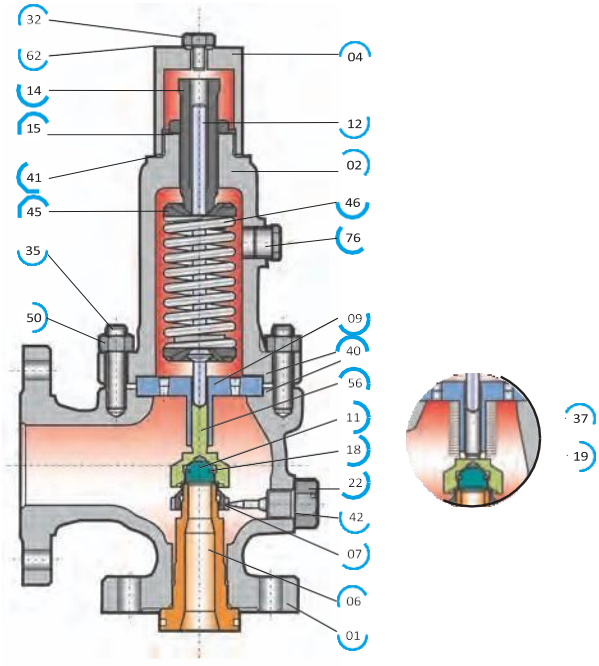
**Notes:**

1. Recommended spare parts
2. Bellows type only
3. Bellows sub-assembly
4. Aluminized steel 50CV4
5. Alloy C on request
6. Carbon content 0.25%, HRC < 22
7. Standard Alloy C type is UNS 10276

## STANDARD conventional and BALANCED BELLOW types

### DUPLEX

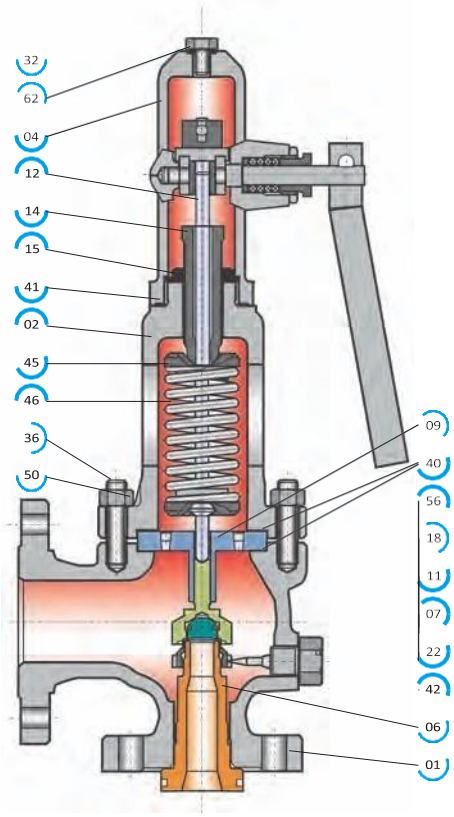
Application: corrosive fluid and offshore




| Notes | Part N° | Part Name | DUPLEX | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | ST, BB | BB Only | | ST, BB | | |
| | | | Material code D1 | Material code D2 | Material code D3 | Material code D4 | Material code D5 | Material code D6 |
| | 01 | Body | SA 216 Gr WCC | SA 216 Gr WCC | SA 216 Gr WCC | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) |
| | 02 | Bonnet | SA 216 Gr WCC | SA 216 Gr WCC | SA 216 Gr WCC | SA 216 Gr WCC | DUPLEX (5) | DUPLEX (5) |
| | 04 | Cap | CARBON STEEL | CARBON STEEL | CARBON STEEL | CARBON STEEL | DUPLEX (5) | DUPLEX (5) |
| 1 | 06 | Nozzle | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) |
| 1 | 07 | Adjusting ring | A 351 Gr CF3M | A 351 Gr CF3M | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) |
| 1 | 09 | Guide | SS 431 | SS 431 | SS 431 | SS 431 | DUPLEX (5) | DUPLEX (5) |
| 1 | 11 | Disc | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) |
| | 12 | Spindle | SS 410 | SS 410 | SS 410 | SS 410 | DUPLEX (5) | DUPLEX (5) |
| | 14 | Adjusting screw | SS 410 | SS 410 | SS 410 | SS 410 | DUPLEX (5) | DUPLEX (5) |
| | 15 | Adjusting screw locknut | SS 316L | SS 316L | SS 316L | SS 316L | DUPLEX (5) | DUPLEX (5) |
| 1 | 18 | Retaining ring | ALLOY 625 | ALLOY 625 | ALLOY 625 | ALLOY 625 | ALLOY 625 | ALLOY 625 |
| 1,2,3 | 19 | Balanced Bellows | SS 316L | ALLOY 625 | ALLOY 625 | ALLOY 625 | ALLOY 625 | ALLOY 625 |
| | 22 | Adjusting ring screw | SS 316L | SS 316L | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) |
| | 35 | Bonnet stud | A 193 Gr B7 | A 193 Gr B7 | A 193 Gr B7 | A 193 Gr B7 | DUPLEX (5) | DUPLEX (5) |
| 2,3 | 37 | Bellows plate | SS 316L | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) |
| 1 | 40 | Body/bonnet gasket | SS | SS | ALLOY 400 | ALLOY 400 | ALLOY 400 | ALLOY 400 |
| 1 | 41 | Bonnet/cap gasket | SS | SS | ALLOY 400 | ALLOY 400 | ALLOY 400 | ALLOY 400 |
| 1 | 42 | Adjusting ring screw gasket | SS | SS | ALLOY 400 | ALLOY 400 | ALLOY 400 | ALLOY 400 |
| 1 | 45 | Spring washers (upper & lower) | CARBON STEEL | CARBON STEEL | CARBON STEEL | CARBON STEEL | ALLOY 400 | ALLOY 400 |
| 1 | 46 | Spring | ALLOY ST. (4) | ALLOY ST. (4) | ALLOY ST. (4) | ALLOY ST. (4) | SS 316L | ALLOY X750 |
| | 50 | Nut | A 194 Gr 2H | A 194 Gr 2H | A 194 Gr 2H | A 194 Gr 2H | DUPLEX (5) | DUPLEX (5) |
| 3 | 56 | Disc holder | SS 316L | SS 316L | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) | DUPLEX (5) |

**Notes:**

1. Recommended spare parts
2. Bellows type only
3. Bellows sub-assembly
4. Aluminized steel 50CV4
5. Standard Duplex is UNS J92205 (Duplex G4) for castings and UNS 31803 (22%) for internals
6. Option: Super duplex (25%) UNS 32750 or 32760 on request




**Valves for steam applications STEAM SERVICE with open bonnet or yoke**

**Valves for hot water applications STANDARD AND BALANCED BELLOW TYPE with closed bonnet and lifting lever**

Standard materials

| Notes | Part N° | Part Name | STEAM SERVICE Standard Materials | | ST/BB |
|---|---|---|---|---|---|
| | | | Up to 427°C Material code 30 | From 427 to 538°C Material code 32 (7) | Up to 427°C Material code 50 (6) |
| | 01 | Body | SA 216 Gr WCC | SA 217 Gr WC6 | SA 216 Gr WCC |
| | 02 | Yoke (1) | SA 216 Gr WCC | SA 216 Gr WCC | SA 216 Gr WCC |
| | 04 | Cap | SA 216 Gr WCC | SA 216 Gr WCC | SA 216 Gr WCC |
| 1 | 06 | Nozzle | SS 410 stellated | SS 316 stellated | SS 410 stellated |
| 1 | 07 | Adjusting ring | A 351 Gr CF3M | A 351 Gr CF3M | A 351 Gr CF3M |
| 1 | 09 | Guide | SS 431 | SS 431 | SS 431 |
| 1 | 11 | Disc | SS 17/4 PH | SS 316L stellated | SS 17/4 PH |
| | 12 | Spindle | SS 410 | SS 410 | SS 410 |
| | 14 | Adjusting screw | SS 410 | SS 410 | SS 410 |
| | 15 | Adjusting screw locknut | SS 316L | SS 316L | SS 316L |
| 1 | 18 | Retaining ring | SS | SS | SS |
| 1,2,3 | 19 | Balanced Bellows | | | SS 316L |
| | 22 | Adjusting ring screw | SS 316L | SS 316L | SS 316L |
| | 35 | Bonnet stud | A 193 Gr B7 | A 194 Gr B16 | A 193 B7 |
| 2,3 | 37 | Bellows plate | | | SS 316L |
| 1 | 40 | Body/bonnet gasket | SS | SS | SS |
| 1 | 41 | Bonnet/cap gasket | SS | SS | SS |
| 1 | 42 | Adjusting ring screw gasket | SS | SS | SS |
| 1 | 45 | Spring washers (upper & lower) | CARBON STEEL | CARBON STEEL | CARBON STEEL |
| 1 | 46 | Spring | ALLOY STEEL | ALLOY STEEL | ALLOY STEEL |
| | 50 | Nut | A 194 Gr 2H | A 194 Gr 2H | A 194 Gr 2H |
| 3 | 56 | Disc holder | SS 316L | SS 316L | SS 316L |

**Notes:**

1. Recommended spare parts
2. Bellows type only
3. Bellows sub-assembly
4. Lever is mandatory on steam applications according to ASME, API and ISO standards and some local laws.
5. Open bonnet for code 30 and 32 (till P orifice - Yoke from Q orifice)
6. Lever required for code 50
7. The code was previously '02'

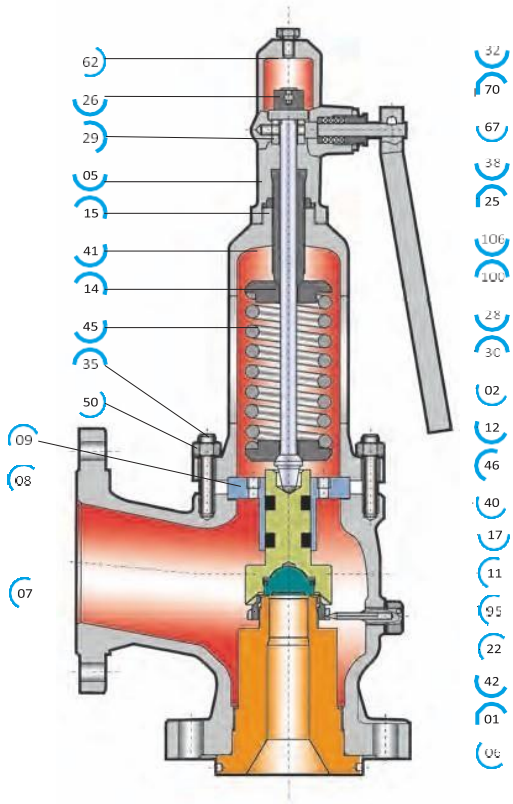
## Valves for steam application S5 with open bonnet or yoke

Standard materials

FLAMMER's 66 Series S5 has been specifically designed for steam process applications.

The main improved features compared to a standard API valve design are:

- Enlarged guide to guarantee improved gliding.
- Thermoglide rings to improve gliding and avoid seizing.
- Intrinsically balanced: allows up to 50% back-pressure within the outlet flange rating limits.



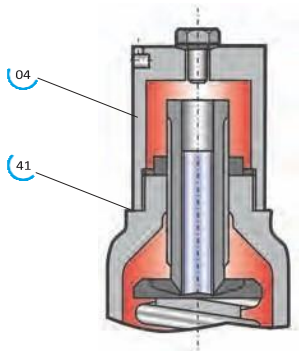

| Notes | Part N° | Part Name | S5 Standard Materials | |
|---|---|---|---|---|
| | | | Up to 427°C Material code 30 | From 427 to 538°C Material code 02 |
| | 01 | Body | SA 216 Gr WCC | SA 217 Gr WC6 |
| 1 | 02 | Yoke | SA 216 Gr WCC | SA 216 Gr WCC |
| | 05 | Cap | SA 216 Gr WCC | SA 216 Gr WCC |
| | 06 | Nozzle | SS 316 stellated | SS 316 stellated |
| | 07 | Adjusting ring | A 351 Gr CF3M | A 351 Gr CF3M |
| | 08 | Disc Holder Ring | Thermoglide™ | Thermoglide™ |
| | 09 | Guide | SS 431 | SS 431 |
| | 11 | Disc | SS 660 | SS 660 |
| | 12 | Spindle | SS 410 | SS 410 |
| | 14 | Adjusting screw | SS 410 | SS 410 |
| | 15 | Adjusting screw locknut | SS 316L | SS 316L |
| | 22 | Adjusting ring screw | SS 316L | SS 316L |
| | 25 | Fork Shaft | SS 316L | SS 316L |
| | 26 | Spindle Nut | SS 316L | SS 316L |
| | 28 | Lever Ring | SS 316L | SS 316L |
| | 29 | Lever Fork | SA 351 Gr. CF3M | SA 351 Gr. CF3M |
| | 30 | Lever | CARBON STEEL | CARBON STEEL |
| | 32 | Cap Plug | STAINLESS STEEL | STAINLESS STEEL |
| | 35 | Bonnet stud | A 193 Gr B7 | A 194 Gr B16 |
| | 40 | Body/bonnet gasket | SS | SS |
| | 41 | Bonnet/cap gasket | SS | SS |
| | 42 | Adjusting ring screw gasket | SS | SS |
| | 45 | Spring washers (upper & lower) | CARBON STEEL | CARBON STEEL |
| | 46 | Spring | ALLOY STEEL | ALLOY STEEL |
| | 50 | Nut | A 194 Gr 2H | A 194 Gr 2H |
| | 56 | Disc Holder | SS 316L | SS 316L |
| | 62 | Plug Gasket | STAINLESS STEEL | STAINLESS STEEL |
| | 67 | Lever Nut | SS 316L | SS 316L |
| | 95 | Retaining ring | SS | SS |

**Notes:**

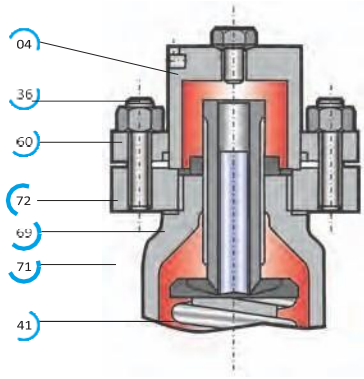
1. Open bonnet till P orifice - Yoke from Q orifice

## Cap Types

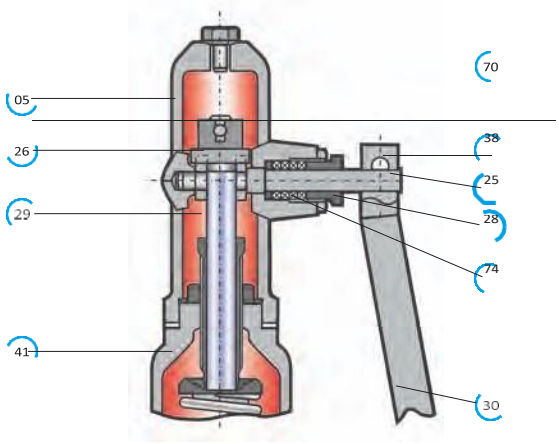
### Screwed cap (standard)



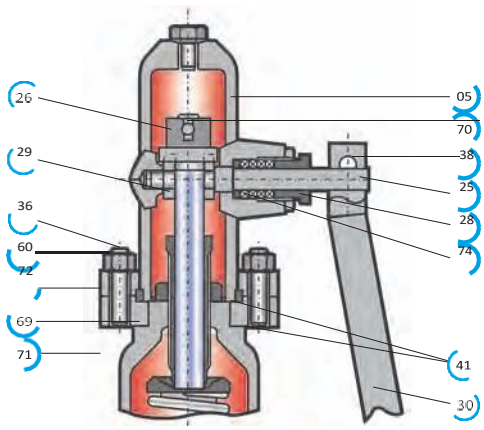

### Bolted cap




### Packed lever (standard)




### Bolted (and packed) lever




| Part N° | Part Name | Standard Materials (3) | SS Materials (3) |
|---|---|---|---|
| 04 | Cap (1) | CARBON STEEL | SS 316L |
| 05 | Cap with lever (2) | A 216 Gr WCC | A 351 Gr CF8M |
| 25 | Shaft | SS 316L | SS 316L |
| 26 | Stem nut | SS 316L | SS 316L |
| 28 | Packing press | SS 316L | SS 316L |
| 29 | Fork | A 351 Gr CF3M | A 351 Gr CF3M |
| 30 | Lever | CARBON STEEL | SS |
| 36 | Threaded rod | A 193 Gr B7 | A 193 Gr B8T |
| 38 | Key | CARBON STEEL | CARBON STEEL |
| 41 | Gasket | SS | SS |
| 60 | Nuts | A 194 Gr 2H | A 194 Gr 8 |
| 69 | Retainer ring | SS | SS |
| 70 | Pin | SS | SS |
| 71 | Lower flange | CARBON STEEL | SS 316L |
| 72 | Upper flange | CARBON STEEL | SS 316L |
| 74 | Packing | GRAPHITE | PTFE |

**Notes:**

(1) Possibility of spindle with threaded end to check set pressurein situ

(2) Exists in open version

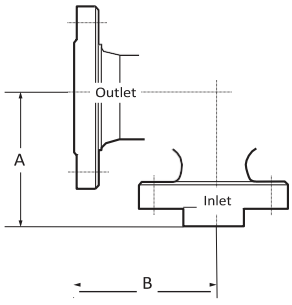
(3) Other materials available according to bill of materials

## Standard options

- Inlet and outlet flange: specify flange standard and surface finish if different from standard. ASME B16.5 flanges are identical to EN 1759 flanges.
- Test gag: optional (sometimes named transportation gag)
- Lifting device: FLAMMER'S 66 SERIES safety relief valves, with the exception of the P5 model (open bonnet for steam applications) as well as models P450 and P350 (closed bonnet, balanced bellows or not, for hot water applications) are normally supplied without lifting device.
  If the lifting device is necessary it has to be specified for example, to comply with ASME.
  Lifting devices may be plain or packed depending on the service requirements.
- Spring material: standard spring materials are those specified in the various bills of material. However, it is possible to specify other spring materials such as tungsten steel, stainless steel, Alloy X750, 17/4 PH etc.
- "STARSOFT" SOFT SEATED VALVE: all FLAMMER'S 66 SERIES safety relief valves can be supplied with a "STARSOFT" soft seat as an option. We strongly encourage the user to select the soft material which is suitable for the intended service. Please check the temperature and chemical compatibility.
  Without any other specification from the customer, Fluorocarbon will be selected as standard material.
- Bellows material different from AISI 316L (such as Alloy 400 or Alloy 625) can be specified.
- The valves can be steam tested. Any kind of size can be tested up to 85barg (for small sizes).

## Options and special accessories

- Inlet flange to customer's specification
- Outlet flange to customer's specification or outlet flange rating above class 150 liberating
- Remotely controlled lifting device
- Change in standard bills of material
- Accessories such as cooling spool, valve lift indicator, leak detector, steam jacket, etc.
  In case of special options or accessories specification, sufficient information should be supplied to the factory to avoid misunderstanding.

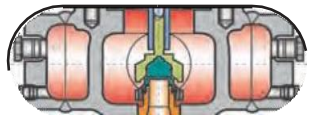



Nominal inlet diameter <4'' A and B ± 1.6 mm
Nominal outlet diameter >4'' A and B ± 3.2 mm

## Options and Accessories

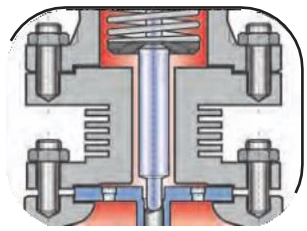
### Steam jacket

In order to avoid solidification of the fluid in certain process lines, FLAMMER'S 66 SERIES safety relief valves may be supplied with a steam jacket.



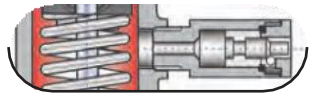
### Cooling spool

FLAMMER'S 66 SERIES safety relief valves can be supplied with a cooling spool so as to protect the spring from the fluid temperature.



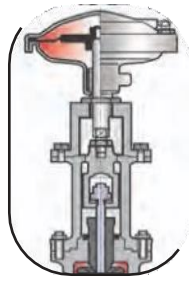
### Leak detector

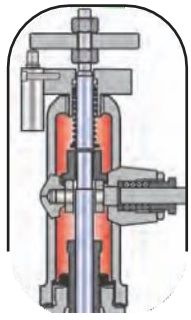
This device can be fitted to balanced bellows safety relief valves to indicate any damage or leakage of the bellows. An indicator switch can also be added to the leak detector.



### Remote Control Lifting Device

All FLAMMER'S 66 SERIES valves can be equipped with a remote-controlled pneumatic lifting device.





### Valve opening detector

Electrical switch or explosion proof device indicating valve opening.

## Orifice tables

### FLAMMER's 66 Series

| Orifice | D | E | F | G | H | J | K | L | M | N | P | Q | R | T | V | W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Actual in² | 0.134 | 0.273 | 0.373 | 0.589 | 0.881 | 1.457 | 2.097 | 3.284 | 4.093 | 4.987 | 7.215 | 12.91 | 17.81 | 28.87 | 46.75 | 70.10 |
| API in² | 0.11 | 0.196 | 0.307 | 0.503 | 0.785 | 1.287 | 1.838 | 2.853 | 3.6 | 4.34 | 6.38 | 11.05 | 16 | 26 | - | - |
| Actual cm² | 0.865 | 1.76 | 2.406 | 3.800 | 5.684 | 9.400 | 13.52 | 21.42 | 26.42 | 32.16 | 46.55 | 83.53 | 114.9 | 186.2 | 301.6 | 452.3 |
| API cm² | 0.71 | 1.26 | 1.98 | 3.24 | 5.06 | 8.30 | 11.86 | 18.41 | 23.2 | 28.0 | 41.2 | 71.2 | 103.2 | 167.8 | - | - |

## FLAMMER's 66 Series P Series

### Selection Tables How to use the selection tables

The correct FLAMMER'S 66 SERIES model number may be selected by using the following selection tables or the selection diagrams.

These tables and have been established according to API STD 526 last edition, whilst the diagrams have been established according to ASME B16.34 last edition.

There are selection tables and selection diagrams for each orifice size from D to T (API STD 526) +V and W (ASME B16.34).

When the valve orifice size has been selected according to the duty requirements as well as the applicable sizing formula or capacity table (see the sizing section in our technical information catalogue), select the applicable selection table or diagram.

In the applicable selection table or diagram, for the specified service temperature, select the valve in accordance with the required set pressure. Selection diagrams should be used for interpolations.

The table or diagram then specifies the 5 first digits of the FLAMMER'S 66 SERIES coding system. The table also shows the 3 following digits which refer to the service conditions (conventional-balanced bellows steam), as well as the inlet and outlet sizes and ratings, the maximum allowable back pressure and the body and spring materials.

Refer to the table of dimensions for geometric data and weight.

**Example:**

What is the model number for a 'D' orifice, set at 40 barg and 135°C?

- Go to the 'D' orifice selection chart and find the location of the intersection 135°C - 40 barg
- Read the model number: P12D2330 (conventional), 1" x D x 2" rating 300 lbs.,inlet 1" - 300 lbs., outlet 2" - 150 lbs., A = 104.8 mm, B = 114.3 mm, weight: 18 kg.

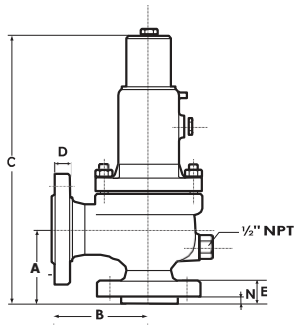
**Notes:**

These tables and diagrams have been issued according to API STD 526 and ASME B16.34. Therefore, they do not take into consideration such parameters as corrosion and special service requirements. This data should be considered when selecting a model number. Refer to the section of this catalogue dealing with the different bills of material.

## ORIFICE: D
**0.71 cm²**
**0.11 in²**

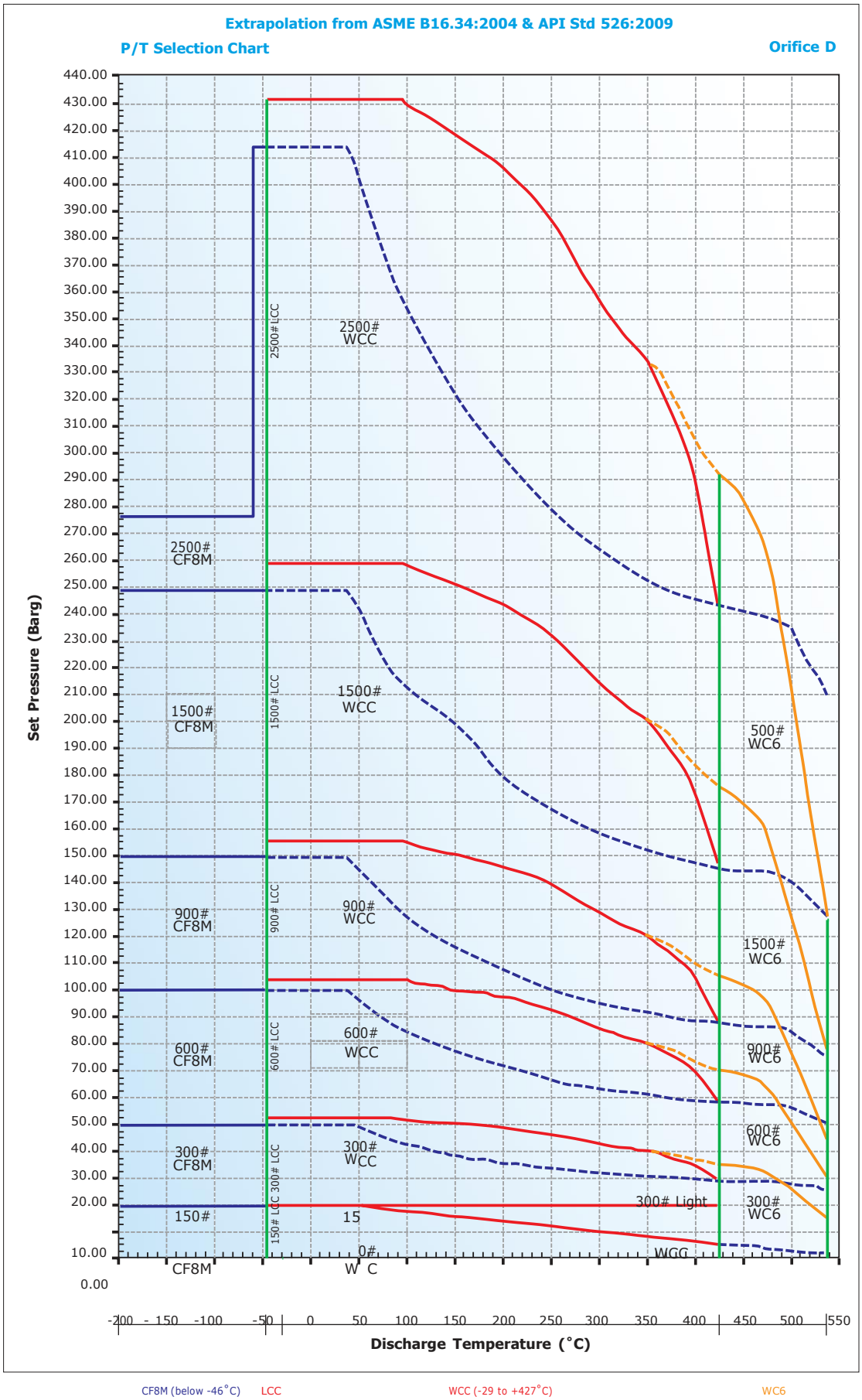
## FLAMMER's 66 Series Selection Table
According to API Std 526: (edition 2009)

| Inlet Orifice OUTLET | ANSI FLANGE RATING Inlet | Outlet | Model Number | Conven-tonal | Bellows | Steam service | MAX. SET PRESSURE barg (psig) -268°C to -47°C (-450°F to -51°F) | -46°C to -29°C (-50°F to -21°F) | -29°C to +38°C (-20°F to 100°F) | <232°C (<450°F) | <427°C (<800°F) | <538°C (<1000°F) | MAX. BACK PRESSURE (1) barg (psig) Conven-tonal | Bellows | MATERIALS Body | Spring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 D 2 | 150 | 150 | P12D1 | 330 | 430 | 530 | | | 19.8 (285) | 13 (185) | 5.5 (80) | | 19.8 (285) | 16 (230) | SA 216 Gr. WCC | Alloy Steel |
| 1 D 2 | 300 | 150 | P12D7 | 330 | 430 | 530 | | | 19.8 (285) | 19.8 (285) | 19.8 (285) | | 19.8 (285) | 16 (230) | | |
| 1 D 2 | 300 | 150 | P12D2 | 330 | 430 | 530 | | | 51 (740) | 42.4 (615) | 29 (410) | | 19.8 (285) | 16 (230) | | |
| 1 D 2 | 600 | 150 | P12D3 | 330 | 430 | 530 | | | 102 (1480) | 85 (1235) | 58 (825) | | 19.8 (285) | 16 (230) | | |
| 1½ D 2 | 900 | 300 | P72D4 | 330 | 430 | 530 | | | 153 (2220) | 128 (1845) | 86 (1235) | | 41 (600) | 35 (500) | | |
| 1½ D 2 | 1500 | 300 | P72D5 | 330 | 430 | 530 | | | 255 (3705) | 213 (3080) | 144 (2060) | | 41 (600) | 35 (500) | | |
| 1½ D 3 (4) | 2500 | 300 | P73D6 | 330 | 430 | 530 | | | 414 (6000) | 414 (6000) | 240 (3430) | | 51 (740) | 35 (500) | | |
| 1 D 2 | 300 | 150 | P12D2 | 332 | 432 | 502 | | | | | 35 (510) | 16 (225) | 19.8 (285) | 16 (230) | SA 216 Gr. WC6 | High Temp. Alloy Steel |
| 1 D 2 | 600 | 150 | P12D3 | 332 | 432 | 502 | | | | | 70 (1015) | 32 (445) | 19.8 (285) | 16 (230) | | |
| 1½ D 2 | 900 | 300 | P72D4 | 332 | 432 | 502 | | | | | 105 (1525) | 46 (670) | 41 (600) | 35 (500) | | |
| 1½ D 2 | 1500 | 300 | P72D5 | 332 | 432 | 502 | | | | | 176 (2540) | 79 (1115) | 41 (600) | 35 (500) | | |
| 1½ D 3 (4) | 2500 | 300 | P73D6 | 332 | 432 | 502 | | | | | 293 (4230) | 128 (1860) | 51 (740) | 35 (500) | | |
| 1 D 2 | 150 | 150 | P12D1 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 16 (230) | SA 352 Gr. LCC | Alloy Steel |
| 1 D 2 | 300 | 150 | P12D7 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 16 (230) | | |
| 1 D 2 | 300 | 150 | P12D2 | 319 | 419 | | | 51 (740) | | | | | 19.8 (285) | 16 (230) | | |
| 1 D 2 | 600 | 150 | P12D3 | 319 | 419 | | | 102 (1480) | | | | | 19.8 (285) | 16 (230) | | |
| 1½ D 2 | 900 | 300 | P72D4 | 319 | 419 | | | 153 (2220) | | | | | 41 (600) | 35 (500) | | |
| 1½ D 2 | 1500 | 300 | P72D5 | 319 | 419 | | | 255 (3705) | | | | | 41 (600) | 35 (500) | | |
| 1½ D 3 (4) | 2500 | 300 | P73D6 | 319 | 419 | | | 414 (6000) | | | | | 51 (740) | 35 (500) | | |
| 1 D 2 | 150 | 150 | P12D1 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 16 (230) | SA 351 Gr. CF8M | Stainless Steel |
| 1 D 2 | 300 | 150 | P12D7 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 16 (230) | | |
| 1 D 2 | 300 | 150 | P12D2 | 316 | 416 | | 50 (720) | | | | | | 19 (275) | 16 (230) | | |
| 1 D 2 | 600 | 150 | P12D3 | 316 | 416 | | 99 (1440) | | | | | | 19 (275) | 16 (230) | | |
| 1½ D 2 | 900 | 300 | P72D4 | 316 | 416 | | 149 (2160) | | | | | | 41 (600) | 35 (500) | | |
| 1½ D 2 | 1500 | 300 | P72D5 | 316 | 416 | | 248 (3600) | | | | | | 41 (600) | 35 (500) | | |
| 1½ D 3 (4) | 2500 | 300 | P73D6 | 316 | 416 | | 276 (4000) | | | | | | 50 (720) | 35 (500) | | |




| Inlet Orifice OUTLET | ANSI FLANGE RATING Inlet | Outlet | MODEL NUMBER | A (2) mm (in) | B (2) mm (in) | C mm (in) | D mm (in) | E mm (in) | N mm (in) | Approximate weight (3) kg (lbs.) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 D 2 | 150 | 150 | P12D1 | 104.8 (4-⅛) | 114.3 (4-½) | 375 (15) | 19.1 (¾) | 31 (1-¼) | 12 (½) | 18 (40) |
| 1 D 2 | 300 | 150 | P12D7 | 104.8 (4-⅛) | 114.3 (4-½) | 375 (15) | 19.1 (¾) | 31 (1-¼) | 12 (½) | 18 (40) |
| 1 D 2 | 300 | 150 | P12D2 | 104.8 (4-⅛) | 114.3 (4-½) | 375 (15) | 19.1 (¾) | 31 (1-¼) | 12 (½) | 18 (40) |
| 1 D 2 | 600 | 150 | P12D3 | 104.8 (4-⅛) | 114.3 (4-½) | 375 (15) | 19.1 (¾) | 31 (1-¼) | 12 (½) | 19 (42) |
| 1½ D 2 | 900 | 300 | P72D4 | 104.8 (4-⅛) | 139.7 (5-½) | 480 (19) | 22.4 (⅞) | 46 (1-$^{13}$⁄$_{16}$) | 13 (½) | 35 (77) |
| 1½ D 2 | 1500 | 300 | P72D5 | 104.8 (4-⅛) | 139.7 (5-½) | 480 (19) | 22.4 (⅞) | 46 (1-$^{13}$⁄$_{16}$) | 13 (½) | 36 (79) |
| 1½ D 3(4) | 2500 | 300 | P73D6 | 139.7 (5-½) | 177.8 (7) | 505 (20) | 28.4 (1⅛) | 59 (2-$^{5}$⁄$_{16}$) | 13 (½) | 45 (99) |

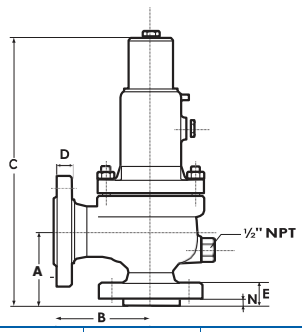
(1) Max. back pressure limits at 38°C; for higher temp. refer to ASME B16.5 flange ratings for conventional valves
(2) Tolerances for A and B: ± 1.6 mm (±$^{1}$⁄$_{16}$ in)
(3) Valves with lifting lever: add 10%
(4) 2½" outlet flange on request in conformity with API Std 526 ed.84, model becomes P75D6


Extrapolation from ASME B16.34:2004 & API Std 526:2009
P/T Selection Chart
Orifice D
Set Pressure (Barg)
440.00
430.00
420.00
410.00
400.00
390.00
380.00
370.00
360.00
350.00
340.00
330.00
320.00
310.00
300.00
290.00
280.00
270.00
260.00
250.00
240.00
230.00
220.00
210.00
200.00
190.00
180.00
170.00
160.00
150.00
140.00
130.00
120.00
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
2500# WCC
2500# LCC
2500# CF8M
1500# WCC
1500# LCC
1500# CF8M
500# WC6
900# WCC
900# LCC
900# CF8M
1500# WC6
600# WCC
600# LCC
600# CF8M
900# WC6
300# WCC
300# LCC
300# CF8M
600# WC6
150# LCC
150#
15
300# Light
300# WC6
0#
WGG
CF8M
W C
-200 -150 -100 -50 0 50 100 150 200 250 300 350 400 450 500 550
Discharge Temperature (˚C)
CF8M (below -46˚C)
LCC
WCC (-29 to +427˚C)
WC6

## ORIFICE: E
**1.26 cm²**
**0.196 in²**

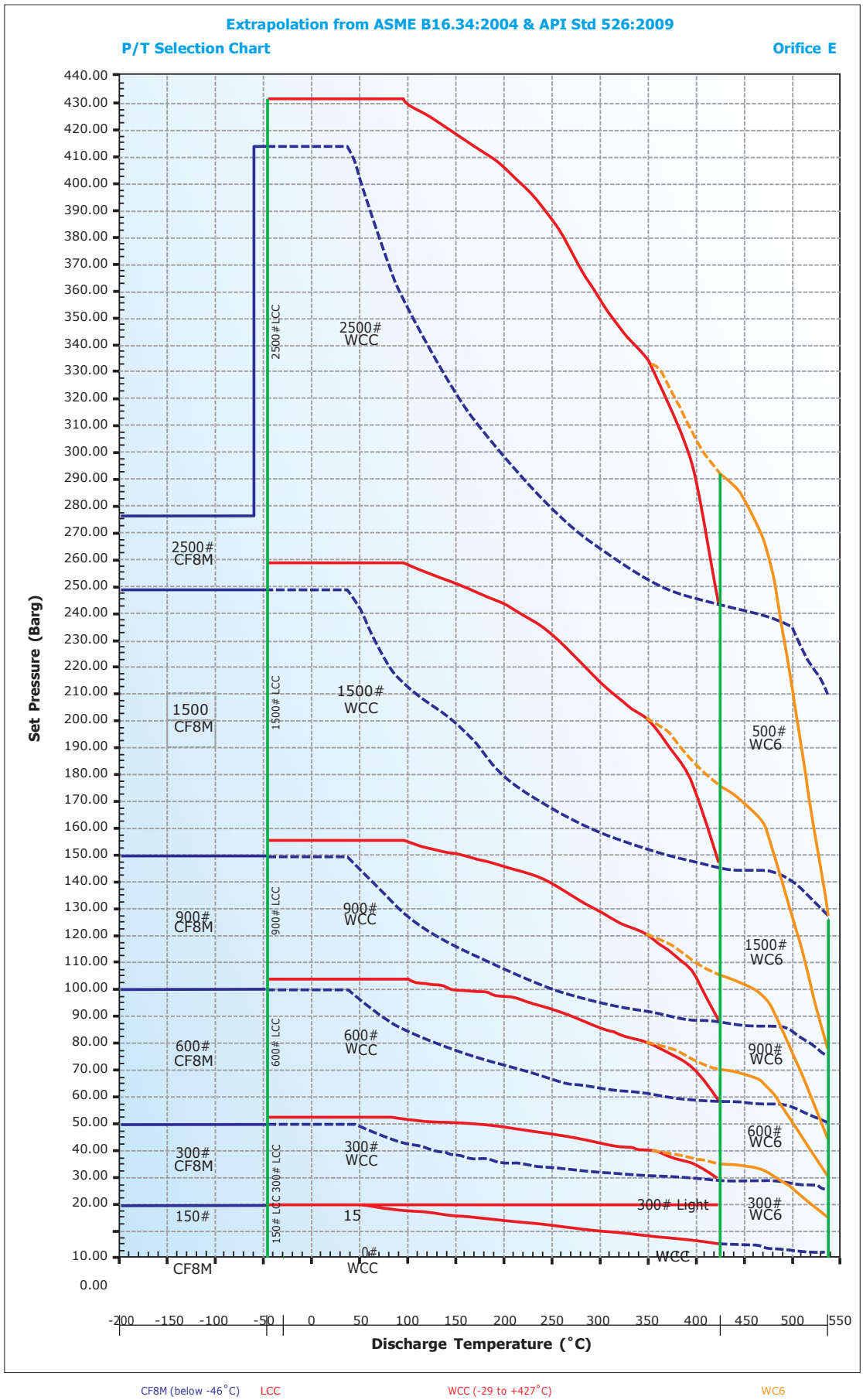
## FLAMMER's 66 Series Selection Table
According to API Std 526: (edition 2009)

| Inlet Orifice OUTLET | ANSI FLANGE RATING Inlet | Outlet | Model Number | Conventional | Bellows | Steam service | MAX. SET PRESSURE barg (psig) -268°C to -47°C (-450°F to -51°F) | -46°C to -29°C (-50°F to -21°F) | -29°C to +38°C (-20°F to 100°F) | <232°C (<450°F) | <427°C (<800°F) | <538°C (<1000°F) | MAX. BACK PRESSURE (1) barg (psig) Conventional | Bellows | MATERIALS Body | Spring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 E 2 | 150 | 150 | P12E1 | 330 | 430 | 530 | | | 19.8 (285) | 13 (185) | 5.5 (80) | | 19.8 (285) | 16 (230) | | |
| 1 E 2 | 300 | 150 | P12E7 | 330 | 430 | 530 | | | 19.8 (285) | 19.8 (285) | 19.8 (285) | | 19.8 (285) | 16 (230) | | |
| 1 E 2 | 300 | 150 | P12E2 | 330 | 430 | 530 | | | 51 (740) | 42.4 (615) | 29 (410) | | 19.8 (285) | 16 (230) | | |
| 1 E 2 | 600 | 150 | P12E3 | 330 | 430 | 530 | | | 102 (1480) | 85 (1235) | 58 (825) | | 19.8 (285) | 16 (230) | SA 216 Gr. WC C | Alloy Steel |
| 1½ E 2 | 900 | 300 | P72E4 | 330 | 430 | 530 | | | 153 (2220) | 128 (1845) | 86 (1235) | | 41 (600) | 35 (500) | | |
| 1½ E 2 | 1500 | 300 | P72E5 | 330 | 430 | 530 | | | 255 (3705) | 213 (3080) | 144 (2060) | | 41 (600) | 35 (500) | | |
| 1½ E 3 (4) | 2500 | 300 | P73E6 | 330 | 430 | 530 | | | 414 (6000) | 414 (6000) | 240 (3430) | | 51 (740) | 35 (500) | | |
| 1 E 2 | 300 | 150 | P12E2 | 332 | 432 | 502 | | | | | 35 (510) | 16 (225) | 19.8 (285) | 16 (230) | | |
| 1 E 2 | 600 | 150 | P12E3 | 332 | 432 | 502 | | | | | 70 (1015) | 32 (445) | 19.8 (285) | 16 (230) | SA 216 Gr. WC 6 | High Temp. Alloy Steel |
| 1½ E 2 | 900 | 300 | P72E4 | 332 | 432 | 502 | | | | | 105 (1525) | 46 (670) | 41 (600) | 35 (500) | | |
| 1½ E 2 | 1500 | 300 | P72E5 | 332 | 432 | 502 | | | | | 176 (2540) | 79 (1115) | 41 (600) | 35 (500) | | |
| 1½ E 3 (4) | 2500 | 300 | P73E6 | 332 | 432 | 502 | | | | | 293 (4230) | 128 (1860) | 51 (740) | 35 (500) | | |
| 1 E 2 | 150 | 150 | P12E1 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 16 (230) | | |
| 1 E 2 | 300 | 150 | P12E7 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 16 (230) | | |
| 1 E 2 | 300 | 150 | P12E2 | 319 | 419 | | | 51 (740) | | | | | 19.8 (285) | 16 (230) | | |
| 1 E 2 | 600 | 150 | P12E3 | 319 | 419 | | | 102 (1480) | | | | | 19.8 (285) | 16 (230) | SA 35 2 Gr. LC C | Alloy Steel |
| 1½ E 2 | 900 | 300 | P72E4 | 319 | 419 | | | 153 (2220) | | | | | 41 (600) | 35 (500) | | |
| 1½ E 2 | 1500 | 300 | P72E5 | 319 | 419 | | | 255 (3705) | | | | | 41 (600) | 35 (500) | | |
| 1½ E 3 (4) | 2500 | 300 | P73E6 | 319 | 419 | | | 414 (6000) | | | | | 51 (740) | 35 (500) | | |
| E 2 | 150 | 150 | P12E1 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 16 (230) | | |
| 1 E 2 | 300 | 150 | P12E7 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 16 (230) | | |
| 1 E 2 | 300 | 150 | P12E2 | 316 | 416 | | 50 (720) | | | | | | 19 (275) | 16 (230) | | |
| 1 E 2 | 600 | 150 | P12E3 | 316 | 416 | | 99 (1440) | | | | | | 19 (275) | 16 (230) | SA 351 Gr. CF8 M | Stainless Steel |
| 1½ E 2 | 900 | 300 | P72E4 | 316 | 416 | | 149 (2160) | | | | | | 41 (600) | 35 (500) | | |
| 1½ E 2 | 1500 | 300 | P72E5 | 316 | 416 | | 248 (3600) | | | | | | 41 (600) | 35 (500) | | |
| 1½ E 3 (4) | 2500 | 300 | P73E6 | 316 | 416 | | 276 (4000) | | | | | | 50 (720) | 35 (500) | | |




| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | MODEL NUMBER | A (2) mm (in) | B (2) mm (in) | C mm (in) | D mm (in) | E mm(in) | N mm (in) | Approximateweight (3) kg (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1E2 | 150 | 150 | P12E1 | 104.8 (4-⅛) | 114.3 (4-½) | 375 (15) | 19.1 (¾) | 31 (1-¼) | 12 (½) | 18 (40) |
| 1E2 | 300 | 150 | P12E7 | 104.8 (4-⅛) | 114.3 (4-½) | 375 (15) | 19.1 (¾) | 31 (1-¼) | 12 (½) | 18 (40) |
| 1E2 | 300 | 150 | P12E2 | 104.8 (4-⅛) | 114.3 (4-½) | 375 (15) | 19.1 (¾) | 31 (1-¼) | 12 (½) | 18 (40) |
| 1E2 | 600 | 150 | P72E3 | 104.8 (4-⅛) | 114.3 (4-½) | 375 (15) | 19.1 (¾) | 31 (1-¼) | 12 (½) | 19 (42) |
| 1½E 2 | 900 | 300 | P72E4 | 104.8 (4-⅛) | 139.7 (5-½) | 480 (19) | 22.4 (⅞) | 46 (1-$^{13}$⁄$_{16}$) | 13 (½) | 35 (77) |
| 1½E 2 | 1500 | 300 | P72E5 | 104.8 (4-⅛) | 139.7 (5-½) | 480 (19) | 22.4 (⅞) | 46 (1-$^{13}$⁄$_{16}$) | 13 (½) | 36 (79) |
| 1½E 3(4) | 2500 | 300 | P73E6 | 139.7 (5-½) | 177.8 (7) | 505 (20) | 28.4 (1-½) | 59 (2-$^{5}$⁄$_{16}$) | 13 (½) | 45 (99) |

(1) Max. back pressure limits at 38°C; for higher temp. refer to ASME B16.5 flange ratings for conventional valves
(2) Tolerances for A and B: ± 1.6 mm (±1⁄16 in)
(3) Valves with lifting lever: add 10%
(4) 2½" outlet flange on request in conformity with API Std 526 ed. 84, model becomes P75E6

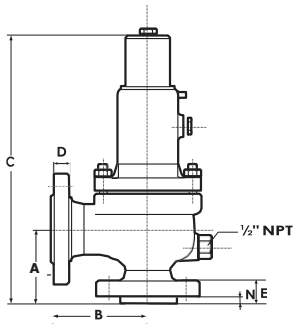

Extrapolation from ASME B16.34:2004 & API Std 526:2009
P/T Selection Chart
Orifice E
Set Pressure (Barg)
Discharge Temperature (˚C)
2500# WCC
2500# CF8M
1500# WCC
1500 CF8M
900# WCC
900# CF8M
600# WCC
600# CF8M
300# WCC
300# CF8M
150#
15
0#
WCC
CF8M
300# Light
500# WC6
1500# WC6
900# WC6
600# WC6
300# WC6
2500# LCC
1500# LCC
900# LCC
600# LCC
300# LCC
150# LCC
CF8M (below -46˚C)
LCC
WCC (-29 to +427˚C)
WC6

**ORIFICE: F**
**1.98 cm²**
**0.307 in²**

## FLAMMER's 66 Series Selection Table

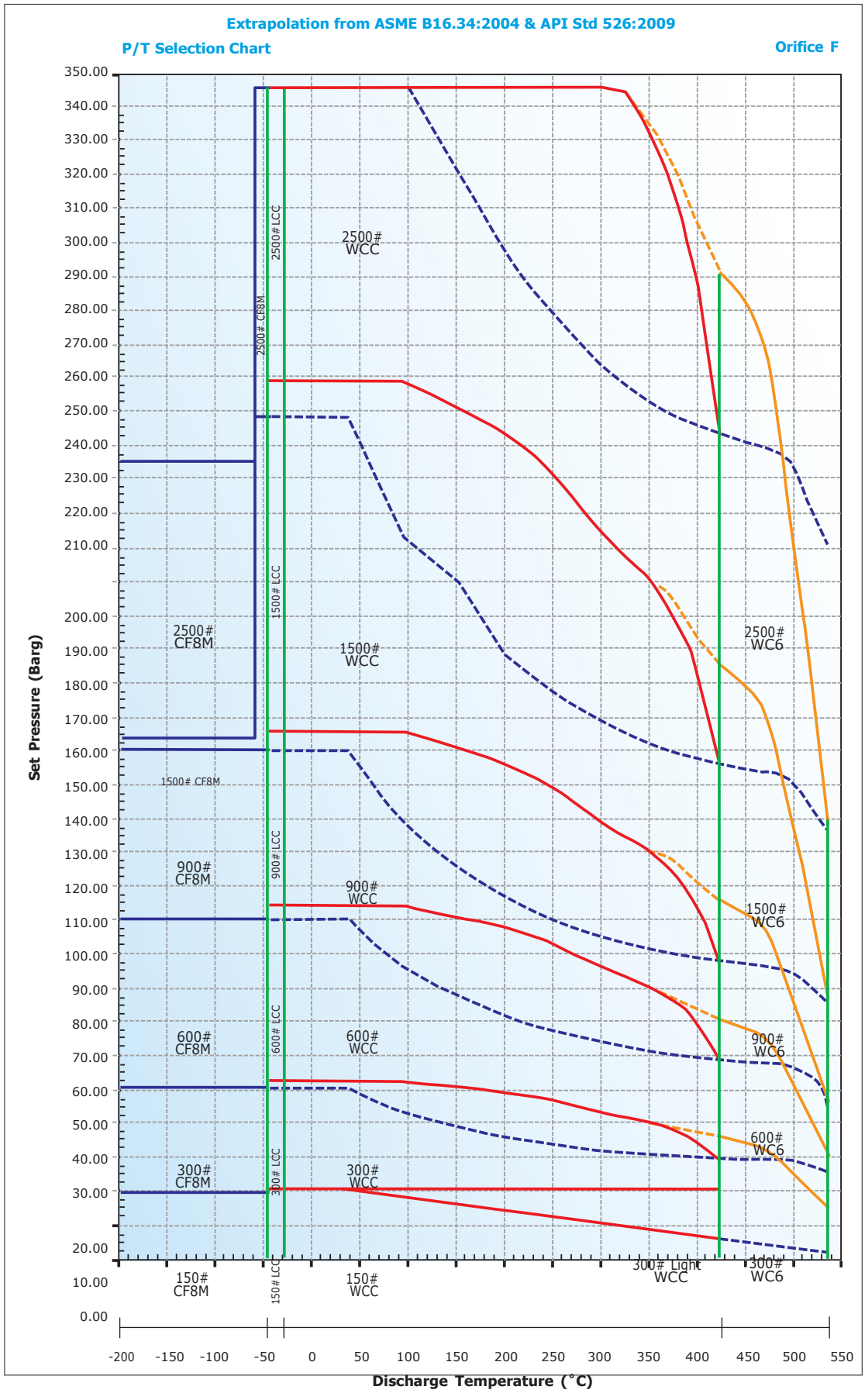
According to API Std 526: (edition 2009)

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | Model Number | Conven-tional | Bellows | Steam service | MAX. SET PRESSURE barg (psig) -268°C to -47°C (-450°F to -51°F) | -46°C to -29°C (-50°F to -21°F) | -29°C to +38°C (-20°F to 100°F) | <232°C (<450°F) | <427°C (<800°F) | <538°C (<1000°F) | MAX. BACK PRESSURE (1) barg (psig) Conven-tional | Bellows | MATERIALS Body | Spring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1½ F 2 | 150 | 150 | P72F1 | 330 | 430 | 530 | | | 19.8 (285) | 13 (185) | 5.5 (80) | | 19.8 (285) | 16 (230) | SA 216 Gr. WCC | Alloy Steel |
| 1½ F 2 | 300 | 150 | P72F7 | 330 | 430 | 530 | | | 19.8 (285) | 19.8 (285) | 19.8 (285) | | 19.8 (285) | 16 (230) | | |
| 1½ F 2 | 300 | 150 | P72F2 | 330 | 430 | 530 | | | 51 (740) | 42.4 (615) | 29 (410) | | 19.8 (285) | 16 (230) | | |
| 1½ F 2 | 600 | 150 | P72F3 | 330 | 430 | 530 | | | 102 (1440) | 85 (1235) | 58 (825) | | 19.8 (285) | 16 (230) | | |
| 1½ F 3 (4) | 900 | 300 | P73F4 | 330 | 430 | 530 | | | 153 (2220) | 128 (1845) | 85 (1235) | | 51 (740) | 34 (500) | | |
| 1½ F 3 (4) | 1500 | 300 | P73F5 | 330 | 430 | 530 | | | 255 (3705) | 213 (3080) | 144 (2060) | | 51 (740) | 34 (500) | | |
| 1½ F 3 (4) | 2500 | 300 | P73F6 | 330 | 430 | 530 | | | 345 (5000) | 345 (5000) | 240 (3430) | | 51 (740) | 34 (500) | | |
| 1½ F 2 | 300 | 150 | P72F2 | 332 | 432 | 502 | | | | | 35 (510) | 15 (225) | 19.8 (285) | 16 (230) | SA 216 Gr. WC6 | High Temp. Alloy Steel |
| 1½ F 2 | 600 | 150 | P72F3 | 332 | 432 | 502 | | | | | 70 (1015) | 31 (445) | 19.8 (285) | 16 (230) | | |
| 1½ F 3 (4) | 900 | 300 | P73F4 | 332 | 432 | 502 | | | | | 105 (1525) | 46 (670) | 51 (740) | 34 (500) | | |
| 1½ F 3 (4) | 1500 | 300 | P73F5 | 332 | 432 | 502 | | | | | 175 (2540) | 77 (1115) | 51 (740) | 34 (500) | | |
| 1½ F 3 (4) | 2500 | 300 | P73F6 | 332 | 432 | 502 | | | | | 292 (4230) | 128 (1860) | 51 (740) | 34 (500) | | |
| 1½ F 2 | 150 | 150 | P72F1 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 16 (230) | SA 352 Gr. LCC | Alloy Steel |
| 1½ F 2 | 300 | 150 | P72F7 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 16 (230) | | |
| 1½ F 2 | 300 | 150 | P72F2 | 319 | 419 | | | 51 (740) | | | | | 19.8 (285) | 16 (230) | | |
| 1½ F 2 | 600 | 150 | P72F3 | 319 | 419 | | | 102 (1440) | | | | | 19.8 (285) | 16 (230) | | |
| 1½ F 3 (4) | 900 | 300 | P73F4 | 319 | 419 | | | 153 (2220) | | | | | 51 (740) | 34 (500) | | |
| 1½ F 3 (4) | 1500 | 300 | P73F5 | 319 | 419 | | | 255 (3705) | | | | | 51 (740) | 34 (500) | | |
| 1½ F 3 (4) | 2500 | 300 | P73F6 | 319 | 419 | | | 345 (5000) | | | | | 51 (740) | 34 (500) | | |
| 1½ F 2 | 150 | 150 | P72F1 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 16 (230) | SA 351 Gr. CF8M | Stainless Steel |
| 1½ F 2 | 300 | 150 | P72F7 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 16 (230) | | |
| 1½ F 2 | 300 | 150 | P72F2 | 316 | 416 | | 50 (720) | | | | | | 19 (275) | 16 (230) | | |
| 1½ F 2 | 600 | 150 | P72F3 | 316 | 416 | | 99 (1440) | | | | | | 19 (275) | 16 (230) | | |
| 1½ F 3 (4) | 900 | 300 | P73F4 | 316 | 416 | | 149 (2160) | | | | | | 50 (720) | 34 (500) | | |
| 1½ F 3 (4) | 1500 | 300 | P73F5 | 316 | 416 | | 152 (2200) | | | | | | 50 (720) | 34 (500) | | |
| 1½ F 3 (4) | 2500 | 300 | P73F6 | 316 | 416 | | 234 (3400) | | | | | | 50 (720) | 34 (500) | | |




| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | MODEL NUMBER | A(2) mm (in) | B(2) mm (in) | C mm (in) | D mm (in) | E mm (in) | N mm (in) | Approximate weight (3) kg (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1½ F 2 | 150 | 150 | P72F1 | 123.8 (4-⅞) | 120.7 (4-¾) | 455 (18) | 19.1 (¾) | 34 (1-5/16) | 12 (½) | 25 (55) |
| 1½ F 2 | 300 | 150 | P72F7 | 123.8 (4-⅞) | 120.7 (4-¾) | 455 (18) | 19.1 (¾) | 36 (1-⅜) | 12 (½) | 27 (60) |
| 1½ F 2 | 300 | 150 | P72F2 | 123.8 (4-⅞) | 152.4 (6) | 455 (18) | 19.1 (¾) | 36 (1-⅜) | 12 (½) | 27 (60) |
| 1½ F 2 | 600 | 150 | P72F3 | 123.8 (4-⅞) | 152.4 (6) | 455 (18) | 19.1 (¾) | 36 (1-⅜) | 12 (½) | 31 (68) |
| 1½ F 3 (4) | 900 | 300 | P73F4 | 123.8 (4-⅞) | 165.1 (6-½) | 505 (20) | 28.4 (1-⅛) | 46 (1-13/16) | 13 (½) | 44 (97) |
| 1½ F 3 (4) | 1500 | 300 | P73F5 | 123.8 (4-⅞) | 165.1 (6-½) | 505 (20) | 28.4 (1-⅛) | 46 (1-13/16) | 13 (½) | 44 (97) |
| 1½ F 3 (4) | 2500 | 300 | P73F6 | 139.7 (5-½) | 177.8 (7) | 505 (20) | 28.4 (1-⅛) | 59 (2-5/16) | 13 (½) | 48 (108) |

(1) Max. back pressure limits at 38°C; for higher temp. refer to ASME B16.5 flange ratings for conventional valves
(2) Tolerances for A and B: ± 1.6 mm (±1/16 in)
(3) Valves with lifting lever: add 10%
(4) 2½'' outlet flange on request in conformity with API Std 526 ed. 84, model becomes P75F

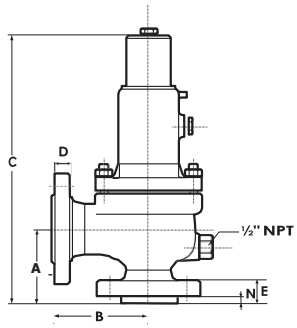

Extrapolation from ASME B16.34:2004 & API Std 526:2009
P/T Selection Chart
Orifice F
Set Pressure (Barg)
Discharge Temperature (°C)
2500# WCC
2500# LCC
2500# CF8M
1500# WCC
1500# LCC
2500# CF8M
2500# WC6
1500# CF8M
900# CF8M
900# WCC
900# LCC
1500# WC6
600# CF8M
600# WCC
600# LCC
900# WC6
300# CF8M
300# WCC
300# LCC
600# WC6
150# CF8M
150# WCC
150# LCC
300# Light WCC
300# WC6

**ORIFICE : G**
**3.24 cm²**
**0.503 in²**

## FLAMMER's 66 Series Selection Table

According to API Std 526 : (edition 2009)

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | Model Number | Conventional | Bellows | Steam service | MAX. SET PRESSURE barg (psig) -268°C to -47°C (-450°F to -51°F) | -46°C to -29°C (-50°F to -21°F) | -29°C to +38°C (-20°F to 100°F) | <232°C (<450°F) | <427°C (<800°F) | <538°C (<1000°F) | MAX. BACK PRESSURE (1) barg (psig) Conventional | Bellows | MATERIALS Body | Spring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1½ G 3 (4) | 150 | 150 | P73G1 | 330 | 430 | 530 | | | 19.8 (285) | 13 (185) | 5.5 (80) | | 19.8 (285) | 16 (230) | | |
| 1½ G 3 (4) | 300 | 150 | P73G7 | 330 | 430 | 530 | | | 19.8 (285) | 19.8 (285) | 19.8 (285) | | 19.8 (285) | 16 (230) | | |
| 1½ G 3 (4) | 300 | 150 | P73G2 | 330 | 430 | 530 | | | 51 (745) | 42.4 (615) | 29 (410) | | 19.8 (285) | 16 (230) | | |
| 1½ G 3 (4) | 600 | 150 | P73G3 | 330 | 430 | 530 | | | 102 (1440) | 85 (1235) | 58 (825) | | 19.8 (285) | 16 (230) | SA 216 | Alloy |
| 1½ G 3 (4) | 900 | 300 | P73G4 | 330 | 430 | 530 | | | 153 (2220) | 127 (1845) | 85 (1235) | | 51 (740) | 32 (470) | Gr. WCC | Steel |
| 2 G 3 | 1500 | 300 | P23G5 | 330 | 430 | 530 | | | 255 (3705) | 212 (3080) | 144 (2060) | | 51 (740) | 32 (470) | | |
| 2 G 3 | 2500 | 300 | P23G6 | 330 | 430 | 530 | | | 255 (3705) | 255 (3705) | 240 (3430) | | 51 (740) | 32 (470) | | |
| 1½ G 3 (4) | 300 | 150 | P73G2 | 332 | 432 | 502 | | | | | 35 (510) | 15 (225) | 19.8 (285) | 16 (230) | | |
| 1½ G 3 (4) | 600 | 150 | P73G3 | 332 | 432 | 502 | | | | | 70 (1015) | 31 (445) | 19.8 (285) | 16 (230) | SA 216 | High Temp. |
| 1½ G 3 (4) | 900 | 300 | P73G4 | 332 | 432 | 502 | | | | | 105 (1525) | 46 (670) | 51 (740) | 34 (500) | Gr. WC6 | Alloy |
| 2 G 3 | 1500 | 300 | P23G5 | 332 | 432 | 502 | | | | | 175 (2540) | 77 (1115) | 51 (740) | 34 (500) | | Steel |
| 2 G 3 | 2500 | 300 | P23G6 | 332 | 432 | 502 | | | | | 255 (3705) | 128 (1860) | 51 (740) | 34 (500) | | |
| 1½ G 3 (4) | 150 | 150 | P73G1 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 16 (230) | | |
| 1½ G 3 (4) | 300 | 150 | P73G7 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 16 (230) | | |
| 1½ G 3 (4) | 300 | 150 | P73G2 | 319 | 419 | | | 51 (745) | | | | | 19.8 (285) | 16 (230) | | |
| 1½ G 3 (4) | 600 | 150 | P73G3 | 319 | 419 | | | 102 (1440) | | | | | 19.8 (285) | 16 (230) | SA 352 | Alloy |
| 1½ G 3 (4) | 900 | 300 | P73G4 | 319 | 419 | | | 153 (2220) | | | | | 51 (740) | 32 (470) | Gr. LCC | Steel |
| 2 G 3 | 1500 | 300 | P23G5 | 319 | 419 | | | 255 (3705) | | | | | 51 (740) | 32 (470) | | |
| 2 G 3 | 2500 | 300 | P23G6 | 319 | 419 | | | 255 (3705) | | | | | 51 (740) | 32 (470) | | |
| 1½ G 3 (4) | 150 | 150 | P73G1 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 16 (230) | | |
| 1½ G 3 (4) | 300 | 150 | P73G7 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 16 (230) | | |
| 1½ G 3 (4) | 300 | 150 | P73G2 | 316 | 416 | | 50 (720) | | | | | | 19 (275) | 16 (230) | | |
| 1½ G 3 (4) | 600 | 150 | P73G3 | 316 | 416 | | 99 (1440) | | | | | | 19 (275) | 16 (230) | SA 351 | Stainless |
| 1½ G 3 (4) | 900 | 300 | P73G4 | 316 | 416 | | 110 (1600) | | | | | | 50 (720) | 34 (500) | Gr. CF8M | Steel |
| 2 G 3 | 1500 | 300 | P23G5 | 316 | 416 | | 169 (2450) | | | | | | 50 (720) | 34 (500) | | |
| 2 G 3 | 2500 | 300 | P23G6 | 316 | 416 | | 179 (2600) | | | | | | 50 (720) | 34 (500) | | |



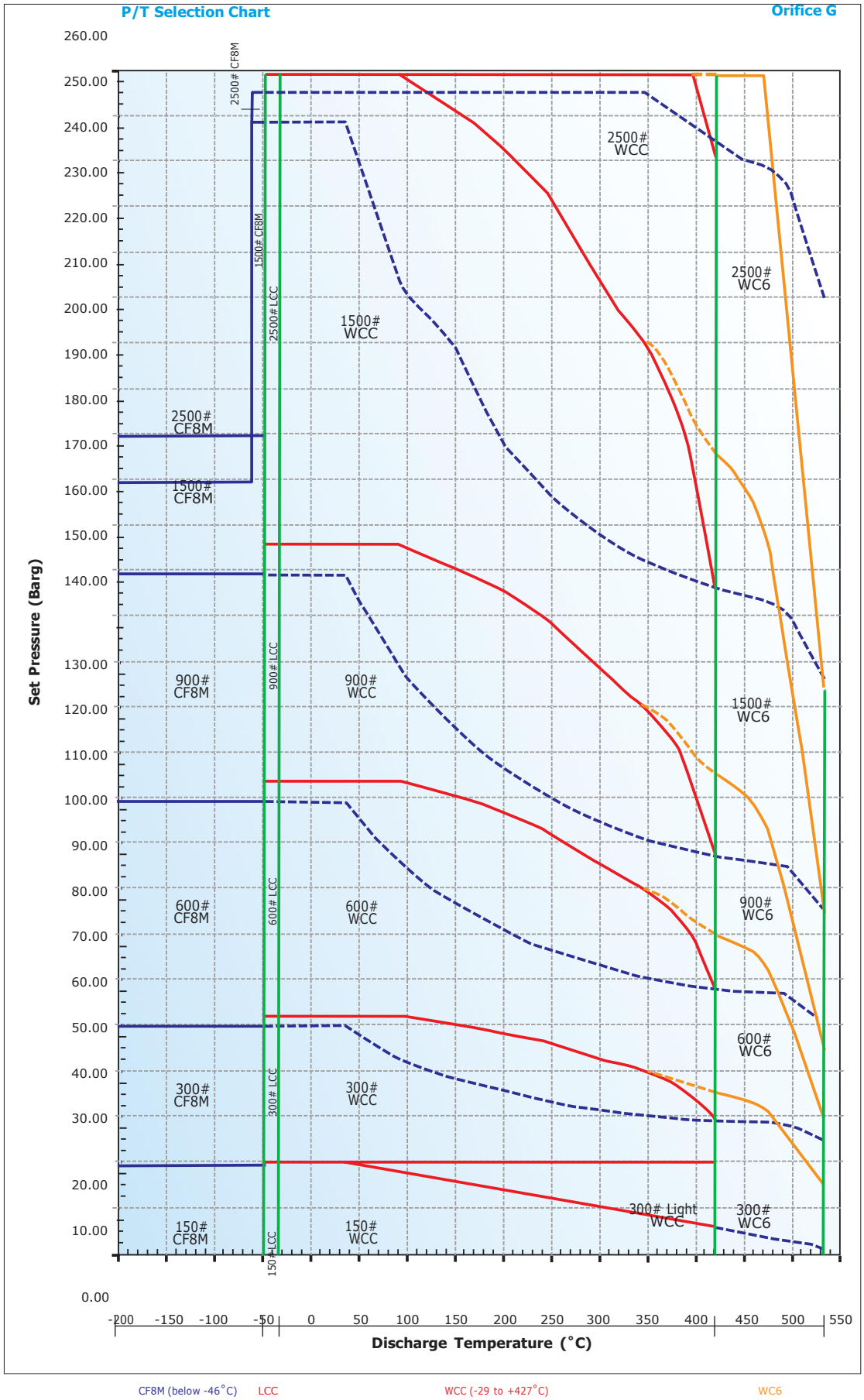

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | MODEL NUMBER | A(2) mm (in) | B(2) mm (in) | C mm (in) | D mm (in) | E mm (in) | N mm (in) | Approximate weight (3) kg (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1½ G 3 (4) | 150 | 150 | P73G1 | 123.8 (4-⅞) | 120.7 (4-¾) | 455 (18) | 23.9 (15/16) | 31 (1-¼) | 12 (½) | 22 (48) |
| 1½ G 3 (4) | 300 | 150 | P73G7 | 123.8 (4-⅞) | 120.7 (4-¾) | 455 (18) | 23.9 (15/16) | 34 (1-5/16) | 12 (½) | 23 (51) |
| 1½ G 3 (4) | 300 | 150 | P73G2 | 123.8 (4-⅞) | 152.4 (6) | 455 (18) | 23.9 (15/16) | 36 (1-⅜) | 12 (½) | 25 (55) |
| 1½ G 3 (4) | 600 | 150 | P73G3 | 123.8 (4-⅞) | 152.4 (6) | 455 (18) | 23.9 (15/16) | 36 (1-⅜) | 12 (½) | 26 (57) |
| 1½ G 3 (4) | 900 | 300 | P73G4 | 123.8 (4-⅞) | 165.1 (6-½) | 505 (20) | 28.4 (1-⅛) | 46 (1-13/16) | 13 (½) | 42 (93) |
| 2 G 3 | 1500 | 300 | P23G5 | 155.6 (6-⅛) | 171.5 (6-¾) | 570 (23) | 28.4 (1-⅛) | 51 (2) | 16 (⅝) | 55 (121) |
| 2 G 3 | 2500 | 300 | P23G6 | 155.6 (6-⅛) | 171.5 (6-¾) | 570 (23) | 28.4 (1-⅛) | 67 (2-⅝) | 16 (⅝) | 61 (134) |

(1) Max. back pressure limits at 38°C; for higher temp. refer to ASME B16.5 flange ratings for conventional valves
(2) Tolerances for A and B : ± 1.6 mm (±1/16 in)
(3) Valves with lifting lever : add 10%
(4) 2½'' outlet flange on request in conformity with API Std 526 ed. 84, model becomes P75G

Extrapolation from ASME B16.34:2004 & API Std 526:2009

P/T Selection Chart

Orifice G



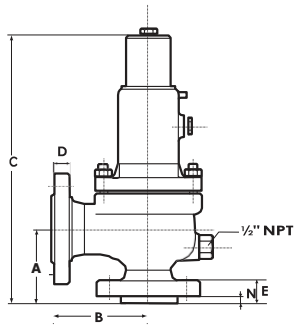

CF8M (below -46˚C) LCC WCC (-29 to +427˚C) WC6

**ORIFICE : H**
**5.06 cm²**
**0.785 in²**

## FLAMMER's 66 Series Selection Table

According to API Std 526 : (edition 2009)

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | Model Number | Conven-tional | Bellows | Steam service | MAX. SET PRESSURE barg (psig) -268°C to -47°C (-450°F to -51°F) | -46°C to -29°C (-50°F to -21°F) | -29°C to +38°C (-20°F to 100°F) | <232°C (<450°F) | <427°C (<800°F) | <538°C (<1000°F) | MAX. BACK PRESSURE (1) barg (psig) Conven-tional | Bellows | MATERIALS Body | Spring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1½ H 3 | 150 | 150 | P73H1 | 330 | 430 | 530 | | | 19.8 (285) | 13 (185) | 5.5 (80) | | 19.8 (285) | 16 (230) | | |
| 1½ H 3 | 300 | 150 | P73H7 | 330 | 430 | 530 | | | 19.8 (285) | 19.8 (285) | 19.8 (285) | | 19.8 (285) | 16 (230) | | |
| 2 H 3 | 300 | 150 | P23H2 | 330 | 430 | 530 | | | 51 (740) | 42.4 (615) | 29 (410) | | 19.8 (285) | 16 (230) | | |
| 2 H 3 | 600 | 150 | P23H3 | 330 | 430 | 530 | | | 102 (1480) | 85 (1235) | 58 (825) | | 19.8 (285) | 16 (230) | SA 216 Gr. WCC | Alloy Steel |
| 2 H 3 | 900 | 150 | P23H4 | 330 | 430 | 530 | | | 153 (2220) | 127 (1845) | 85 (1235) | | 19.8 (285) | 16 (230) | | |
| 2 H 3 | 1500 | 300 | P23H5 | 330 | 430 | 530 | | | 190 (2750) | 190 (2750) | 144 (2060) | | 51 (740) | 29 (415) | | |
| 2 H 3 | 300 | 150 | P23H2 | 332 | 432 | 502 | | | | | 35 (510) | 15 (225) | 19.8 (285) | 16 (230) | | |
| 2 H 3 | 600 | 150 | P23H3 | 332 | 432 | 502 | | | | | 56 (815) | 31 (445) | 19.8 (285) | 16 (230) | SA 216 Gr. WC6 | High Temp. Alloy Steel |
| 2 H 3 | 900 | 150 | P23H4 | 332 | 432 | 502 | | | | | 84 (1225) | 46 (670) | 19.8 (285) | 16 (230) | | |
| 2 H 3 | 1500 | 300 | P23H5 | 332 | 432 | 502 | | | | | 141 (2040) | 77 (1115) | 51 (740) | 29 (415) | | |
| 1½ H 3 | 150 | 150 | P73H1 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 16 (230) | | |
| 1½ H 3 | 300 | 150 | P73H7 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 16 (230) | | |
| 2 H 3 | 300 | 150 | P23H2 | 319 | 419 | | | 51 (740) | | | | | 19.8 (285) | 16 (230) | SA 352 Gr. LCC | Alloy Steel |
| 2 H 3 | 600 | 150 | P23H3 | 319 | 419 | | | 102 (1480) | | | | | 19.8 (285) | 16 (230) | | |
| 2 H 3 | 900 | 150 | P23H4 | 319 | 419 | | | 153 (2220) | | | | | 19.8 (285) | 16 (230) | | |
| 2 H 3 | 1500 | 300 | P23H5 | 319 | 419 | | | 190 (2750) | | | | | 51 (740) | 29 (415) | | |
| 1½ H 3 | 150 | 150 | P73H1 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 16 (230) | | |
| 1½ H 3 | 300 | 150 | P73H7 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 16 (230) | | |
| 2 H 3 | 300 | 150 | P23H2 | 316 | 416 | | 50 (720) | | | | | | 19 (275) | 16 (230) | SA 351 Gr. CF8M | Stainless Steel |
| 2 H 3 | 600 | 150 | P23H3 | 316 | 416 | | 99 (1440) | | | | | | 19 (275) | 16 (230) | | |
| 2 H 3 | 900 | 150 | P23H4 | 316 | 416 | | 102 (1485) | | | | | | 19 (275) | 16 (230) | | |
| 2 H 3 | 1500 | 300 | P23H5 | 316 | 416 | | 110 (1600) | | | | | | 29 (415) | 29 (415) | | |



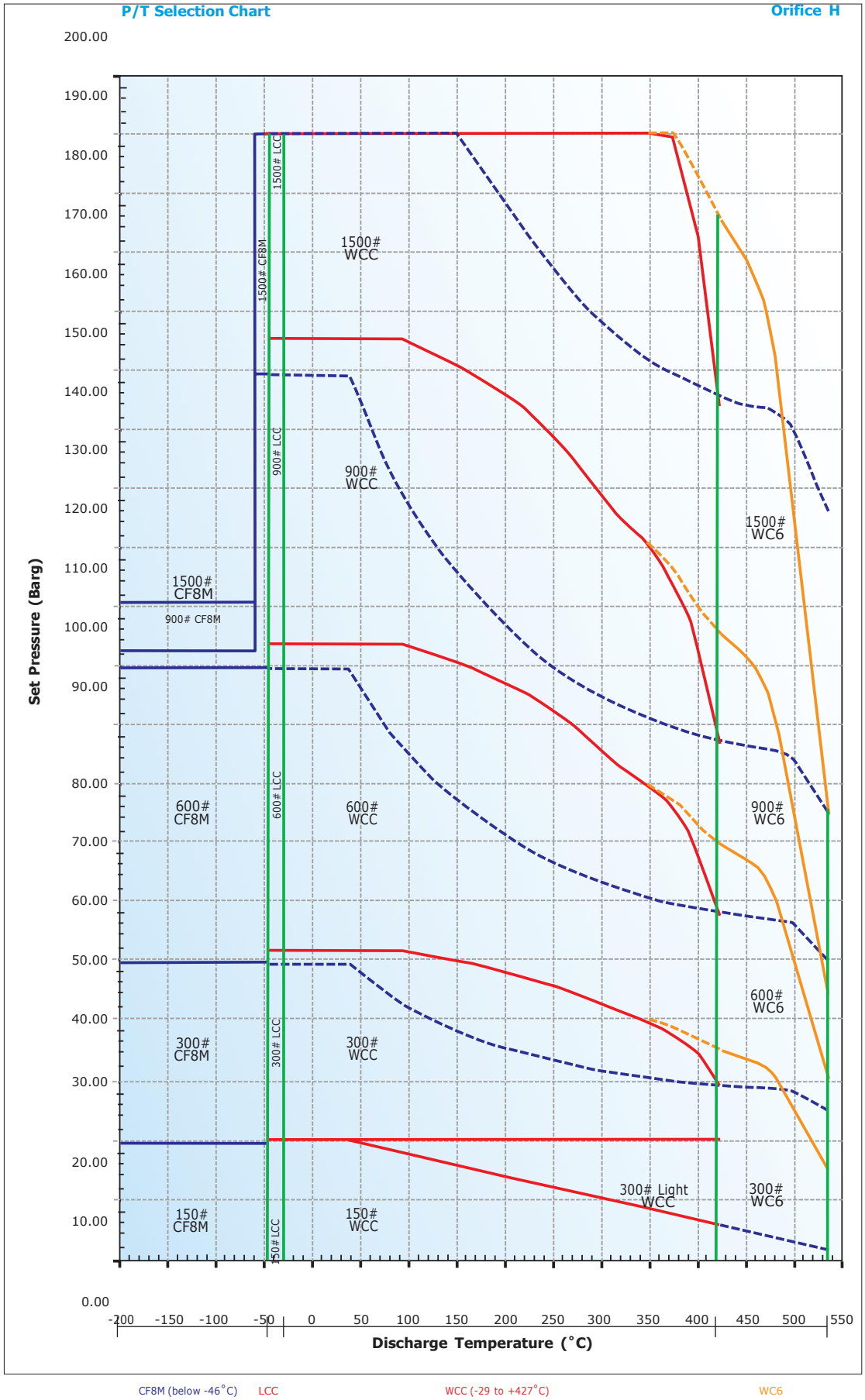

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | MODEL NUMBER | A(2) mm (in) | B(2) mm (in) | C mm (in) | D mm (in) | E mm (in) | N mm (in) | Approximate weight (3) kg (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1½ H 3 | 150 | 150 | P73H1 | 130.2 (5-1/8) | 123.8 (4-7/8) | 460 (18) | 23.9 (15/16) | 33 (1-5/16) | 14 (9/16) | 23 (51) |
| 1½ H 3 | 300 | 150 | P73H7 | 130.2 (5-1/8) | 123.8 (4-7/8) | 460 (18) | 23.9 (15/16) | 36 (1-3/8) | 14 (9/16) | 25 (55) |
| 2 H 3 | 300 | 150 | P23H2 | 130.2 (5-1/8) | 123.8 (4-7/8) | 460 (18) | 23.9 (15/16) | 38 (1-1/2) | 14 (9/16) | 27 (60) |
| 2 H 3 | 600 | 150 | P23H3 | 154 (6-1/16) | 161.9 (6-3/8) | 515 (20) | 23.9 (15/16) | 41 (1-9/16) | 14 (9/16) | 38 (84) |
| 2 H 3 | 900 | 150 | P23H4 | 154 (6-1/16) | 161.9 (6-3/8) | 570 (22-1/2) | 23.9 (15/16) | 55 (2-1/16) | 14 (9/16) | 51 (112) |
| 2 H 3 | 1500 | 300 | P23H5 | 154 (6-1/16) | 161.9 (6-3/8) | 570 (22-1/2) | 28.4 (1-1/8) | 55 (2-1/16) | 14 (9/16) | 55 (121) |

(1) Max. back pressure limits at 38°C; for higher temp. refer to ASME B16.5 flange ratings for conventional valves
(2) Tolerances for A and B : ± 1.6 mm (±1/16 in)
(3) Valves with lifting lever : add 10%

Extrapolation from ASME B16.34:2004 & API Std 526:2009

P/T Selection Chart

Orifice H



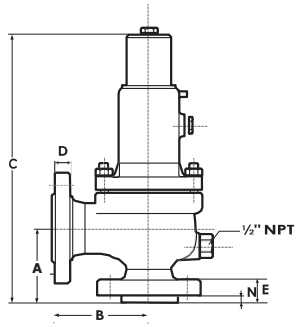

CF8M (below -46˚C) LCC WCC (-29 to +427˚C) WC6

**ORIFICE : J**
**8.30 cm²**
**1.287 in²**

## FLAMMER's 66 Series Selection Table

According to API Std 526 : (edition 2009)

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | Model Number | MAX. SET PRESSURE barg (psig) -268°C Steam service | -46°C to -29°C (-50°F to -21°F) | -29°C to +38°C (-20°F to 100°F) | <232°C (<450°F) | <427°C (<800°F) | <538°C (<1000°F) | MAX. BACK PRESSURE (1) barg (psig) Conven- tional | Bellows | MATERIALS Body | Spring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 J 3 | 150 | 150 | P23J1 | 330 | 430 | 530 | | | 19.8 (285) | 13 (185) | 5.5 (80) | | 19.8 (285) | 16 (230) | | |
| 2 J 3 | 300 | 150 | P23J7 | 330 | 430 | 530 | | | 19.8 (285) | 19.8 (285) | 19.8 (285) | | 19.8 (285) | 16 (230) | | |
| 3 J 4 (5) | 300 | 150 | P34J2 | 330 | 430 | 530 | | | 51 (740) | 42.4 (615) | 29 (410) | | 19.8 (285) | 16 (230) | SA 216 | Alloy |
| 3 J 4 (5) | 600 | 150 | P34J3 | 330 | 430 | 530 | | | 102 (1480) | 85 (1235) | 58 (825) | | 19.8 (285) | 16 (230) | Gr. WCC | Steel |
| 3 J 4 | 900 | 150 | P34J4 | 330 | 430 | 530 | | | 153 (2220) | 127 (1845) | 85 (1235) | | 19.8 (285) | 16 (230) | | |
| 3 J 4 | 1500 | 300 | P34J5 | 330 | 430 | 530 | | | 186 (2700) | 186 (2700) | 144 (2060) | | 41 (600) | 16 (230) | | |
| 3 J 4 (5) | 300 | 150 | P34J2 | 332 | 432 | 502 | | | | | 35 (510) | 15 (225) | 19.8 (285) | 16 (230) | SA 216 | High Temp. |
| 3 J 4 (5) | 600 | 150 | P34J3 | 332 | 432 | 502 | | | | | 56 (815) | 31 (445) | 19.8 (285) | 16 (230) | Gr. WC6 | Alloy |
| 3 J 4 | 900 | 150 | P34J4 | 332 | 432 | 502 | | | | | 84 (1225) | 46 (670) | 19.8 (285) | 16 (230) | | Steel |
| 3 J 4 | 1500 | 300 | P34J5 | 332 | 432 | 502 | | | | | 141 (2040) | 77 (1115) | 41 (600) | 16 (230) | | |
| 2 J 3 | 150 | 150 | P23J1 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 16 (230) | | |
| 2 J 3 | 300 | 150 | P23J7 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 16 (230) | | |
| 3 J 4 (5) | 300 | 150 | P34J2 | 319 | 419 | | | 51 (740) | | | | | 19.8 (285) | 16 (230) | SA 352 | Alloy |
| 3 J 4 (5) | 600 | 150 | P34J3 | 319 | 419 | | | 102 (1480) | | | | | 19.8 (285) | 16 (230) | Gr. LCC | Steel |
| 3 J 4 | 900 | 150 | P34J4 | 319 | 419 | | | 153 (2220) | | | | | 19.8 (285) | 16 (230) | | |
| 3 J 4 | 1500 | 300 | P34J5 | 319 | 419 | | | 186 (2700) | | | | | 41 (600) | 16 (230) | | |
| 2 J 3 | 150 | 150 | P23J1 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 16 (230) | | |
| 2 J 3 | 300 | 150 | P23J7 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 16 (230) | | |
| 3 J 4 (5) | 300 | 150 | P34J2 | 316 | 416 | | 34 (500) | | | | | | 19 (275) | 16 (230) | SA 351 | Stainless |
| 3 J 4 (5) | 600 | 150 | P34J3 | 316 | 416 | | 43 (625) | | | | | | 19 (275) | 16 (230) | Gr. CF8M | Steel |
| 3 J 4 | 900 | 150 | P34J4 | 316 | 416 | | 55 (800) | | | | | | 19 (275) | 16 (230) | | |
| 3 J 4 | 1500 | 300 | P34J5 | 316 | 416 | | 55 (800) | | | | | | 41 (600) | 16 (230) | | |



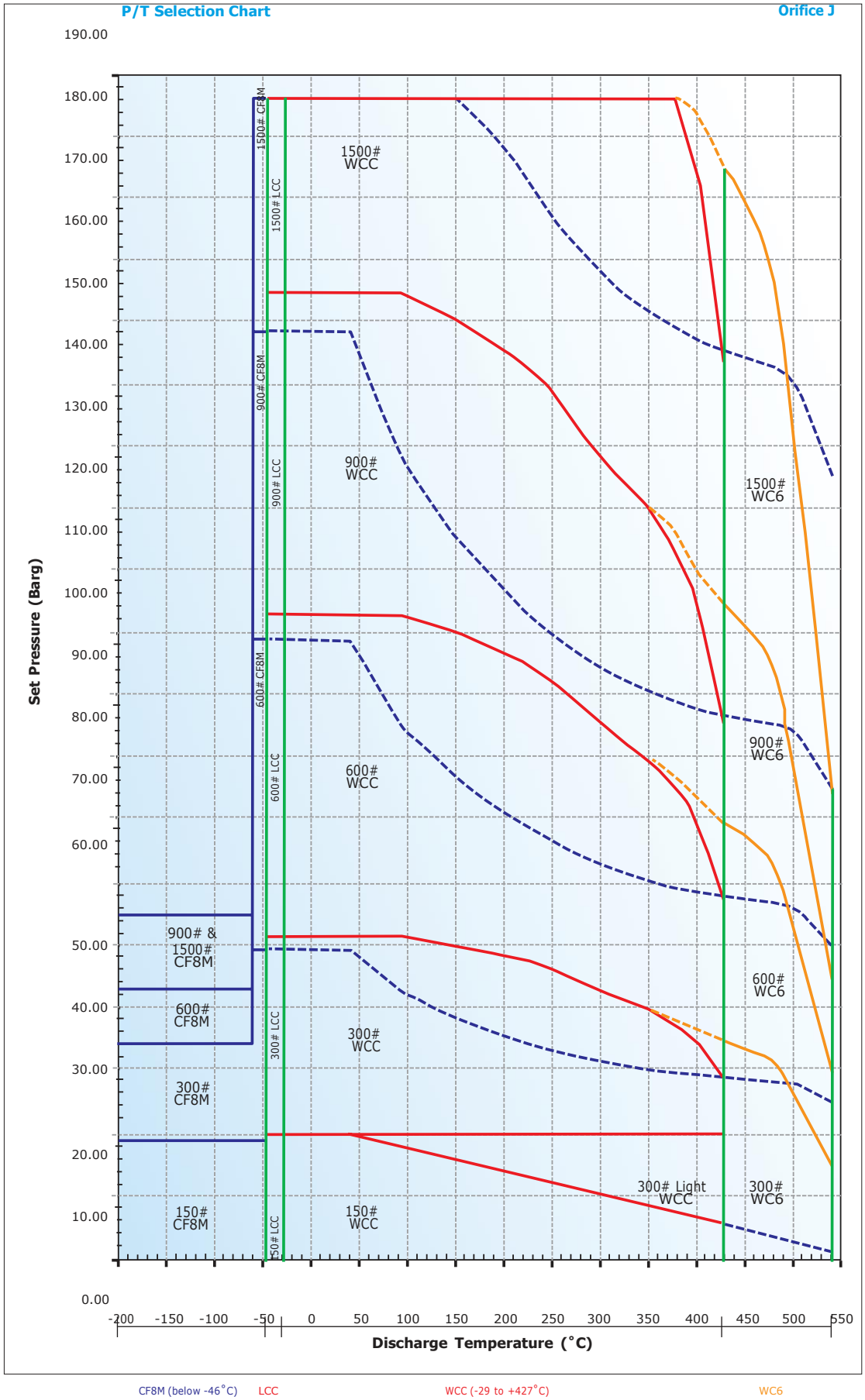

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | MODEL NUMBER | A(2) mm (in) | B(2) mm (in) | C mm (in) | D mm (in) | E mm (in) | N mm (in) | Approximate weight (3) kg (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 J 3 | 150 | 150 | P23J1 | 136.5 (5-3/8) | 123.8 (4-7/8) | 515 (20) | 23.9 (15/16) | 33 (1-5/16) | 14 (9/16) | 33 (73) |
| 2 J 3 | 300 | 150 | P23J7 | 136.5 (5-3/8) | 123.8 (4-7/8) | 515 (20) | 23.9 (15/16) | 38 (1-1/2) | 14 (9/16) | 35 (77) |
| 3 J 4 (5) | 300 | 150 | P34J2 | 184.1 (7-1/4) | 181 (7-1/8) | 550 (22) | 23.9 (15/16) | 44 (1-3/4) | 14 (9/16) | 49 (108) |
| 3 J 4 (5) | 600 | 150 | P34J3 | 184.1 (7-1/4) | 181 (7-1/8) | 590 (23) | 23.9 (15/16) | 47 (1-7/8) | 14 (9/16) | 60 (132) |
| 3 J 4 | 900 | 150 | P34J4 | 184.1 (7-1/4) | 181 (7-1/8) | 765 (30) | 23.9 (15/16) | 54 (2-1/16) | 14 (9/16) | 97 (213) |
| 3 J 4 | 1500 | 300 | P34J5 | 184.1 (7-1/4) | 181 (7-1/8) | 765 (30) | 31.8 (1-1/4) | 64 (2-1/2) | 14 (9/16) | 108 (238) |

(1) Max. back pressure limits at 38°C; for higher temp. refer to ASME B16.5 flange ratings for conventional valves
(2) Tolerances for A and B : ± 1.6 mm (±1/16 in)
(3) Valves with lifting lever : add 10%
(5) 2½'' inlet flange on request in conformity with API Std 526 ed. 84, model becomes P54J

Extrapolation from ASME B16.34:2004 & API Std 526:2009

P/T Selection Chart

Orifice J

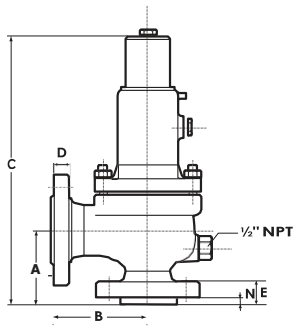



CF8M (below -46˚C) LCC WCC (-29 to +427˚C) WC6

## ORIFICE : K
**11.86 cm²**
**1.838 in²**

## FLAMMER's 66 Series Selection Table
According to API Std 526 : (edition 2009)

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | Model Number | Conventional | Bellows | Steam service | MAX. SET PRESSURE barg (psig) -268°C to -47°C (-450°F to -51°F) | -46°C to -29°C (-50°F to -21°F) | -29°C to +38°C (-20°F to 100°F) | <232°C (<450°F) | <427°C (<800°F) | <538°C (<1000°F) | MAX. BACK PRESSURE (1) barg (psig) Conventional | Bellows | MATERIALS Body | Spring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 K 4 | 150 | 150 | P34K1 | 330 | 430 | 530 | | | 19.8 (285) | 13 (185) | 5.5 (80) | | 19.8 (285) | 10 (150) | | |
| 3 K 4 | 300 | 150 | P34K7 | 330 | 430 | 530 | | | 19.8 (285) | 19.8 (285) | 19.8 (285) | | 19.8 (285) | 10 (150) | | |
| 3 K 4 | 300 | 150 | P34K2 | 330 | 430 | 530 | | | 51 (740) | 42.4 (615) | 29 (410) | | 19.8 (285) | 10 (150) | SA 216 | Alloy |
| 3 K 4 | 600 | 150 | P34K3 | 330 | 430 | 530 | | | 102 (1480) | 85 (1235) | 58 (825) | | 19.8 (285) | 14 (200) | Gr. WCC | Steel |
| 3 K 6 | 900 | 150 | P36K4 | 330 | 430 | 530 | | | 153 (2220) | 127 (1845) | 85 (1235) | | 19.8 (285) | 14 (200) | | |
| 3 K 6 | 1500 | 300 | P36K5 | 330 | 430 | 530 | | | 153 (2220) | 153 (2220) | 144 (2060) | | 41 (600) | 14 (200) | | |
| 3 K 4 | 300 | 150 | P34K2 | 332 | 432 | 502 | | | | | 35 (510) | 15 (225) | 19.8 (285) | 10 (150) | | |
| 3 K 4 | 600 | 150 | P34K3 | 332 | 432 | 502 | | | | | 56 (815) | 31 (445) | 19.8 (285) | 14 (200) | SA 216 | High Temp. |
| 3 K 6 | 900 | 150 | P36K4 | 332 | 432 | 502 | | | | | 84 (1225) | 46 (670) | 19.8 (285) | 14 (200) | Gr. WC6 | Alloy |
| 3 K 6 | 1500 | 300 | P36K5 | 332 | 432 | 502 | | | | | 141 (2040) | 77 (1115) | 41 (600) | 14 (200) | | Steel |
| 3 K 4 | 150 | 150 | P34K1 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 10 (150) | | |
| 3 K 4 | 300 | 150 | P34K7 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 10 (150) | | |
| 3 K 4 | 300 | 150 | P34K2 | 319 | 419 | | | 51 (740) | | | | | 19.8 (285) | 10 (150) | SA 352 | Alloy |
| 3 K 4 | 600 | 150 | P34K3 | 319 | 419 | | | 102 (1480) | | | | | 19.8 (285) | 14 (200) | Gr. LCC | Steel |
| 3 K 6 | 900 | 150 | P36K4 | 319 | 419 | | | 153 (2220) | | | | | 19.8 (285) | 14 (200) | | |
| 3 K 6 | 1500 | 300 | P36K5 | 319 | 419 | | | 153 (2220) | | | | | 41 (600) | 14 (200) | | |
| 3 K 4 | 150 | 150 | P34K1 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 10 (150) | | |
| 3 K 4 | 300 | 150 | P34K7 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 10 (150) | | |
| 3 K 4 | 300 | 150 | P34K2 | 316 | 416 | | 36 (525) | | | | | | 19 (275) | 10 (150) | SA 351 | Stainless |
| 3 K 4 | 600 | 150 | P34K3 | 316 | 416 | | 41 (600) | | | | | | 19 (275) | 14 (200) | Gr. CF8M | Steel |
| 3 K 6 | 900 | 150 | P36K4 | 316 | 416 | | 41 (600) | | | | | | 19 (275) | 14 (200) | | |
| 3 K 6 | 1500 | 300 | P36K5 | 316 | 416 | | 52 (750) | | | | | | 41 (600) | 14 (200) | | |



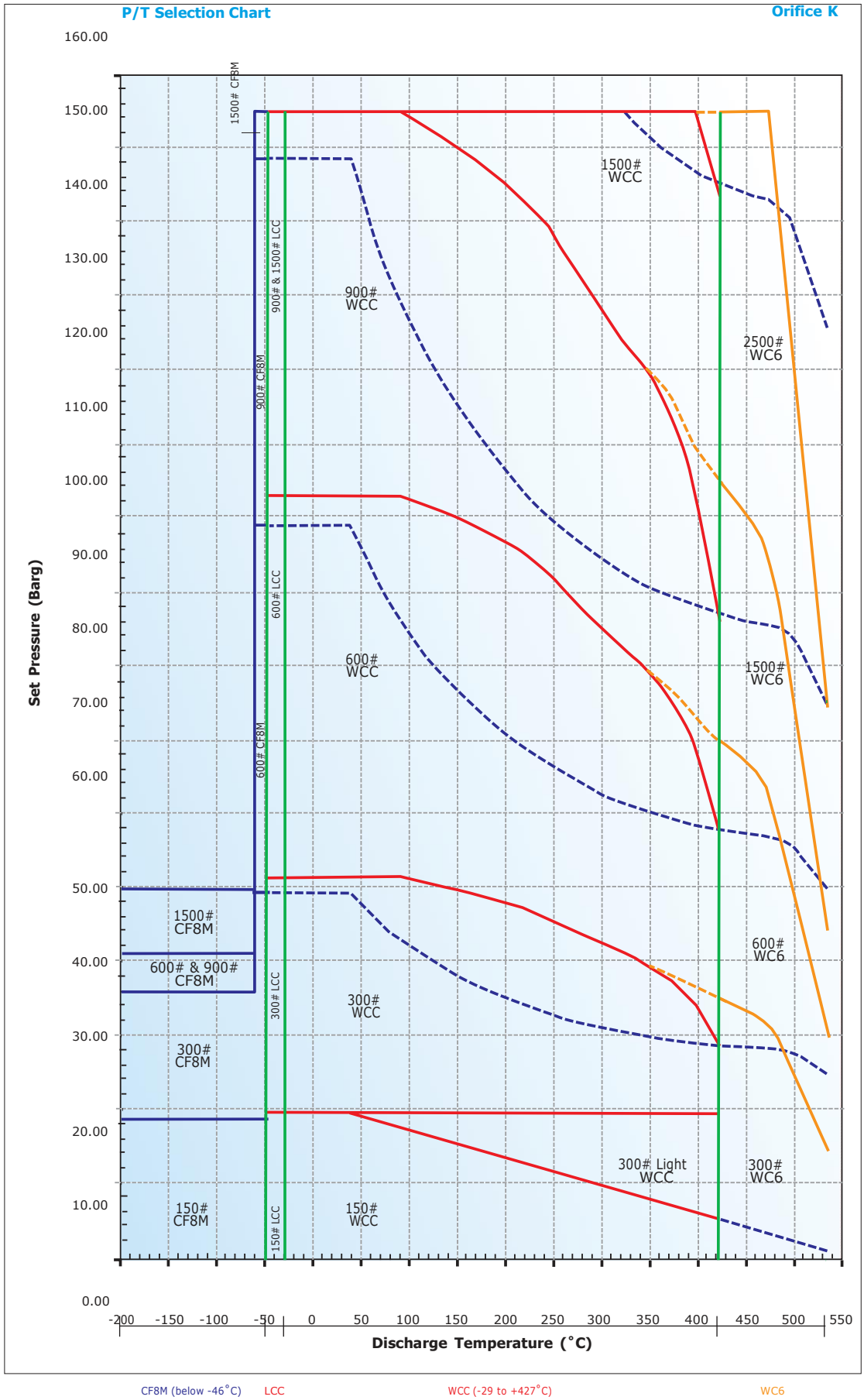

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | MODEL NUMBER | A(2) mm (in) | B(2) mm (in) | C mm (in) | D mm (in) | E mm (in) | N mm (in) | Approximate weight (3) kg (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 K 4 | 150 | 150 | P34K1 | 155.5 (6-1/8) | 161.9 (6-3/8) | 580 (23) | 23.9 (15/16) | 39 (1-1/4) | 14 (9/16) | 49 (108) |
| 3 K 4 | 300 | 150 | P34K7 | 155.5 (6-1/8) | 161.9 (6-3/8) | 580 (23) | 23.9 (15/16) | 45 (1-3/4) | 14 (9/16) | 54 (120) |
| 3 K 4 | 300 | 150 | P34K2 | 155.5 (6-1/8) | 161.9 (6-3/8) | 580 (23) | 23.9 (15/16) | 45 (1-3/4) | 14 (9/16) | 56 (123) |
| 3 K 4 | 600 | 150 | P34K3 | 184.1 (7-1/4) | 181 (7-1/8) | 635 (25) | 23.9 (15/16) | 47 (1-7/8) | 14 (9/16) | 68 (150) |
| 3 K 6 | 900 | 150 | P36K4 | 198.4 (7-13/16) | 215.9 (8-1/2) | 785 (31) | 25.4 (1) | 53 (2-1/16) | 14 (9/16) | 112 (247) |
| 3 K 6 | 1500 | 300 | P36K5 | 196.8 (7-3/4) | 215.9 (8-1/2) | 785 (31) | 36.6 (1-7/16) | 63 (2-7/16) | 14 (9/16) | 125 (275) |

(1) Max. back pressure limits at 38°C; for higher temp. refer to ASME B16.5 flange ratings for conventional valves
(2) Tolerances for A and B : ± 1.6 mm (±1/16 in)
(3) Valves with lifting lever : add 10%

Extrapolation from ASME B16.34:2004 & API Std 526:2009

P/T Selection Chart

Orifice K



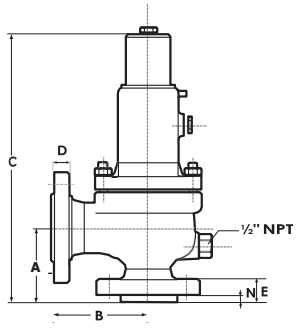

CF8M (below -46˚C) LCC WCC (-29 to +427˚C) WC6

**ORIFICE : L**
**18.41 cm²**
**2.853 in²**

## FLAMMER's 66 Series Selection Table

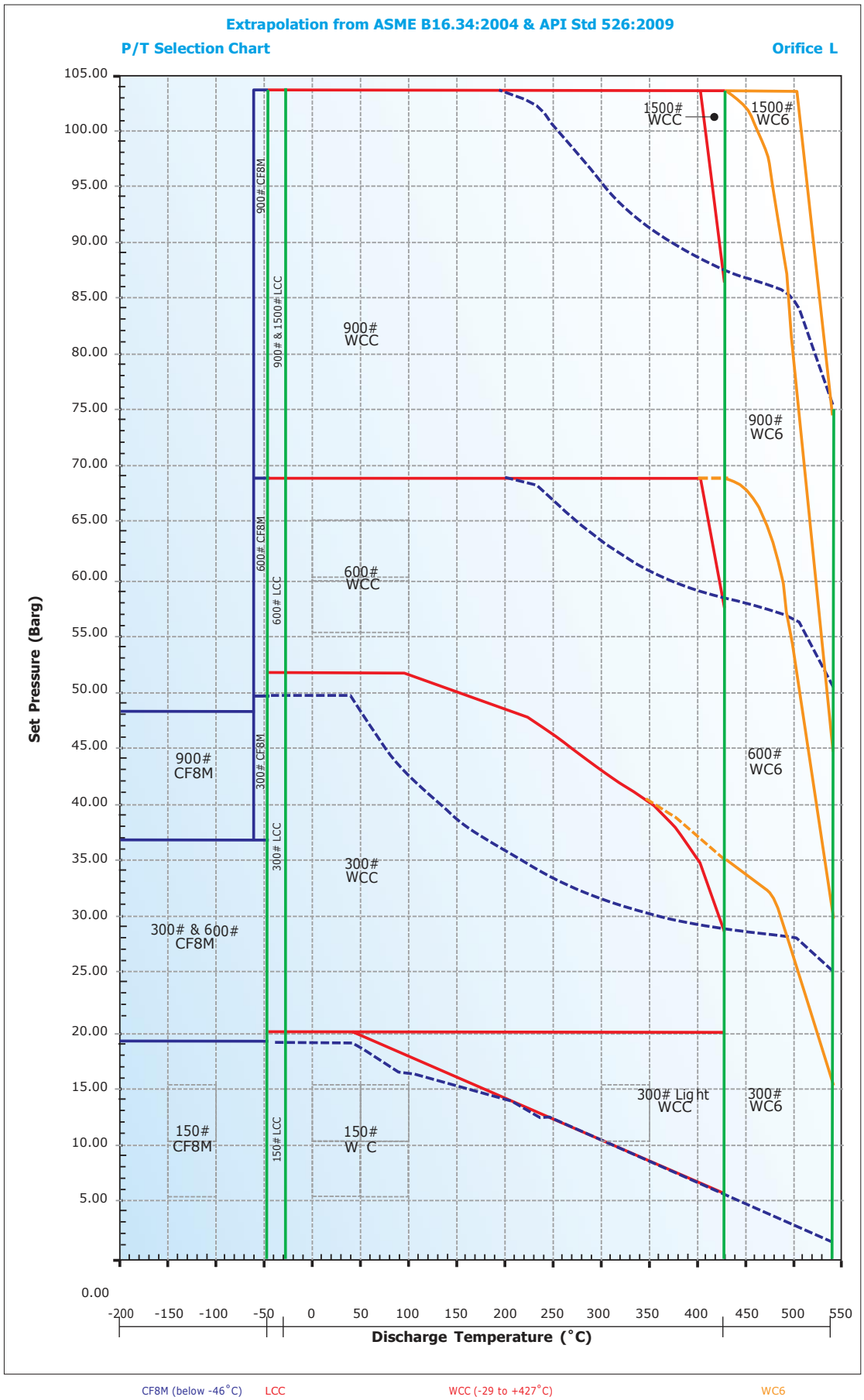
According to API Std 526 : (edition 2009)

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | Model Number | Conven-tional | Bellows | Steam service | MAX. SET PRESSURE barg (psig) -268°C to -47°C (-450°F to -51°F) | -46°C to -29°C (-50°F to -21°F) | -29°C to +38°C (-20°F to 100°F) | <232°C (<450°F) | <427°C (<800°F) | <538°C (<1000°F) | MAX. BACK PRESSURE (1) barg (psig) Conven-tional | Bellows | MATERIALS Body | Spring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 L 4 | 150 | 150 | P34L1 | 330 | 430 | 530 | | | 19.8 (285) | 13 (185) | 5.5 (80) | | 19.8 (285) | 7 (100) | | |
| 3 L 4 | 300 | 150 | P34L7 | 330 | 430 | 530 | | | 19.8 (285) | 19.8 (285) | 19.8 (285) | | 19.8 (285) | 7 (100) | | |
| L 6 | 300 | 150 | P46L2 | 330 | 430 | 530 | | | 51 (740) | 42.4 (615) | 28 (410) | | 19.8 (285) | 12 (170) | SA 216 | Alloy |
| 4 L 6 | 600 | 150 | P46L3 | 330 | 430 | 530 | | | 69 (1000) | 69 (1000) | 57 (825) | | 19.8 (285) | 12 (170) | Gr. WCC | Steel |
| 4 L 6 | 900 | 150 | P46L4 | 330 | 430 | 530 | | | 103 (1500) | 103 (1500) | 85 (1235) | | 19.8 (285) | 12 (170) | | |
| 4 L 6 | 1500 | 150 | P46L5 | 330 | 430 | 530 | | | | 103 (1500) | 103 (1500) | | 19.8 (285) | 12 (170) | | |
| 4 L 6 | 300 | 150 | P46L2 | 332 | 432 | 502 | | | | | 35 (510) | 16 (225) | 19.8 (285) | 12 (170) | | |
| 4 L 6 | 600 | 150 | P46L3 | 332 | 432 | 502 | | | | | 69 (1000) | 31 (445) | 19.8 (285) | 12 (170) | SA 216 | High Temp. |
| 4 L 6 | 900 | 150 | P46L4 | 332 | 432 | 502 | | | | | 103 (1500) | 46 (670) | 19.8 (285) | 12 (170) | Gr. WC6 | Alloy |
| 4 L 6 | 1500 | 150 | P46L5 | 332 | 432 | 502 | | | | | 103 (1500) | 76 (1115) | 19.8 (285) | 12 (170) | | Steel |
| 3 L 4 | 150 | 150 | P34L1 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 7 (100) | | |
| 3 L 4 | 300 | 150 | P34L7 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 7 (100) | | |
| L 6 | 300 | 150 | P46L2 | 319 | 419 | | | 51 (740) | | | | | 19.8 (285) | 12 (170) | SA 352 | Alloy |
| 4 L 6 | 600 | 150 | P46L3 | 319 | 419 | | | 69 (1000) | | | | | 19.8 (285) | 12 (170) | Gr. LCC | Steel |
| 4 L 6 | 900 | 150 | P46L4 | 319 | 419 | | | 103 (1500) | | | | | 19.8 (285) | 12 (170) | | |
| 3 L 4 | 150 | 150 | P34L1 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 7 (100) | | |
| L 4 | 300 | 150 | P34L7 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 7 (100) | | |
| 4 L 6 | 300 | 150 | P46L2 | 316 | 416 | | 37 (535) | | | | | | 19 (275) | 12 (170) | SA 351 | Stainless |
| 4 L 6 | 600 | 150 | P46L3 | 316 | 416 | | 37 (535) | | | | | | 19 (275) | 12 (170) | Gr. CF8M | Steel |
| 4 L 6 | 900 | 150 | P46L4 | 316 | 416 | | 48 (700) | | | | | | 19 (275) | 12 (170) | | |




| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | MODEL NUMBER | A(2) mm (in) | B(2) mm (in) | C mm (in) | D mm (in) | E mm (in) | N mm (in) | Approximate weight (3) kg (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 L 4 | 150 | 150 | P34L1 | 155.6 (6-1/8) | 165.1 (6-1/2) | 580 (23) | 23.9 (15/16) | 39 (1-1/2) | 14 (9/16) | 51 (112) |
| 3 L 4 | 300 | 150 | P34L7 | 155.6 (6-1/8) | 165.1 (6-1/2) | 580 (23) | 23.9 (15/16) | 45 (1-3/4) | 14 (9/16) | 57 (126) |
| 4 L 6 | 300 | 150 | P46L2 | 179.4 (7-1/16) | 181 (7-1/8) | 785 (31) | 25.4 (1) | 49 (1-15/16) | 15.5 (5/8) | 95 (210) |
| 4 L 6 | 600 | 150 | P46L3 | 179.4 (7-1/16) | 203.2 (8) | 845 (34) | 25.4 (1) | 56 (2-1/4) | 15.5 (5/8) | 115 (254) |
| 4 L 6 | 900 | 150 | P46L4 | 196.9 (7-3/4) | 222.2 (8-3/4) | 875 (35) | 25.4 (1) | 68 (2-11/16) | 14.5 (9/16) | 140 (310) |
| 4 L 6 | 1500 | 150 | P46L5 | 196.9 (7-3/4) | 222.2 (8-3/4) | 875 (35) | 25.4 (1) | 68 (2-11/16) | 14.5 (9/16) | 155 (342) |

(1) Max. back pressure limits at 38°C; for higher temp. refer to ASME B16.5 flange ratings for conventional valves
(2) Tolerances for A and B : ± 1.6 mm (±1/16 in)
(3) Valves with lifting lever : add 10%

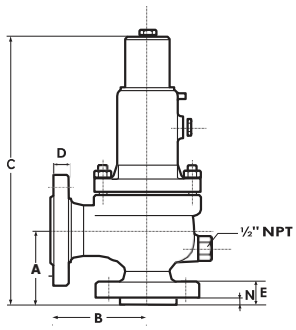

Extrapolation from ASME B16.34:2004 & API Std 526:2009
P/T Selection Chart
Orifice L
Set Pressure (Barg)
105.00
100.00
95.00
90.00
85.00
80.00
75.00
70.00
65.00
60.00
55.00
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-200 -150 -100 -50 0 50 100 150 200 250 300 350 400 450 500 550
Discharge Temperature (˚C)
900# CF8M
900# & 1500# LCC
600# CF8M
600# LCC
300# CF8M
300# LCC
150# LCC
1500# WCC
1500# WC6
900# WCC
900# WC6
600# WCC
600# WC6
900# CF8M
300# WCC
300# & 600# CF8M
300# Light WCC
300# WC6
150# CF8M
150# W C
CF8M (below -46˚C)
LCC
WCC (-29 to +427˚C)
WC6

## ORIFICE : M
## 23.2 cm²
## 3.60 in²

## FLAMMER's 66 Series Selection Table

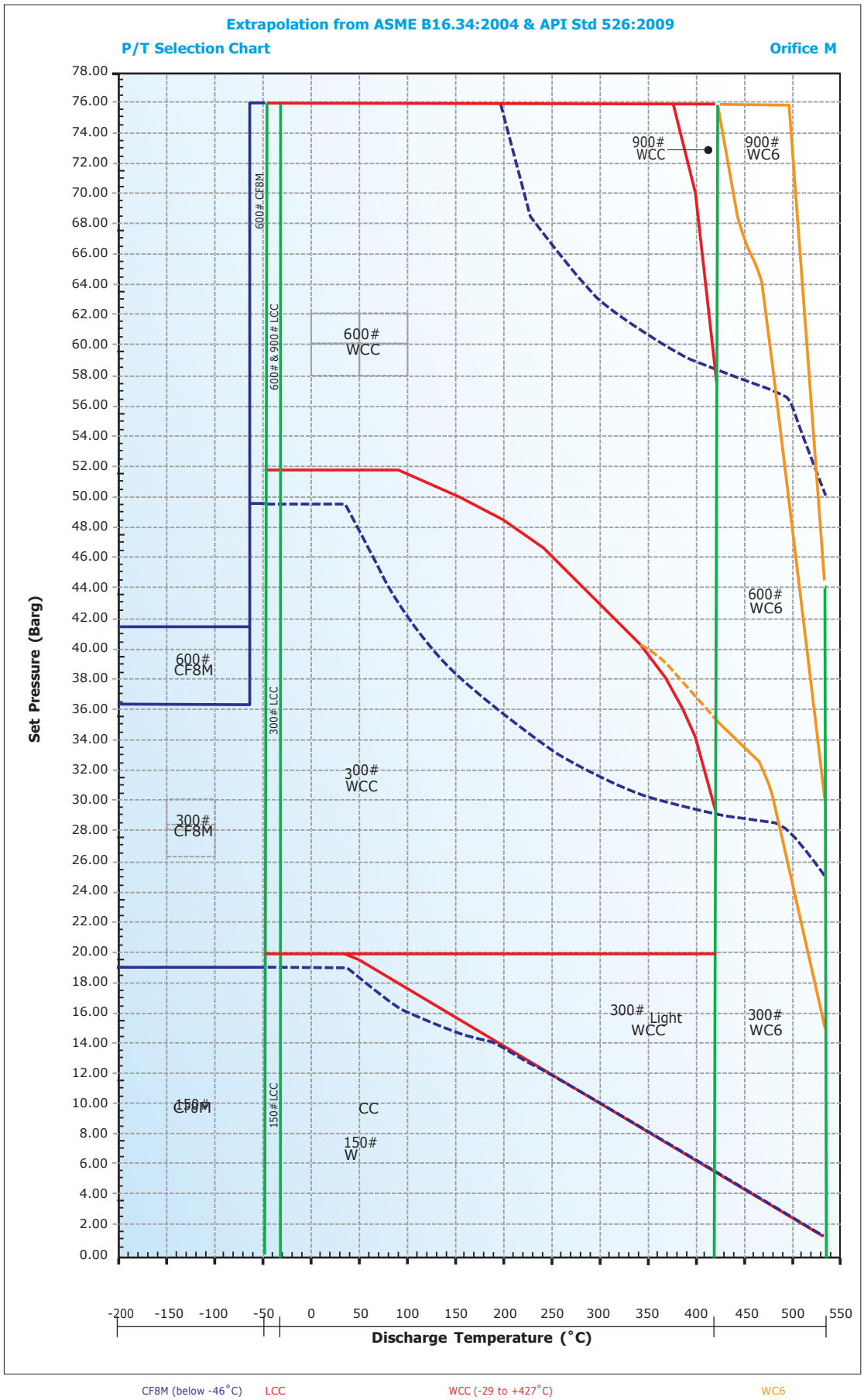
According to API Std 526 : (edition 2009)

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | Model Number | MAX. SET PRESSURE barg (psig) Conven-tional | Bellows | Steam service | -268°C to -47°C (-450°F to -51°F) | -46°C to -29°C (-50°F to -21°F) | -29°C to +38°C (-20°F to 100°F) | <232°C (<450°F) | <427°C (<800°F) | <538°C (<1000°F) | MAX. BACK PRESSURE (1) barg (psig) Conven-tional | Bellows | MATERIALS Body | Spring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 M 6 | 150 | 150 | P46M1 | 330 | 430 | 530 | | | 19.8 (285) | 13 (185) | 5.5 (80) | | 19.8 (285) | 5.5 (80) | | |
| 4 M 6 | 300 | 150 | P46M7 | 330 | 430 | 530 | | | 19.8 (285) | 19.8 (285) | 19.8 (285) | | 19.8 (285) | 5.5 (80) | SA 216 | Alloy |
| 4 M 6 | 300 | 150 | P46M2 | 330 | 430 | 530 | | | 51 (740) | 42.4 (615) | 28 (410) | | 19.8 (285) | 11 (160) | | |
| 4 M 6 | 600 | 150 | P46M3 | 330 | 430 | 530 | | | 76 (1100) | 76 (1100) | 57 (825) | | 19.8 (285) | 11 (160) | Gr. WCC | Steel |
| 4 M 6 | 900 | 150 | P46M4 | 330 | 430 | 530 | | | | 76 (1100) | 76 (1100) | | 19.8 (285) | 11 (160) | | |
| 4 M 6 | 300 | 150 | P46M2 | 332 | 432 | 502 | | | | | 35 (510) | 16 (225) | 19.8 (285) | 11 (160) | SA 216 | High Temp. |
| 4 M 6 | 600 | 150 | P46M3 | 332 | 432 | 502 | | | | | 70 (1015) | 31 (445) | 19.8 (285) | 11 (160) | Gr. WC6 | Alloy |
| 4 M 6 | 900 | 150 | P46M4 | 332 | 432 | 502 | | | | | 76 (1100) | 46 (670) | 19.8 (285) | 11 (160) | | Steel |
| 4 M 6 | 150 | 150 | P46M1 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 5.5 (80) | | |
| 4 M 6 | 300 | 150 | P46M7 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 5.5 (80) | SA 352 | Alloy |
| 4 M 6 | 300 | 150 | P46M2 | 319 | 419 | | | 51 (740) | | | | | 19.8 (285) | 11 (160) | Gr. LCC | Steel |
| 4 M 6 | 600 | 150 | P46M3 | 319 | 419 | | | 76 (1100) | | | | | 19.8 (285) | 11 (160) | | |
| 4 M 6 | 150 | 150 | P46M1 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 5.5 (80) | | |
| 4 M 6 | 300 | 150 | P46M7 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 5.5 (80) | SA 351 | Stainless |
| 4 M 6 | 300 | 150 | P46M2 | 316 | 416 | | 36 (525) | | | | | | 19 (275) | 11 (160) | Gr. CF8M | Steel |
| 4 M 6 | 600 | 150 | P46M3 | 316 | 416 | | 41 (600) | | | | | | 19 (275) | 11 (160) | | |




| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | MODEL NUMBER | A(2) mm (in) | B(2) mm (in) | C mm (in) | D mm (in) | E mm (in) | N mm (in) | Approximate weight (3) kg (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 M 6 | 150 | 150 | P46M1 | 177.8 (7) | 184.1 (7-¼) | 725 (29) | 25.4 (1) | 40 (1-9/16) | 14 (9/16) | 85 (187) |
| 4 M 6 | 300 | 150 | P46M7 | 177.8 (7) | 184.1 (7-¼) | 725 (29) | 25.4 (1) | 48 (1-⅞) | 14 (9/16) | 88 (194) |
| 4 M 6 | 300 | 150 | P46M2 | 177.8 (7) | 184.1 (7-¼) | 785 (31) | 25.4 (1) | 48 (1-⅞) | 14 (9/16) | 95 (210) |
| 4 M 6 | 600 | 150 | P46M3 | 177.8 (7) | 203.2 (8) | 845 (34) | 25.4 (1) | 54 (2-⅛) | 14 (9/16) | 115 (254) |
| 4 M 6 | 900 | 150 | P46M4 | 196.8 (7-¾) | 222.2 (8-¾) | 950 (38) | 25.4 (1) | 68 (2-1/16) | 14 (9/16) | 165 (364) |

(1) Max. back pressure limits at 38°C; for higher temp. refer to ASME B16.5 flange ratings for conventional valves
(2) Tolerances for A and B : ± 1.6 mm (±1/16 in)
(3) Valves with lifting lever : add 10%

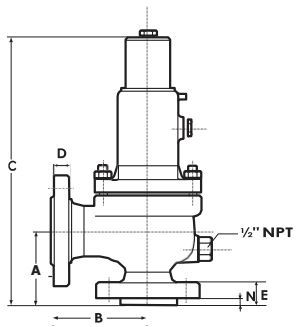

Extrapolation from ASME B16.34:2004 & API Std 526:2009
P/T Selection Chart
Orifice M
Set Pressure (Barg)
78.00
76.00
74.00
72.00
70.00
68.00
66.00
64.00
62.00
60.00
58.00
56.00
54.00
52.00
50.00
48.00
46.00
44.00
42.00
40.00
38.00
36.00
34.00
32.00
30.00
28.00
26.00
24.00
22.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
600# CF8M
600# & 900# LCC
300# LCC
150# LCC
900# WCC
900# WC6
600# WCC
600# WC6
600# CF8M
300# WCC
300# CF8M
300# Light WCC
300# WC6
150# CF8M
CC
150# W
-200 -150 -100 -50 0 50 100 150 200 250 300 350 400 450 500 550
Discharge Temperature (°C)
CF8M (below -46°C)
LCC
WCC (-29 to +427°C)
WC6

## ORIFICE : N
## 28 cm²
## 4.34 in²

## FLAMMER's 66 Series Selection Table

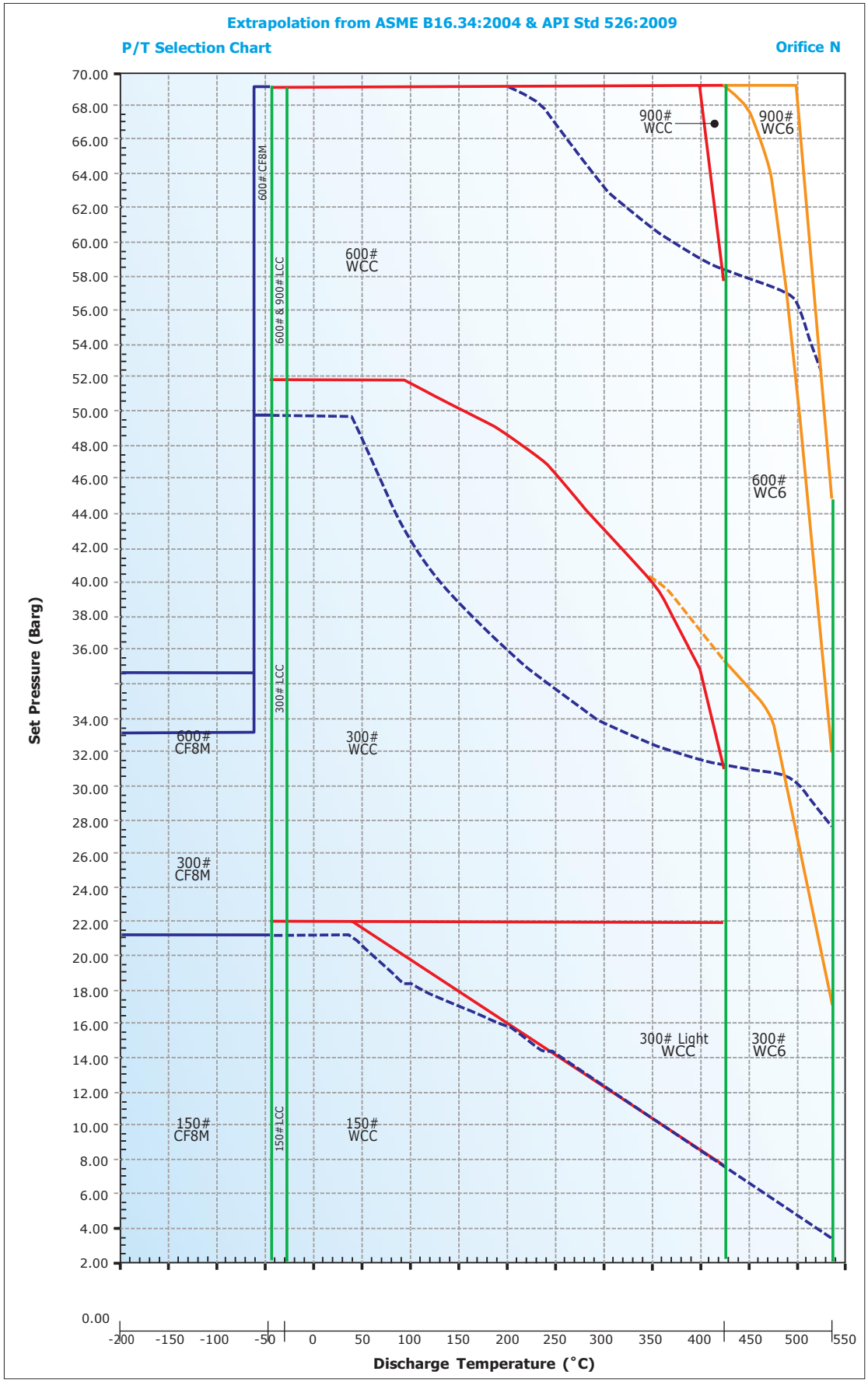
According to API Std 526 : (edition 2009)

| INLET x ORIFICE x OUTLET | ANSI FLANGE RATING Inlet | Outlet | Model Number | Conven-tional | Bellows | Steam service | MAX. SET PRESSURE barg (psig) -268°C to -47°C (-450°F to -51°F) | -46°C to-29°C (-50°F to -21°F) | -29°C to +38°C (-20°F to 100°F) | <232°C (<450°F) | <427°C (<800°F) | <538°C (<1000°F) | MAX. BACK PRESSURE (1) barg (psig) Conven-tional | Bellows | MATERIALS Body | Spring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 N 6 | 150 | 150 | P46N1 | 330 | 430 | 530 | | | 19.8 (285) | 13 (185) | 5.5 (80) | | 19.8 (285) | 5.5 (80) | | |
| 4 N 6 | 300 | 150 | P46N7 | 330 | 430 | 530 | | | 19.8 (285) | 19.8 (285) | 19.8 (285) | | 19.8 (285) | 5.5 (80) | SA 216 | Alloy |
| 4 N 6 | 300 | 150 | P46N2 | 330 | 430 | 530 | | | 51 (740) | 42.4 (615) | 28 (410) | | 19.8 (285) | 11 (160) | | |
| 4 N 6 | 600 | 150 | P46N3 | 330 | 430 | 530 | | | 69 (1000) | 69 (1000) | 57 (825) | | 19.8 (285) | 11 (160) | Gr. WCC | Steel |
| 4 N 6 | 900 | 150 | P46N4 | 330 | 430 | 530 | | | | 69 (1000) | 69 (1000) | | 19.8 (285) | 11 (160) | | |
| 4 N 6 | 300 | 150 | P46N2 | 332 | 432 | 502 | | | | | 35 (510) | 16 (225) | 19.8 (285) | 11 (160) | SA 216 | High Temp. |
| 4 N 6 | 600 | 150 | P46N3 | 332 | 432 | 502 | | | | | 69 (1000) | 31 (445) | 19.8 (285) | 11 (160) | Gr. WC6 | Alloy |
| 4 N 6 | 900 | 150 | P46N4 | 332 | 432 | 502 | | | | | 69 (1000) | 46 (670) | 19.8 (285) | 11 (160) | | Steel |
| 4 N 6 | 150 | 150 | P46N1 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 5.5 (80) | | |
| 4 N 6 | 300 | 150 | P46N7 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 5.5 (80) | SA 352 | Alloy |
| 4 N 6 | 300 | 150 | P46N2 | 319 | 419 | | | 51 (740) | | | | | 19.8 (285) | 11 (160) | Gr. LCC | Steel |
| 4 N 6 | 600 | 150 | P46N3 | 319 | 419 | | | 69 (1000) | | | | | 19.8 (285) | 11 (160) | | |
| 4 N 6 | 150 | 150 | P46N1 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 5.5 (80) | | |
| 4 N 6 | 300 | 150 | P46N7 | 316 | 416 | | 19 (275) | | | | | | 19 (275) | 5.5 (80) | SA 351 | Stainless |
| 4 N 6 | 300 | 150 | P46N2 | 316 | 416 | | 31 (450) | | | | | | 19 (275) | 11 (160) | Gr. CF8M | Steel |
| 4 N 6 | 600 | 150 | P46N3 | 316 | 416 | | 34 (500) | | | | | | 19 (275) | 11 (160) | | |




| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | MODEL NUMBER | A(2) mm (in) | B(2) mm (in) | C mm (in) | D mm (in) | E mm (in) | N mm (in) | Approximate weight (3) kg (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 N 6 | 150 | 150 | P46N1 | 196.8 (7-¾) | 209.5 (8-¼) | 750 (30) | 25.4 (1) | 40 (1-9/16) | 14 (9/16) | 95 (210) |
| 4 N 6 | 300 | 150 | P46N7 | 196.8 (7-¾) | 209.5 (8-¼) | 750 (30) | 25.4 (1) | 48 (1-⅞) | 14 (9/16) | 100 (220) |
| 4 N 6 | 300 | 150 | P46N2 | 196.8 (7-¾) | 209.5 (8-¼) | 810 (32) | 25.4 (1) | 48 (1-⅞) | 14 (9/16) | 105 (232) |
| 4 N 6 | 600 | 150 | P46N3 | 196.8 (7-¾) | 222.2 (8-¾) | 870 (34) | 25.4 (1) | 54 (2-⅛) | 14 (9/16) | 125 (276) |
| 4 N 6 | 900 | 150 | P46N4 | 196.8 (7-¾) | 222.2 (8-¾) | 990 (39) | 25.4 (1) | 59 (2-5/16) | 14 (9/16) | 210 (460) |

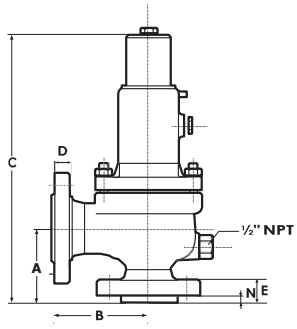
(1) Max. back pressure limits at 38°C; for higher temp. refer to ASME B16.5 flange ratings for conventional valves
(2) Tolerances for A and B : ± 1.6 mm (±1/16 in)
(3) Valves with lifting lever : add 10%


Extrapolation from ASME B16.34:2004 & API Std 526:2009
P/T Selection Chart
Orifice N
Set Pressure (Barg)
Discharge Temperature (°C)
70.00
68.00
66.00
64.00
62.00
60.00
58.00
56.00
54.00
52.00
50.00
48.00
46.00
44.00
42.00
40.00
38.00
36.00
34.00
32.00
30.00
28.00
26.00
24.00
22.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-200 -150 -100 -50 0 50 100 150 200 250 300 350 400 450 500 550
600# CF8M
600# & 900# LCC
600# WCC
900# WCC
900# WC6
600# WC6
300# LCC
600# CF8M
300# WCC
300# CF8M
300# Light WCC
300# WC6
150# CF8M
150# LCC
150# WCC
CF8M (below -46°C)
LCC
WCC (-29 to +427°C)
WC6

## ORIFICE : P
## 41.2 cm²
## 6.38 in²

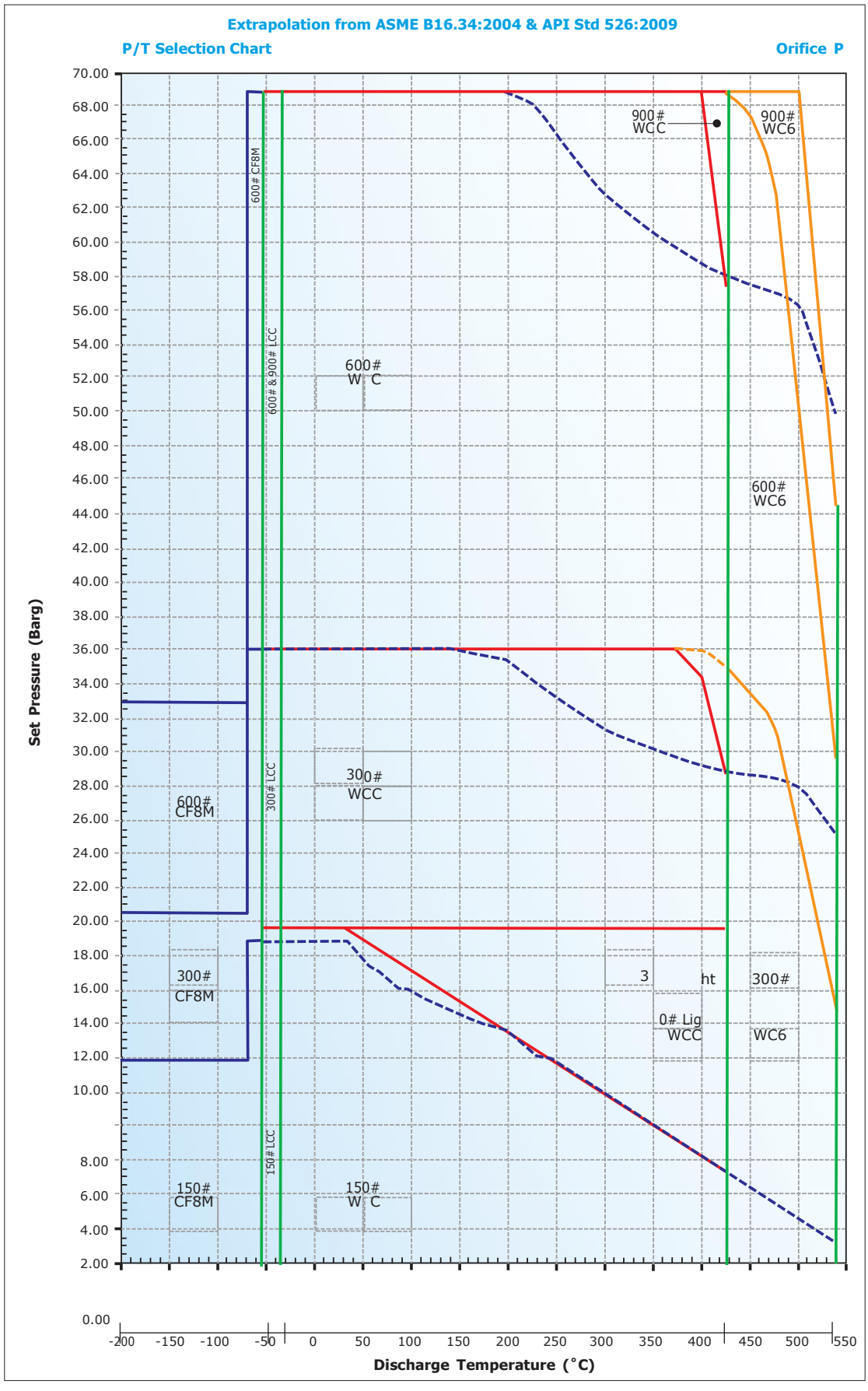
## FLAMMER's 66 Series Selection Table
According to API Std 526 : (edition 2009)

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | Model Number | Conven-tional | Bellows | Steam service | MAX. SET PRESSURE barg (psig) -268°C to -47°C (-450°F to -51°F) | -46°C to -29°C (-50°F to -21°F) | -29°C to +38°C (-20°F to 100°F) | <232°C (<450°F) | <427°C (<800°F) | <538°C (<1000°F) | MAX. BACK PRESSURE (1) barg (psig) Conven-tional | Bellows | MATERIALS Body | Spring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 P 6 | 150 | 150 | P46P1 | 330 | 430 | 530 | | | 19.8 (285) | 13 (185) | 5.5 (80) | | 19.8 (285) | 5.5 (80) | | |
| 4 P 6 | 300 | 150 | P46P7 | 330 | 430 | 530 | | | 19.8 (285) | 19.8 (285) | 19.8 (285) | | 19.8 (285) | 5.5 (80) | | |
| 4 P 6 | 300 | 150 | P46P2 | 330 | 430 | 530 | | | 36.2 (525) | 36.2 (525) | 28 (410) | | 19.8 (285) | 10 (150) | SA 216 WCC | Alloy Steel |
| 4 P 6 | 600 | 150 | P46P3 | 330 | 430 | 530 | | | 69 (1000) | 69 (1000) | 57 (825) | | 19.8 (285) | 10 (150) | | |
| 4 P 6 | 900 | 150 | P46P4 | 330 | 430 | 530 | | | | 69 (1000) | 69 (1000) | | 19.8 (285) | 10 (150) | | |
| 4 P 6 | 300 | 150 | P46P2 | 332 | 432 | 502 | | | | | 35 (510) | 16 (225) | 19.8 (285) | 10 (150) | SA 216 | High Temp. |
| 4 P 6 | 600 | 150 | P46P3 | 332 | 432 | 502 | | | | | 69 (1000) | 31 (445) | 19.8 (285) | 10 (150) | Gr. WC6 | Alloy |
| 4 P 6 | 900 | 150 | P46P4 | 332 | 432 | 502 | | | | | 69 (1000) | 46 (670) | 19.8 (285) | 10 (150) | | Steel |
| 4 P 6 | 150 | 150 | P46P1 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 5.5 (80) | | |
| 4 P 6 | 300 | 150 | P46P7 | 319 | 419 | | | 19.8 (285) | | | | | 19.8 (285) | 5.5 (80) | SA 352 | Alloy |
| 4 P 6 | 300 | 150 | P46P2 | 319 | 419 | | | 36 (525) | | | | | 19.8 (285) | 10 (150) | Gr. LCC | Steel |
| 4 P 6 | 600 | 150 | P46P3 | 319 | 419 | | | 69 (1000) | | | | | 19.8 (285) | 10 (150) | | |
| 4 P 6 | 150 | 150 | P46P1 | 316 | 416 | | 12 (175) | | | | | | 12 (175) | 5.5 (80) | | |
| 4 P 6 | 300 | 150 | P46P7 | 316 | 416 | | 12 (175) | | | | | | 12 (175) | 5.5 (80) | SA 351 | Stainless |
| 4 P 6 | 300 | 150 | P46P2 | 316 | 416 | | 21 (300) | | | | | | 19 (275) | 10 (150) | Gr. CF8M | Steel |
| 4 P 6 | 600 | 150 | P46P3 | 316 | 416 | | 33 (486) | | | | | | 19 (275) | 10 (150) | | |




| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | MODEL NUMBER | A(2) mm (in) | B(2) mm (in) | C mm (in) | D mm (in) | E mm (in) | N mm (in) | Approximate weight (3) kg (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 P 6 | 150 | 150 | P46P1 | 181 (7-1/8) | 228.6 (9) | 795 (32) | 25.4 (1) | 40 (1-9/16) | 14 (9/16) | 105 (232) |
| 4 P 6 | 300 | 150 | P46P7 | 181 (7-1/8) | 228.6 (9) | 795 (32) | 25.4 (1) | 46 (1-13/16) | 14 (9/16) | 110 (242) |
| 4 P 6 | 300 | 150 | P46P2 | 225.4 (8-7/8) | 254 (10) | 850 (34) | 25.4 (1) | 48 (1-7/8) | 14 (9/16) | 125 (276) |
| 4 P 6 | 600 | 150 | P46P3 | 225.4 (8-7/8) | 254 (10) | 875 (35) | 25.4 (1) | 54 (2-1/8) | 14 (9/16) | 145 (320) |
| 4 P 6 | 900 | 150 | P46P4 | 225.4 (8-7/8) | 254 (10) | 1180 (47) | 25.4 (1) | 59 (2-5/16) | 14 (9/16) | 250 (550) |

(1) Max. back pressure limits at 38°C; for higher temp. refer to ASME B16.5 flange ratings for conventional valves
(2) Tolerances for A and B : ± 1.6 mm (±1/16 in)
(3) Valves with lifting lever : add 10%

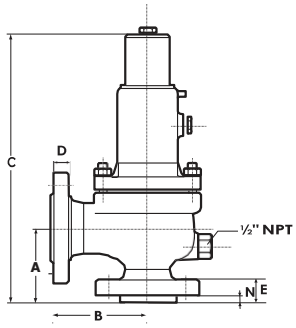

Extrapolation from ASME B16.34:2004 & API Std 526:2009
P/T Selection Chart
Orifice P
Set Pressure (Barg)
Discharge Temperature (˚C)
70.00
68.00
66.00
64.00
62.00
60.00
58.00
56.00
54.00
52.00
50.00
48.00
46.00
44.00
42.00
40.00
38.00
36.00
34.00
32.00
30.00
28.00
26.00
24.00
22.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-200
-150
-100
-50
0
50
100
150
200
250
300
350
400
450
500
550
600# CF8M
600# & 900# LCC
300# LCC
150# LCC
900# WCC
900# WC6
600# W C
600# WC6
300# WCC
600# CF8M
300# CF8M
3 ht
300#
0# Lig
WCC
WC6
150# CF8M
150# W C
CF8M (below -46˚C)
LCC
WCC (-29 to +427˚C)
WC6

**ORIFICE : Q**
**71.2 cm²**
**11.05 in²**

## FLAMMER's 66 Series Selection Table

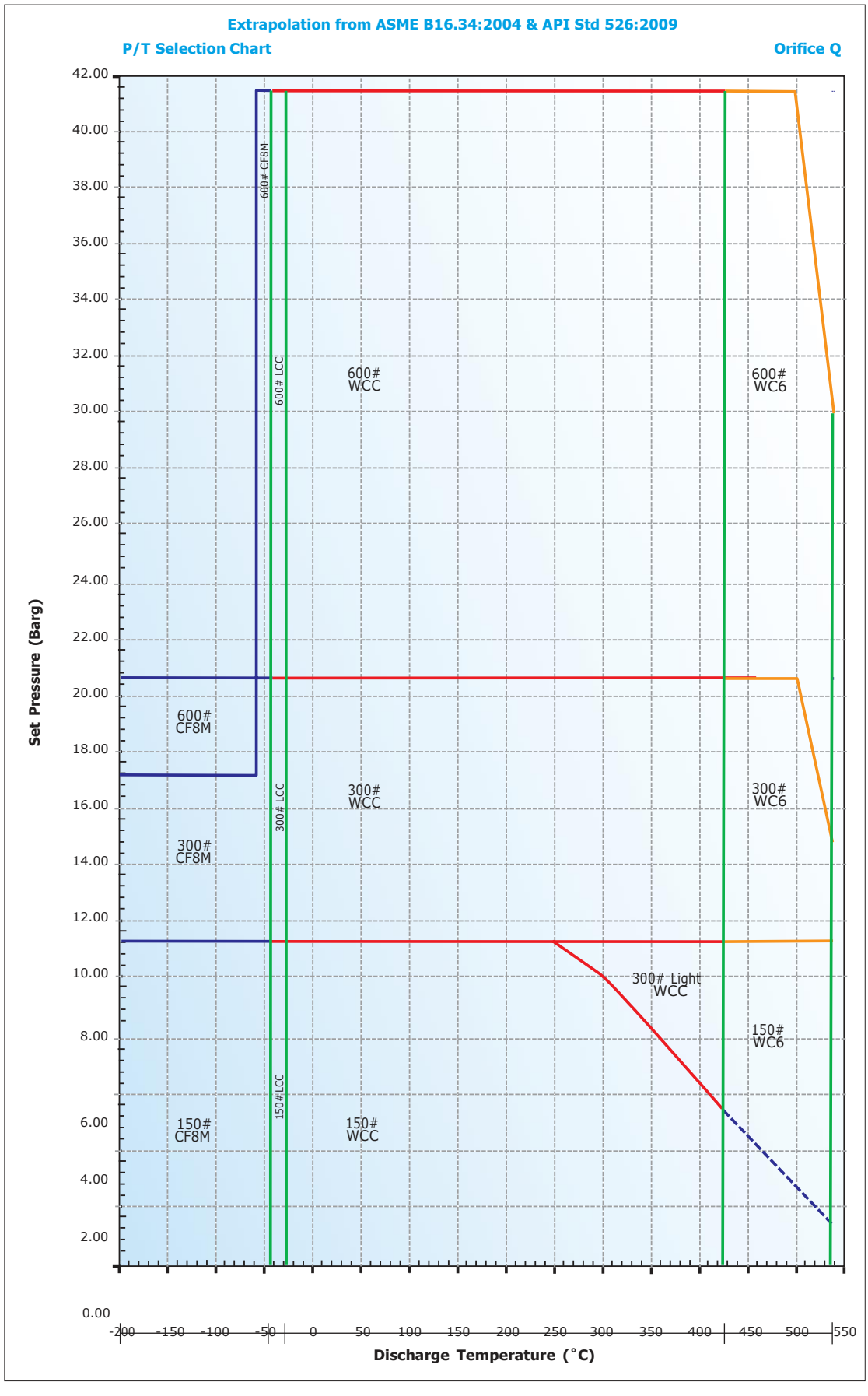
According to API Std 526 : (edition 2009)

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | Model Number | Conventional | Balanced bellows | Steam service | MAX. SET PRESSURE barg (psig) -268°C to -47°C (-450°F to -51°F) | -46°C to -29°C (-50°F to -21°F) | -29°C to +38°C (-20°F to 100°F) | <232°C (<450°F) | <427°C (<800°F) | <538°C (<1000°F) | MAX. BACK PRESSURE (1) barg (psig) Conventional | Balanced bellows | MATERIALS Body | Spring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 150 | 150 | P68Q1 | 330 | 430 | 530 | | | 11 (165) | 11 (165) | | | 8 (115) | | | |
| 6 Q 8 | 300 | 150 | P68Q7 | 330 | 430 | 530 | | | 11 (165) | 11 (165) | 11 (165) | | 8 (115) | 5 (70) | SA 216 | Alloy |
| | 300 | 150 | P68Q2 | 330 | 430 | 530 | | | 21 (300) | 21 (300) | 21 (300) | | 8 (115) | 8 (115) | Gr. WCC | Steel |
| 6 Q 8 | 600 | 150 | P68Q3 | 330 | 430 | 530 | | | 41 (600) | 41 (600) | 41 (600) | | 8 (115) | 8 (115) | | |
| | 300 | 150 | P68Q2 | 332 | 432 | 502 | | | | | 11 (165) | 11 (165) | 8 (115) | 8 (115) | SA 216 | High Temp. |
| 6 Q 8 | 600 | 150 | P68Q3 | 332 | 432 | 502 | | | | | 41 (600) | 31 (445) | 8 (115) | 8 (115) | Gr. WC6 | Alloy Steel |
| | 150 | 150 | P68Q1 | 319 | 419 | | | 11 (165) | | | | | 8 (115) | | | |
| 6 Q 8 | 300 | 150 | P68Q7 | 319 | 419 | | | 11 (165) | | | | | 8 (115) | 5 (70) | SA 352 | Alloy |
| | 300 | 150 | P68Q2 | 319 | 419 | | | 21 (300) | | | | | 8 (115) | 8 (115) | Gr. LCC | Steel |
| 6 Q 8 | 600 | 150 | P68Q3 | 319 | 419 | | | 41 (600) | | | | | 8 (115) | 8 (115) | | |
| | 150 | 150 | P68Q1 | 316 | 416 | | 11 (165) | | | | | | 8 (115) | | | |
| 6 Q 8 | 300 | 150 | P68Q7 | 316 | 416 | | 11 (165) | | | | | | 8 (115) | 5 (70) | SA 351 | Stainless |
| | 300 | 150 | P68Q2 | 316 | 416 | | 17 (250) | | | | | | 8 (115) | 8 (115) | Gr. CF8M | Steel |
| 6 Q 8 | 600 | 150 | P68Q3 | 316 | 416 | | 21 (300) | | | | | | 8 (115) | 8 (115) | | |




| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | MODEL NUMBER | A(2) mm (in) | B(2) mm (in) | C mm (in) | D mm (in) | E mm (in) | N mm (in) | Approximate weight (3) kg (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 Q 8 | 150 | 150 | P68Q1 | 239.7 (9-7/16) | 241.3 (9-½) | 950 (38) | 28.6 (1-⅛) | 45 (1-¾) | 18 (11/16) | 215 (474) |
| 6 Q 8 | 300 | 150 | P68Q7 | 239.7 (9-7/16) | 241.3 (9-½) | 950 (38) | 28.6 (1-⅛) | 57 (2-¼) | 18 (11/16) | 230 (507) |
| 6 Q 8 | 300 | 150 | P68Q2 | 239.7 (9-7/16) | 241.3 (9-½) | 1070 (43) | 28.6 (1-⅛) | 57 (2-¼) | 18 (11/16) | 255 (562) |
| 6 Q 8 | 600 | 150 | P68Q3 | 239.7 (9-7/16) | 241.3 (9-½) | 1140 (45) | 28.6 (1-⅛) | 68 (2-11/16) | 18 (11/16) | 305 (672) |

(1) Max. back pressure limits at 38°C; for higher temp. refer to ASME B16.5 flange ratings for conventional valves
(2) Tolerances for A and B : ± 3.2 mm (±⅛in)
(3) Valves with lifting lever : add 10%

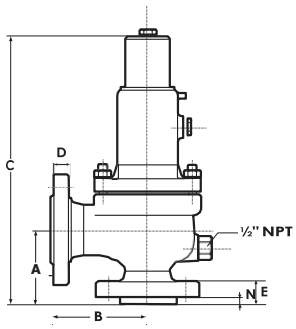

Extrapolation from ASME B16.34:2004 & API Std 526:2009
P/T Selection Chart
Orifice Q
Set Pressure (Barg)
42.00
40.00
38.00
36.00
34.00
32.00
30.00
28.00
26.00
24.00
22.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
600# CF8M
600# LCC
600# WCC
600# WC6
600# CF8M
300# LCC
300# WCC
300# WC6
300# CF8M
300# Light WCC
150# WC6
150# LCC
150# CF8M
150# WCC
-200 -150 -100 -50 0 50 100 150 200 250 300 350 400 450 500 550
Discharge Temperature (˚C)
CF8M (below -46˚C)
LCC
WCC (-29 to +427˚C)
WC6

**ORIFICE : R**
**103.2 cm²**
**16.00 in²**

## FLAMMER's 66 Series Selection Table

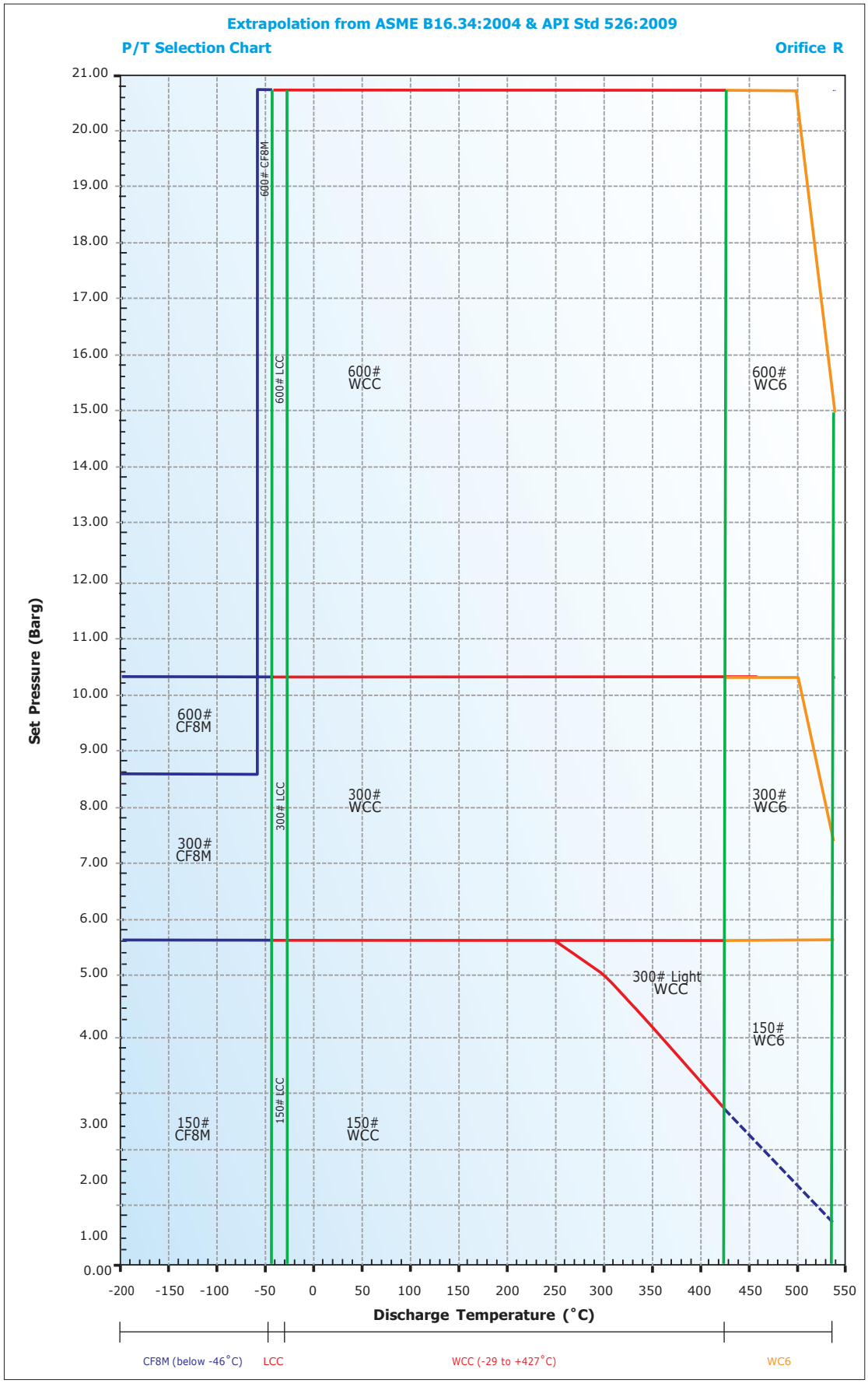
According to API Std 526 : (edition 2009)

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | Model Number tion | nven- B | llows | Steam t service | MAX. SET PRESSURE barg (psig) -268°C -47°C to (-450°F to -51°F) | -46°C -29°C (-50°F to -21°F) | -29°C to +38°C (-20°F to 100°F) | <232°C (<450°F) | <427°C (<800°F) | <538°C ( (<1000°F) | MAX. BACK PRESSURE (1) barg (psig) nven- B tional | llows | MATERIALS Body | Spring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 R 8 | 150 | 150 | P68R1 | 330 | 430 | 530 | | | 7 (100) | 7 (100) | 5.5 (80) | | 4 (60) | 4 (60) | | |
| 6 R 8 | 300 | 150 | P68R7 | 330 | 430 | 530 | | | 7 (100) | 7 (100) | 7 (100) | | 4 (60) | 4 (60) | SA 216 | Alloy |
| 6 R 10 | 300 | 150 | P69R2 | 330 | 430 | 530 | | | 16 (230) | 16 (230) | 16 (230) | | 7 (100) | 7 (100) | Gr. WCC | Steel |
| 6 R 10 | 600 | 150 | P69R3 | 330 | 430 | 530 | | | 21 (300) | 21 (300) | 21 (300) | | 7 (100) | 7 (100) | | |
| 6 R 8 | 300 | 150 | P69R2 | 332 | 432 | 502 | | | | | 7 (100) | 7 (100) | 4 (60) | 4 (60) | SA 216 | High Temp. |
| 6 R 10 | 600 | 150 | P69R3 | 332 | 432 | 502 | | | | | 21 (300) | 21 (300) | 7 (100) | 7 (100) | Gr. WC6 | Alloy Steel |
| 6 R 8 | 150 | 150 | P68R1 | 319 | 419 | | | 7 (100) | | | | | 4 (60) | 4 (60) | | |
| 6 R 8 | 300 | 150 | P68R7 | 319 | 419 | | | 7 (100) | | | | | 4 (60) | 4 (60) | SA 352 | Alloy |
| 6 R 10 | 300 | 150 | P69R2 | 319 | 419 | | | 16 (230) | | | | | 7 (100) | 7 (100) | Gr. LCC | Steel |
| 6 R 10 | 600 | 150 | P69R3 | 319 | 419 | | | 21 (300) | | | | | 7 (100) | 7 (100) | | |
| 6 R 8 | 150 | 150 | P68R1 | 316 | 416 | | 3.8 (55) | | | | | | 3.8 (55) | 3.8 (55) | | |
| 6 R 8 | 300 | 150 | P68R7 | 316 | 416 | | 3.8 (55) | | | | | | 3.8 (55) | 3.8 (55) | SA 351 | Stainless |
| 6 R 10 | 300 | 150 | P69R2 | 316 | 416 | | 10 (150) | | | | | | 7 (100) | 7 (100) | Gr. CF8M | Steel |
| 6 R 10 | 600 | 150 | P69R3 | 316 | 416 | | 14 (200) | | | | | | 7 (100) | 7 (100) | | |




| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | MODEL NUMBER | A(2) mm (in) | B(2) mm (in) | C mm (in) | D mm (in) | E mm (in) | N mm (in) | Approximate weight (3) kg (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 R 8 | 150 | 150 | P68R1 | 239.7 (9-7/16) | 241.3 (9-1/2) | 950 (38) | 28.6 (1-1/8) | 45 (1-3/4) | 18 (11/16) | 215 (474) |
| 6 R 8 | 300 | 150 | P68R7 | 239.7 (9-7/16) | 241.3 (9-1/2) | 950 (38) | 28.6 (1-1/8) | 57 (2-1/4) | 18 (11/16) | 230 (507) |
| 6 R 10 | 300 | 150 | P69R2 | 239.7 (9-7/16) | 266.7 (10-1/2) | 1070 (43) | 30.2 (1-3/16) | 57 (2-1/4) | 18 (11/16) | 275 (606) |
| 6 R 10 | 600 | 150 | P69R3 | 239.7 (9-7/16) | 266.7 (10-1/2) | 1140 (45) | 30.2 (1-3/16) | 68 (2-11/16) | 18 (11/16) | 325 (716) |

(1) Max. back pressure limits at 38°C; for higher temp. refer to ASME B16.5 flange ratings for conventional valves
(2) Tolerances for A and B : ± 3.2 mm (±1/8in)
(3) Valves with lifting lever : add 10%

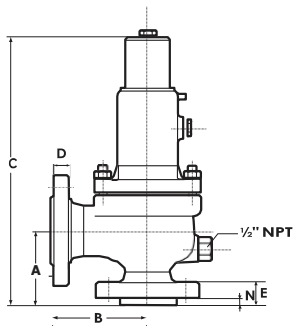

Extrapolation from ASME B16.34:2004 & API Std 526:2009
P/T Selection Chart
Orifice R
Set Pressure (Barg)
21.00
20.00
19.00
18.00
17.00
16.00
15.00
14.00
13.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
600# CF8M
600# LCC
600# WCC
600# WC6
600# CF8M
300# LCC
300# WCC
300# WC6
300# CF8M
300# Light WCC
150# WC6
150# LCC
150# CF8M
150# WCC
-200
-150
-100
-50
0
50
100
150
200
250
300
350
400
450
500
550
Discharge Temperature (°C)
CF8M (below -46°C)
LCC
WCC (-29 to +427°C)
WC6

**ORIFICE : T**
**168 cm²**
**26.00 in²**

## FLAMMER's 66 Series Selection Table

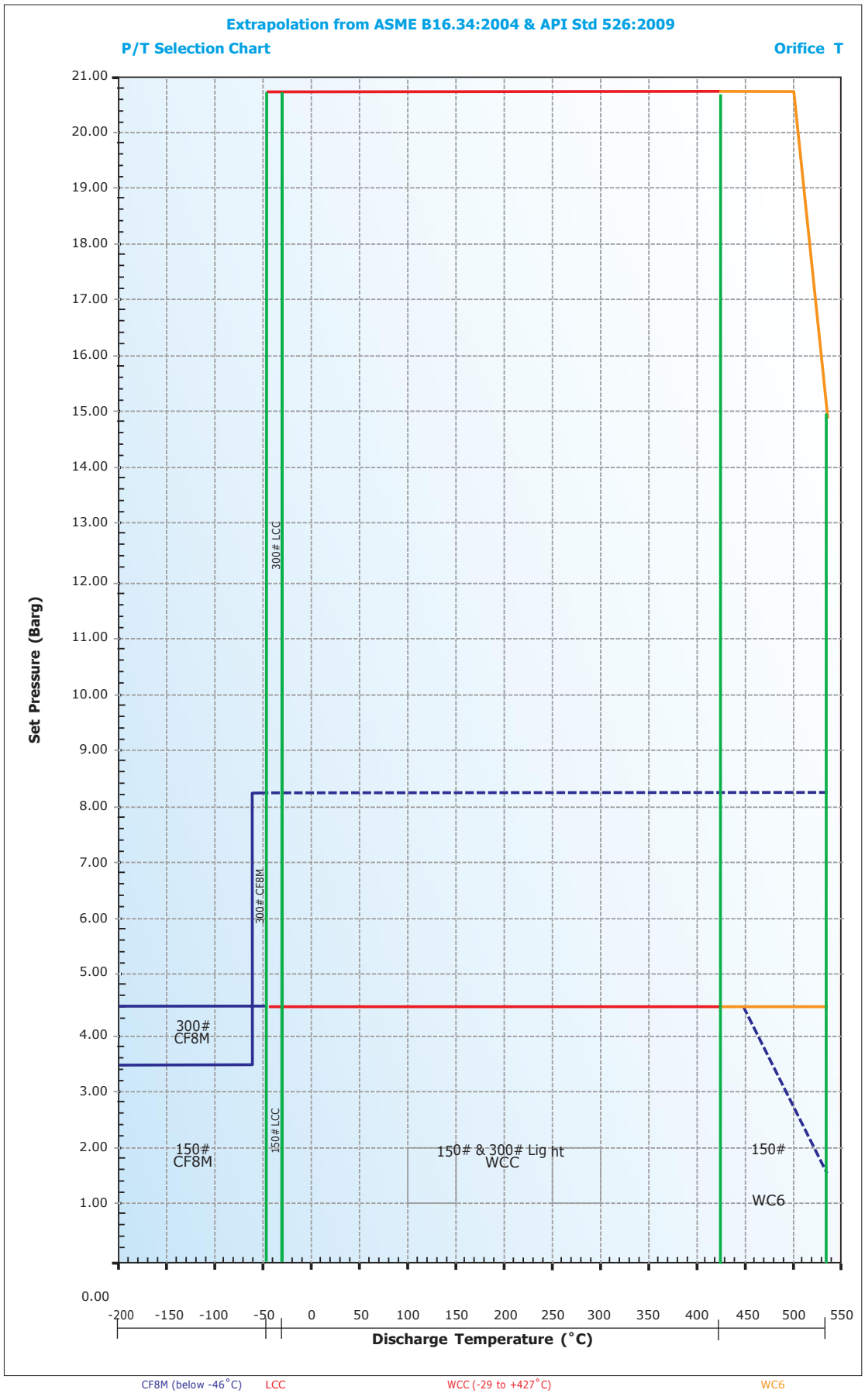
According to API 526 : (edition 2009)

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | Model Number | Conventional | Bellows | Steam service | MAX. SET PRESSURE barg (psig) -268°C to -47°C (-450°F to -51°F) | -46°C to -29°C (-50°F to -21°F) | -29°C to +38°C (-20°F to 100°F) | <232°C (<450°F) | <427°C (<800°F) | <538°C (<1000°F) | MAX. BACK PRESSURE (1) barg (psig) Conventional | Bellows | MATERIALS Body | Spring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 T 10 | 150 | 150 | P89T1 | 330 | 430 | 530 | | | 4.5 (65) | 4.5 (65) | 4.5 (65) | | 2 (30) | 2 (30) | | |
| 8 T 10 | 300 | 150 | P89T7 | 330 | 430 | 530 | | | 4.5 (65) | 4.5 (65) | 4.5 (65) | | 2 (30) | 2 (30) | SA 216 | Alloy |
| 8 T 10 | 300 | 150 | P89T2 | 330 | 430 | 530 | | | 8 (120) | 8 (120) | 8 (120) | | 4 (60) | 4 (60) | Gr. WCC | Steel |
| 8 T 10 | 300 | 150 | P89T3 | 330 | 430 | 530 | | | 21 (300) | 21 (300) | 21 (300) | | 7 (100) | 7 (100) | | |
| 8 T 10 | 300 | 150 | P89T2 | 332 | 432 | 502 | | | | | 8 (120) | 8 (120) | 4 (60) | 4 (60) | SA 216 | High Temp. |
| 8 T 10 | 300 | 150 | P89T3 | 332 | 432 | 502 | | | | | 21 (300) | 16 (225) | 7 (100) | 7 (100) | Gr. WC6 | Alloy Steel |
| 8 T 10 | 150 | 150 | P89T1 | 319 | 419 | | | 4.5 (65) | | | | | 2 (30) | 2 (30) | | |
| 8 T 10 | 300 | 150 | P89T7 | 319 | 419 | | | 4.5 (65) | | | | | 2 (30) | 2 (30) | SA 352 | Alloy |
| 8 T 10 | 300 | 150 | P89T2 | 319 | 419 | | | 8 (120) | | | | | 4 (60) | 4 (60) | Gr. LCC | Steel |
| 8 T 10 | 300 | 150 | P89T3 | 319 | 419 | | | 21 (300) | | | | | 7 (100) | 7 (100) | | |
| 8 T 10 | 150 | 150 | P89T1 | 316 | 416 | | 3.5 (50) | | | | | | 2 (30) | 2 (30) | SA 351 | Stainless |
| 8 T 10 | 300 | 150 | P89T7 | 316 | 416 | | 3.5 (50) | | | | | | 2 (30) | 2 (30) | Gr. CF8M | Steel |
| 8 T 10 | 300 | 150 | P89T2 | 316 | 416 | | 4.5 (65) | | | | | | 4 (60) | 4 (60) | | |




| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | MODEL NUMBER | A(2) mm (in) | B(2) mm (in) | C mm (in) | D mm (in) | E mm (in) | N mm (in) | Approximate weight (3) kg (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 T 10 | 150 | 150 | P89T1 | 276.2 (10-7/8) | 279.4 (11) | 1020 (41) | 30.2 (1-3/16) | 49 (1-15/16) | 18 (11/16) | 290 (640) |
| 8 T 10 | 300 | 150 | P89T7 | 276.2 (10-7/8) | 279.4 (11) | 1020 (41) | 30.2 (1-3/16) | 61 (2-3/8) | 18 (11/16) | 310 (683) |
| 8 T 10 | 300 | 150 | P89T2 | 276.2 (10-7/8) | 279.4 (11) | 1200 (48) | 30.2 (1-3/16) | 61 (2-3/8) | 18 (11/16) | 340 (749) |
| 8 T 10 | 300 | 150 | P89T3 | 276.2 (10-7/8) | 279.4 (11) | 1200 (48) | 30.2 (1-3/16) | 61 (2-3/8) | 18 (11/16) | 350 (772) |

(1) Max. back pressure limits at 38°C; for higher temp. refer to ASME B16.5 flange ratings for conventional valves
(2) Tolerances for A and B : ± 3.2 mm (±1/8in)
(3) Valves with lifting lever : add 10%


Extrapolation from ASME B16.34:2004 & API Std 526:2009
P/T Selection Chart
Orifice T
Set Pressure (Barg)
21.00
20.00
19.00
18.00
17.00
16.00
15.00
14.00
13.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
300# LCC
300# CF8M
150# LCC
300# CF8M
150# CF8M
150# & 300# Lig ht WCC
150#
WC6
-200 -150 -100 -50 0 50 100 150 200 250 300 350 400 450 500 550
Discharge Temperature (°C)
CF8M (below -46°C)
LCC
WCC (-29 to +427°C)
WC6

**ORIFICE : V**
**301.6 cm² (actual)**
**46.75 in² (actual)**

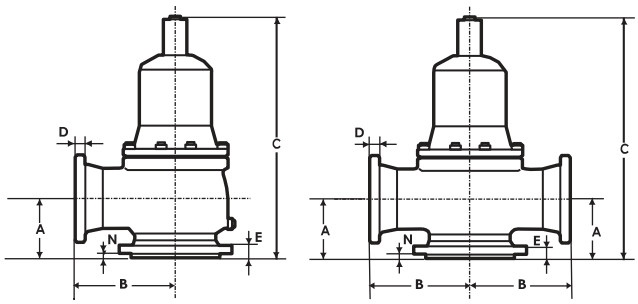
**ORIFICE : W**
**452.3 cm² (actual)**
**70.10 in² (actual)**

## FLAMMER's 66 Series Selection Table

According to ASME B16.34

| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | Model Number | Conven-tional | Bellows | Steam service | MAX. SET PRESSURE barg (psig) -268°C to -47°C (-450°F to -51°F) | -46°C to -29°C (-50°F to -21°F) | -29°C to +38°C (-20°F to 100°F) | <232°C (<450°F) | <427°C (<800°F) | <538°C (<1000°F) | MAX. BACK PRESSURE (1) barg (psig) Conven-tional | Bellows | MATERIALS Body | Spring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 V 14 | 150 | 150 | P9BV1 | 330 | 430 | 530 | | | 7.1 (103) | 7.1 (103) | 5.5 (80) | | 2 (30) | 3 (45) | SA 216 Gr. WCC | Alloy Steel |
| 10 V 14 | 300 | 150 | P9BV7 | 330 | 430 | 530 | | | 7.1 (103) | 7.1 (103) | 5.5 (80) | | 2 (30) | 3 (45) | | |
| 10 V 14 | 300 | 150 | P9BV2 | 330 | 430 | 530 | | | 20 (290) | 20 (290) | 20 (290) | | 4 (60) | 3 (45) | | |
| 10 V 14 | 150 | 150 | P9BV1 | 332 | 432 | 532 | | | | | 5.5 (80) | 5.5 (80) | 2 (30) | 3 (45) | SA 216 Gr. WC6 | High Temp. Alloy Steel |
| 10 V 14 | 300 | 150 | P9BV7 | 332 | 432 | 532 | | | | | 7.1 (103) | 7.1 (103) | 2 (30) | 3 (45) | | |
| 10 V 14 | 300 | 150 | P9BV2 | 332 | 432 | 532 | | | | | 20 (290) | 20 (290) | 4 (60) | 3 (45) | | |
| 10 V 14 | 150 | 150 | P9BV1 | 319 | 419 | | | 7.1 (103) | | | | | 2 (30) | 3 (45) | SA 352 Gr. LCC | Alloy Steel |
| 10 V 14 | 300 | 150 | P9BV7 | 319 | 419 | | | 7.1 (103) | | | | | 2 (30) | 3 (45) | | |
| 10 V 14 | 300 | 150 | P9BV2 | 319 | 419 | | | 20 (290) | | | | | 4 (60) | 3 (45) | | |
| 10 V 14 | 150 | 150 | P9BV1 | 316 | 416 | | 7.1 (103) | | | | | | 2 (30) | 3 (45) | SA 351 Gr. CF8M | Stainless Steel |
| 10 V 14 | 300 | 150 | P9BV7 | 316 | 416 | | 7.1 (103) | | | | | | 2 (30) | 3 (45) | | |
| 10 V 14 | 300 | 150 | P9BV2 | 316 | 416 | | 20 (290) | | | | | | 4 (60) | 3 (45) | | |
| 12 W 12 | 150 | 150 | PAAW1 | 330 | 430 | 530 | | | 6.3 (91) | 6.3 (91) | 5.5 (80) | | 2 (30) | 2 (30) | SA 216 Gr. WCC | Alloy Steel |
| 12 W 12 | 300 | 150 | PAAW7 | 330 | 430 | 530 | | | 6.3 (91) | 6.3 (91) | 5.5 (80) | | 2 (30) | 2 (30) | | |
| 12 W 12 | 300 | 150 | PAAW2 | 330 | 430 | 530 | | | 20 (290) | 20 (290) | 20 (290) | | 4 (60) | 4 (60) | | |
| 12 W 12 | 150 | 150 | PAAW1 | 332 | 432 | 532 | | | | | 5.5 (80) | 5.5 (80) | 2 (30) | 2 (30) | SA 216 Gr. WC6 | High Temp. Alloy Steel |
| 12 W 12 | 300 | 150 | PAAW7 | 332 | 432 | 532 | | | | | 6.3 (91) | 6.3 (91) | 2 (30) | 2 (30) | | |
| 12 W 12 | 300 | 150 | PAAW2 | 332 | 432 | 532 | | | | | 20 (290) | 20 (290) | 4 (60) | 4 (60) | | |
| 12 W 12 | 150 | 150 | PAAW1 | 319 | 419 | | | 6.3 (91) | | | | | 2 (30) | 2 (30) | SA 352 Gr. LCC | Alloy Steel |
| 12 W 12 | 300 | 150 | PAAW7 | 319 | 419 | | | 6.3 (91) | | | | | 2 (30) | 2 (30) | | |
| 12 W 12 | 300 | 150 | PAAW2 | 319 | 419 | | | 20 (290) | | | | | 4 (60) | 4 (60) | | |
| 12 W 12 | 150 | 150 | PAAW1 | 316 | 416 | | 6.3 (91) | | | | | | 2 (30) | 2 (30) | SA 351 Gr. CF8M | Stainless Steel |
| 12 W 12 | 300 | 150 | PAAW7 | 316 | 416 | | 6.3 (91) | | | | | | 2 (30) | 2 (30) | | |
| 12 W 12 | 300 | 150 | PAAW2 | 316 | 416 | | | | | | | | 4 (60) | 4 (60) | | |

**Orifice V** **Orifice W**

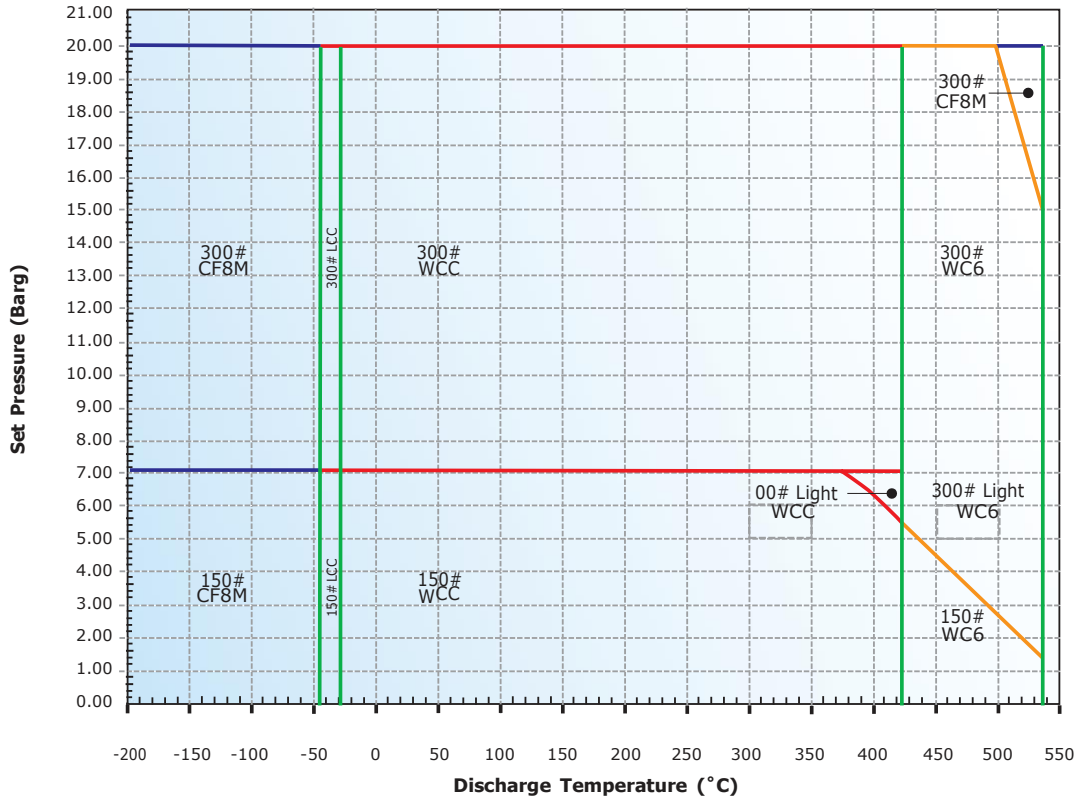



| INLETx ORIFICEx OUTLET | ANSI FLANGE RATING Inlet | Outlet | MODEL NUMBER | A(2) mm (in) | B(2) mm (in) | C mm (in) | D mm (in) | E mm (in) | N mm (in) | Approximate weight (3) kg (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 V 14 | 150 | 150 | P9BV1 | 380 (14-15/16) | 370 (14-9/16) | 1370 (53-15/16) | 35 (1-3/8) | 59 (2-5/16) | 28 (1-1/8) | 470 (1080) |
| 10 V 14 | 300 | 150 | P9BV7 | 380 (14-15/16) | 370 (14-9/16) | 1370 (53-15/16) | 35 (1-3/8) | 77.5 (3-1/16) | 28 (1-1/8) | 530 (1215) |
| 10 V 14 | 300 | 150 | P9BV2 | 380 (14-15/16) | 370 (14-9/16) | 1620 (63-3/4) | 35 (1-3/8) | 77.5 (3-1/16) | 28 (1-1/8) | 780 (1790) |
| 12 W 12 | 150 | 150 | PAAW1 | 328 (12-15/16) | 430 (16-15/16) | 1375 (54-1/8) | 31.8 (1-1/4) | 61 (2-3/8) | 28 (1-1/8) | 580 (1330) |
| 12 W 12 | 300 | 150 | PAAW7 | 328 (12-15/16) | 430 (16-15/16) | 1375 (54-1/8) | 39 (1-9/16) | 82 (3-1/4) | 28 (1-1/8) | 650 (1330) |
| 12 W 12 | 300 | 150 | PAAW2 | 328 (12-15/16) | 430 (16-15/16) | 1650 (64-15/16) | 39 (1-9/16) | 82 (3-1/4) | 28 (1-1/8) | 830 (1900) |

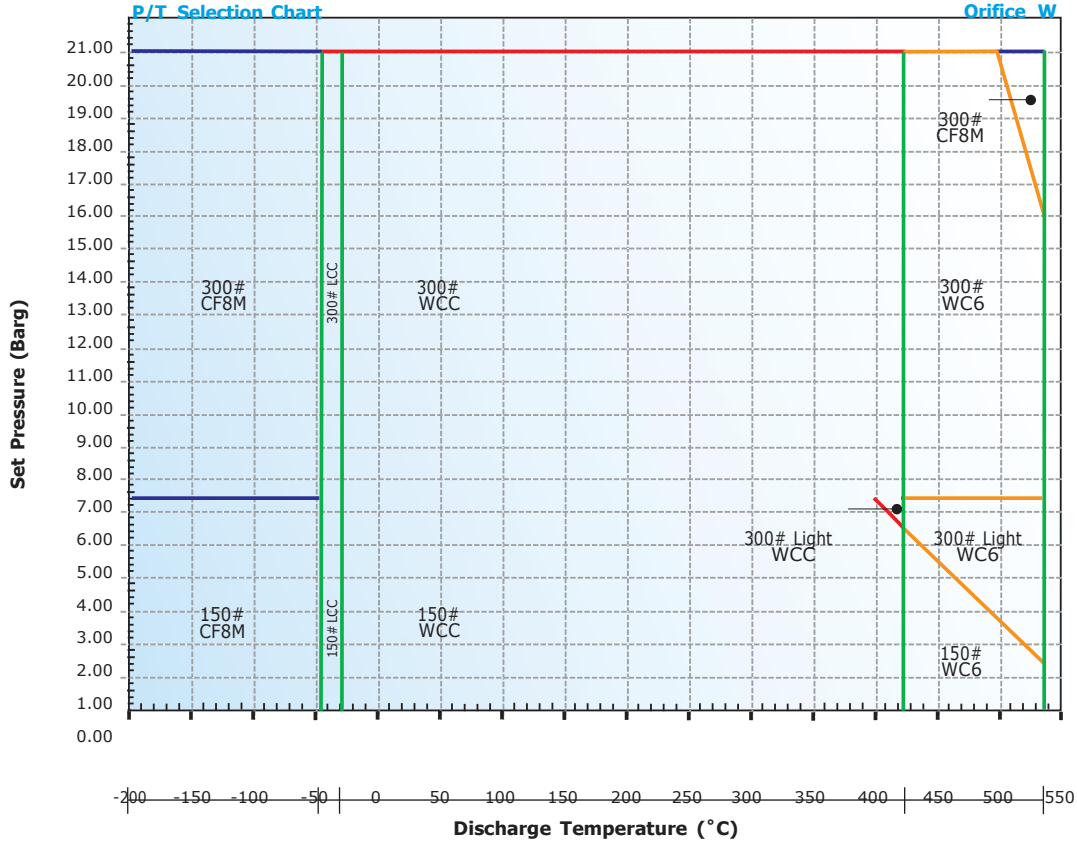
(2) Tolerances for A and B : ± 3.2 mm (±1/8 in)
(3) Valves with lifting lever : add 5%

Extrapolationfrom ASMEB16.34:2004

P/T Selection Chart Orifice V




P/T Selection Chart Orifice W




CF8M (below -46˚C) LCC WCC (-29 to +427˚C) WC6

## FLAMMER's 66 Series

## Capacity Tables Sizing a valve

## usingcapacity tables

For air, steam or water it can be quicker to size the valves using the capacity tables rather than the sizing formulas.

### Example of sizing

Required flow : 5 800 $Nm^3/h$ of air
Set pressure : 42 bar
Overpressure : 10%

Using the air capacity table, with a set pressure of 42 bar, we find an orifice F (1.98 $cm^2$), with a capacity of 6 193 $Nm^3/h$.

This capacity includes the safety margin of 0.9. (as per ASME and ISO requirements).

## FLAMMER's 66 Series Capacity Tables

**Air** **Calculation according to API STD 520** **Capacities in $Nm^3/hr$ at 0°C at 10% overpressure**

| Orifices | D | E | F | G | H | J | K | L | M | N | P | Q | R | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $cm^2$ / Set pressure - barg | 0.71 | 1.26 | 1.98 | 3.24 | 5.06 | 8.30 | 11.86 | 18.41 | 23.22 | 28 | 41.2 | 71.2 | 103.2 | 168 |
| 1 | 99 | 176 | 277 | 454 | 708 | 1162 | 1660 | 2577 | 3250 | 3920 | 5767 | 9967 | 14446 | 23517 |
| 1.5 | 125 | 222 | 349 | 572 | 893 | 1464 | 2092 | 3248 | 4096 | 4940 | 7269 | 12561 | 18207 | 29639 |
| 2 | 151 | 268 | 421 | 690 | 1077 | 1767 | 2524 | 3919 | 4943 | 5960 | 8770 | 15155 | 21967 | 35760 |
| 2.5 | 177 | 314 | 494 | 808 | 1261 | 2069 | 2957 | 4590 | 5789 | 6980 | 10271 | 17750 | 25727 | 41882 |
| 3 | 203 | 360 | 566 | 926 | 1446 | 2372 | 3389 | 5260 | 6635 | 8000 | 11772 | 20344 | 29488 | 48003 |
| 3.5 | 229 | 406 | 638 | 1044 | 1630 | 2674 | 3821 | 5931 | 7481 | 9021 | 13273 | 22938 | 33248 | 54124 |
| 4 | 255 | 452 | 710 | 1162 | 1815 | 2976 | 4253 | 6602 | 8327 | 10041 | 14775 | 25533 | 37008 | 60246 |
| 4.5 | 280 | 498 | 782 | 1280 | 1999 | 3279 | 4685 | 7273 | 9173 | 11061 | 16276 | 28127 | 40768 | 66367 |
| 5 | 306 | 544 | 854 | 1398 | 2183 | 3581 | 5117 | 7944 | 10019 | 12081 | 17777 | 30721 | 44529 | 72489 |
| 5.5 | 332 | 590 | 926 | 1516 | 2368 | 3884 | 5549 | 8614 | 10865 | 13102 | 19278 | 33316 | 48289 | 78610 |
| 6 | 358 | 635 | 999 | 1634 | 2552 | 4186 | 5982 | 9285 | 11711 | 14122 | 20779 | 35910 | 52049 | 84731 |
| 6.5 | 384 | 681 | 1071 | 1752 | 2736 | 4489 | 6414 | 9956 | 12557 | 15142 | 22281 | 38504 | 55810 | 90853 |
| 7 | 410 | 727 | 1143 | 1870 | 2921 | 4791 | 6846 | 10627 | 13403 | 16162 | 23782 | 41099 | 59570 | 96974 |
| 8 | 462 | 819 | 1287 | 2106 | 3290 | 5396 | 7710 | 11968 | 15095 | 18203 | 26784 | 46287 | 67090 | 109217 |
| 8.5 | 487 | 865 | 1359 | 2224 | 3474 | 5698 | 8142 | 12639 | 15941 | 19223 | 28285 | 48882 | 70851 | 115338 |
| 9 | 513 | 911 | 1431 | 2342 | 3658 | 6001 | 8574 | 13310 | 16787 | 20243 | 29787 | 51476 | 74611 | 121460 |
| 9.5 | 539 | 957 | 1504 | 2460 | 3843 | 6303 | 9007 | 13981 | 17634 | 21264 | 31288 | 54070 | 78371 | 127581 |
| 10 | 565 | 1003 | 1576 | 2579 | 4027 | 6606 | 9439 | 14652 | 18480 | 22284 | 32789 | 56664 | 82132 | 133703 |
| 11 | 617 | 1095 | 1720 | 2815 | 4396 | 7210 | 10303 | 15993 | 20172 | 24324 | 35791 | 61853 | 89652 | 145945 |
| 12 | 669 | 1186 | 1864 | 3051 | 4764 | 7815 | 11167 | 17335 | 21864 | 26365 | 38794 | 67042 | 97173 | 158188 |
| 13 | 720 | 1278 | 2009 | 3287 | 5133 | 8420 | 12032 | 18676 | 23556 | 28405 | 41796 | 72230 | 104693 | 170431 |
| 14 | 772 | 1370 | 2153 | 3523 | 5502 | 9025 | 12896 | 20018 | 25248 | 30446 | 44799 | 77419 | 112214 | 182674 |
| 15 | 824 | 1462 | 2297 | 3759 | 5871 | 9630 | 13760 | 21360 | 26940 | 32486 | 47801 | 82608 | 119735 | 194917 |
| 16 | 875 | 1554 | 2442 | 3995 | 6239 | 10235 | 14624 | 22701 | 28632 | 34527 | 50803 | 87796 | 127255 | 207160 |
| 18 | 979 | 1737 | 2730 | 4467 | 6977 | 11444 | 16353 | 25384 | 32017 | 38608 | 56808 | 98173 | 142296 | 231645 |
| 20 | 1082 | 1921 | 3019 | 4940 | 7714 | 12654 | 18082 | 28068 | 35401 | 42688 | 62813 | 108551 | 157338 | 256131 |
| 22 | 1186 | 2105 | 3307 | 5412 | 8452 | 13864 | 19810 | 30751 | 38785 | 46769 | 68818 | 118928 | | |
| 24 | 1289 | 2288 | 3596 | 5884 | 9189 | 15073 | 21539 | 33434 | 42169 | 50850 | 74823 | 129305 | | |
| 26 | 1393 | 2472 | 3884 | 6356 | 9927 | 16283 | 23267 | 36117 | 45554 | 54931 | 80827 | 139682 | | |
| 28 | 1496 | 2656 | 4173 | 6829 | 10664 | 17493 | 24996 | 38801 | 48938 | 59012 | 86832 | 150060 | | |
| 30 | 1600 | 2839 | 4462 | 7301 | 11402 | 18703 | 26724 | 41484 | 52322 | 63093 | 92837 | 160437 | | |
| 32 | 1703 | 3023 | 4750 | 7773 | 12139 | 19912 | 28453 | 44167 | 55707 | 67174 | 98842 | 170814 | | |
| 34 | 1807 | 3206 | 5039 | 8245 | 12877 | 21122 | 30182 | 46850 | 59091 | 71255 | 104847 | 181191 | | |
| 36 | 1910 | 3390 | 5327 | 8717 | 13614 | 22332 | 31910 | 49533 | 62475 | 75336 | 110852 | 191569 | | |
| 38 | 2014 | 3574 | 5616 | 9190 | 14352 | 23541 | 33639 | 52217 | 65859 | 79417 | 116856 | 201946 | | |
| 40 | 2117 | 3757 | 5904 | 9662 | 15089 | 24751 | 35367 | 54900 | 69244 | 83498 | 122861 | 212323 | | |
| 42 | 2221 | 3941 | 6193 | 10134 | 15827 | 25961 | 37096 | 57583 | 72628 | 87579 | 128866 | | | |
| 44 | 2324 | 4125 | 6482 | 10606 | 16564 | 27171 | 38824 | 60266 | 76012 | 91660 | 134871 | | | |
| 46 | 2428 | 4308 | 6770 | 11079 | 17302 | 28380 | 40553 | 62949 | 79396 | 95741 | 140876 | | | |
| 48 | 2531 | 4492 | 7059 | 11551 | 18039 | 29590 | 42282 | 65633 | 82781 | 99822 | 146880 | | | |
| 50 | 2635 | 4676 | 7347 | 12023 | 18777 | 30800 | 44010 | 68316 | 86165 | 103903 | 152885 | | | |
| 52 | 2738 | 4859 | 7636 | 12495 | 19514 | 32009 | 45739 | 70999 | 89549 | 107983 | 158890 | | | |
| 54 | 2842 | 5043 | 7925 | 12967 | 20252 | 33219 | 47467 | 73682 | 92933 | 112064 | 164895 | | | |
| 56 | 2945 | 5227 | 8213 | 13440 | 20989 | 34429 | 49196 | 76366 | 96318 | 116145 | 170900 | | | |
| 58 | 3049 | 5410 | 8502 | 13912 | 21727 | 35639 | 50924 | 79049 | 99702 | 120226 | 176904 | | | |
| 60 | 3152 | 5594 | 8790 | 14384 | 22464 | 36848 | 52653 | 81732 | 103086 | 124307 | 182909 | | | |
| 65 | 3411 | 6053 | 9512 | 15565 | 24308 | 39872 | 56974 | 88440 | 111547 | 134510 | 197921 | | | |
| 70 | 3669 | 6512 | 10233 | 16745 | 26152 | 42897 | 61296 | 95148 | 120008 | 144712 | 212933 | | | |
| 75 | 3928 | 6971 | 10955 | 17926 | 27995 | 45921 | 65617 | 101856 | 128468 | | | | | |
| 80 | 4187 | 7430 | 11676 | 19106 | 29839 | 48945 | 69939 | 108564 | 136929 | | | | | |
| 85 | 4446 | 7889 | 12398 | 20287 | 31683 | 51970 | 74260 | 115272 | | | | | | |
| 90 | 4704 | 8348 | 13119 | 21467 | 33526 | 54994 | 78582 | 121980 | | | | | | |
| 95 | 4963 | 8808 | 13840 | 22648 | 35370 | 58018 | 82903 | 128688 | | | | | | |
| 100 | 5222 | 9267 | 14562 | 23829 | 37214 | 61042 | 87224 | 135396 | | | | | | |
| 110 | 5739 | 10185 | 16005 | 26190 | 40901 | 67091 | 95867 | | | | | | | |
| 120 | 6257 | 11103 | 17448 | 28551 | 44589 | 73139 | 104510 | | | | | | | |
| 130 | 6774 | 12021 | 18891 | 30912 | 48276 | 79188 | 113153 | | | | | | | |
| 140 | 7291 | 12940 | 20334 | 33273 | 51963 | 85236 | 121796 | | | | | | | |
| 150 | 7809 | 13858 | 21776 | 35634 | 55651 | 91285 | 130439 | | | | | | | |
| 160 | 8326 | 14776 | 23219 | 37995 | 59338 | 97334 | | | | | | | | |
| 170 | 8844 | 15694 | 24662 | 40356 | 63026 | 103382 | | | | | | | | |
| 180 | 9361 | 16612 | 26105 | 42717 | 66713 | 109431 | | | | | | | | |
| 190 | 9878 | 17531 | 27548 | 45079 | 70401 | 115479 | | | | | | | | |
| 200 | 10396 | 18449 | 28991 | 47440 | | | | | | | | | | |
| 220 | 11431 | 20285 | 31877 | 52162 | | | | | | | | | | |
| 240 | 12465 | 22122 | 34763 | 56884 | | | | | | | | | | |
| 260 | 13500 | 23958 | 37648 | 61606 | | | | | | | | | | |
| 280 | 14535 | 25794 | 40534 | | | | | | | | | | | |
| 300 | 15570 | 27631 | 43420 | | | | | | | | | | | |
| 320 | 16605 | 29467 | 46306 | | | | | | | | | | | |
| 340 | 17639 | 31304 | 49192 | | | | | | | | | | | |
| 360 | 18674 | 33140 | 52077 | | | | | | | | | | | |
| 380 | 19709 | 34977 | | | | | | | | | | | | |
| 400 | 20744 | 36813 | | | | | | | | | | | | |
| 420 | 21779 | 38649 | | | | | | | | | | | | |

## FLAMMER's 66 Series Capacity Tables

### Saturated Steam Calculation according to API STD 520 Capacities T/hr at 10% overpressure

| Orifices | D | E | F | G | H | J | K | L | M | N | P | Q | R | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| cm² / Set pressure - barg | 0.71 | 1.26 | 1.98 | 3.24 | 5.06 | 8.30 | 11.86 | 18.41 | 23.22 | 28 | 41.2 | 71.2 | 103.2 | 168 |
| 1 | 0.08 | 0.14 | 0.21 | 0.35 | 0.55 | 0.90 | 1.28 | 1.99 | 2.51 | 3.02 | 4.45 | 7.69 | 11.14 | 18.13 |
| 1.5 | 0.10 | 0.17 | 0.27 | 0.44 | 0.69 | 1.13 | 1.61 | 2.50 | 3.16 | 3.81 | 5.60 | 9.69 | 14.04 | 22.85 |
| 2 | 0.12 | 0.21 | 0.32 | 0.53 | 0.83 | 1.36 | 1.95 | 3.02 | 3.81 | 4.60 | 6.76 | 11.69 | 16.94 | 27.57 |
| 2.5 | 0.14 | 0.24 | 0.38 | 0.62 | 0.97 | 1.60 | 2.28 | 3.54 | 4.46 | 5.38 | 7.92 | 13.69 | 19.84 | 32.29 |
| 3 | 0.16 | 0.28 | 0.44 | 0.71 | 1.11 | 1.83 | 2.61 | 4.06 | 5.12 | 6.17 | 9.08 | 15.69 | 22.74 | 37.01 |
| 3.5 | 0.18 | 0.31 | 0.49 | 0.80 | 1.26 | 2.06 | 2.95 | 4.57 | 5.77 | 6.96 | 10.23 | 17.69 | 25.64 | 41.73 |
| 4 | 0.20 | 0.35 | 0.55 | 0.90 | 1.40 | 2.30 | 3.28 | 5.09 | 6.42 | 7.74 | 11.39 | 19.69 | 28.54 | 46.45 |
| 4.5 | 0.22 | 0.38 | 0.60 | 0.99 | 1.54 | 2.53 | 3.61 | 5.61 | 7.07 | 8.53 | 12.55 | 21.69 | 31.44 | 51.17 |
| 5 | 0.24 | 0.42 | 0.66 | 1.08 | 1.68 | 2.76 | 3.95 | 6.13 | 7.73 | 9.32 | 13.71 | 23.69 | 34.34 | 55.89 |
| 5.5 | 0.26 | 0.45 | 0.71 | 1.17 | 1.83 | 2.99 | 4.28 | 6.64 | 8.38 | 10.10 | 14.86 | 25.69 | 37.23 | 60.61 |
| 6 | 0.28 | 0.49 | 0.77 | 1.26 | 1.97 | 3.23 | 4.61 | 7.16 | 9.03 | 10.89 | 16.02 | 27.69 | 40.13 | 65.33 |
| 6.5 | 0.30 | 0.53 | 0.83 | 1.35 | 2.11 | 3.46 | 4.95 | 7.68 | 9.68 | 11.68 | 17.18 | 29.69 | 43.03 | 70.05 |
| 7 | 0.32 | 0.56 | 0.88 | 1.44 | 2.25 | 3.69 | 5.28 | 8.19 | 10.33 | 12.46 | 18.34 | 31.69 | 45.93 | 74.77 |
| 8 | 0.36 | 0.63 | 0.99 | 1.62 | 2.54 | 4.16 | 5.95 | 9.23 | 11.64 | 14.04 | 20.65 | 35.69 | 51.73 | 84.21 |
| 8.5 | 0.38 | 0.67 | 1.05 | 1.72 | 2.68 | 4.39 | 6.28 | 9.75 | 12.29 | 14.82 | 21.81 | 37.69 | 54.63 | 88.93 |
| 9 | 0.40 | 0.70 | 1.10 | 1.81 | 2.82 | 4.63 | 6.61 | 10.26 | 12.94 | 15.61 | 22.97 | 39.69 | 57.53 | 93.65 |
| 9.5 | 0.42 | 0.74 | 1.16 | 1.90 | 2.96 | 4.86 | 6.94 | 10.78 | 13.60 | 16.40 | 24.13 | 41.69 | 60.43 | 98.37 |
| 10 | 0.44 | 0.77 | 1.22 | 1.99 | 3.11 | 5.09 | 7.28 | 11.30 | 14.25 | 17.18 | 25.28 | 43.69 | 63.33 | 103.09 |
| 11 | 0.48 | 0.84 | 1.33 | 2.17 | 3.39 | 5.56 | 7.94 | 12.33 | 15.55 | 18.76 | 27.60 | 47.69 | 69.13 | 112.54 |
| 12 | 0.52 | 0.91 | 1.44 | 2.35 | 3.67 | 6.03 | 8.61 | 13.37 | 16.86 | 20.33 | 29.91 | 51.69 | 74.93 | 121.98 |
| 13 | 0.56 | 0.99 | 1.55 | 2.53 | 3.96 | 6.49 | 9.28 | 14.40 | 18.16 | 21.90 | 32.23 | 55.70 | 80.73 | 131.42 |
| 14 | 0.60 | 1.06 | 1.66 | 2.72 | 4.24 | 6.96 | 9.94 | 15.44 | 19.47 | 23.48 | 34.54 | 59.70 | 86.53 | 140.86 |
| 15 | 0.64 | 1.13 | 1.77 | 2.90 | 4.53 | 7.43 | 10.61 | 16.47 | 20.77 | 25.05 | 36.86 | 63.70 | 92.32 | 150.30 |
| 16 | 0.68 | 1.20 | 1.88 | 3.08 | 4.81 | 7.89 | 11.28 | 17.50 | 22.08 | 26.62 | 39.17 | 67.70 | 98.12 | 159.74 |
| 18 | 0.75 | 1.34 | 2.11 | 3.44 | 5.38 | 8.82 | 12.61 | 19.57 | 24.69 | 29.77 | 43.80 | 75.70 | 109.72 | 178.62 |
| 20 | 0.83 | 1.48 | 2.33 | 3.81 | 5.95 | 9.76 | 13.94 | 21.64 | 27.30 | 32.92 | 48.43 | 83.70 | 121.32 | 197.50 |
| 22 | 0.91 | 1.62 | 2.55 | 4.17 | 6.52 | 10.69 | 15.28 | 23.71 | 29.91 | 36.06 | 53.06 | 91.70 | | |
| 24 | 0.99 | 1.76 | 2.77 | 4.54 | 7.09 | 11.62 | 16.61 | 25.78 | 32.52 | 39.21 | 57.69 | 99.70 | | |
| 26 | 1.07 | 1.91 | 3.00 | 4.90 | 7.65 | 12.56 | 17.94 | 27.85 | 35.13 | 42.36 | 62.32 | 107.71 | | |
| 28 | 1.15 | 2.05 | 3.22 | 5.27 | 8.22 | 13.49 | 19.27 | 29.92 | 37.73 | 45.50 | 66.95 | 115.71 | | |
| 30 | 1.23 | 2.19 | 3.44 | 5.63 | 8.79 | 14.42 | 20.61 | 31.99 | 40.34 | 48.65 | 71.58 | 123.71 | | |
| 32 | 1.31 | 2.33 | 3.66 | 5.99 | 9.36 | 15.35 | 21.94 | 34.06 | 42.95 | 51.80 | 76.21 | 131.71 | | |
| 34 | 1.39 | 2.47 | 3.89 | 6.36 | 9.93 | 16.29 | 23.27 | 36.13 | 45.56 | 54.94 | 80.84 | 139.71 | | |
| 36 | 1.47 | 2.61 | 4.11 | 6.72 | 10.50 | 17.22 | 24.61 | 38.19 | 48.17 | 58.09 | 85.47 | 147.71 | | |
| 38 | 1.55 | 2.76 | 4.33 | 7.09 | 11.07 | 18.15 | 25.94 | 40.26 | 50.78 | 61.24 | 90.11 | 155.72 | | |
| 40 | 1.63 | 2.90 | 4.55 | 7.45 | 11.63 | 19.09 | 27.27 | 42.33 | 53.39 | 64.38 | 94.74 | 163.72 | | |
| 42 | 1.71 | 3.04 | 4.78 | 7.81 | 12.20 | 20.02 | 28.60 | 44.40 | 56.00 | 67.53 | 99.37 | | | |
| 44 | 1.79 | 3.18 | 5.00 | 8.18 | 12.77 | 20.95 | 29.94 | 46.47 | 58.61 | 70.68 | 104.00 | | | |
| 46 | 1.87 | 3.32 | 5.22 | 8.54 | 13.34 | 21.88 | 31.27 | 48.54 | 61.22 | 73.82 | 108.63 | | | |
| 48 | 1.95 | 3.46 | 5.44 | 8.91 | 13.91 | 22.82 | 32.60 | 50.61 | 63.83 | 76.97 | 113.26 | | | |
| 50 | 2.03 | 3.61 | 5.67 | 9.27 | 14.48 | 23.75 | 33.94 | 52.68 | 66.44 | 80.12 | 117.89 | | | |
| 52 | 2.11 | 3.75 | 5.89 | 9.63 | 15.05 | 24.68 | 35.27 | 54.75 | 69.05 | 83.26 | 122.52 | | | |
| 54 | 2.19 | 3.89 | 6.11 | 10.00 | 15.62 | 25.61 | 36.60 | 56.81 | 71.66 | 86.41 | 127.15 | | | |
| 56 | 2.27 | 4.03 | 6.33 | 10.36 | 16.18 | 26.55 | 37.93 | 58.88 | 74.27 | 89.56 | 131.78 | | | |
| 58 | 2.35 | 4.17 | 6.56 | 10.73 | 16.75 | 27.48 | 39.27 | 60.95 | 76.88 | 92.70 | 136.41 | | | |
| 60 | 2.43 | 4.31 | 6.78 | 11.09 | 17.32 | 28.41 | 40.60 | 63.02 | 79.49 | 95.85 | 141.04 | | | |
| 65 | 2.63 | 4.67 | 7.33 | 12.00 | 18.74 | 30.74 | 43.93 | 68.19 | 86.01 | 103.72 | 152.61 | | | |
| 70 | 2.83 | 5.02 | 7.89 | 12.91 | 20.16 | 33.08 | 47.26 | 73.37 | 92.53 | 111.58 | 164.19 | | | |
| 75 | 3.03 | 5.38 | 8.45 | 13.82 | 21.59 | 35.41 | 50.60 | 78.54 | 99.06 | | | | | |
| 80 | 3.23 | 5.73 | 9.00 | 14.73 | 23.01 | 37.74 | 53.93 | 83.71 | 105.58 | | | | | |
| 85 | 3.43 | 6.08 | 9.56 | 15.64 | 24.43 | 40.07 | 57.26 | 88.88 | | | | | | |
| 90 | 3.63 | 6.44 | 10.12 | 16.55 | 25.85 | 42.40 | 60.59 | 94.06 | | | | | | |
| 95 | 3.83 | 6.79 | 10.67 | 17.46 | 27.27 | 44.74 | 63.92 | 99.23 | | | | | | |
| 100 | 4.03 | 7.15 | 11.23 | 18.37 | 28.69 | 47.07 | 67.26 | 104.40 | | | | | | |
| 110 | 4.43 | 7.85 | 12.34 | 20.19 | 31.54 | 51.73 | 73.92 | | | | | | | |
| 120 | 4.82 | 8.56 | 13.45 | 22.01 | 34.38 | 56.40 | 80.59 | | | | | | | |
| 130 | 5.22 | 9.27 | 14.57 | 23.84 | 37.22 | 61.06 | 87.25 | | | | | | | |
| 140 | 5.62 | 9.98 | 15.68 | 25.66 | 40.07 | 65.72 | 93.91 | | | | | | | |
| 150 | 6.02 | 10.69 | 16.79 | 27.48 | 42.91 | 70.39 | 100.58 | | | | | | | |
| 160 | 6.42 | 11.39 | 17.90 | 29.30 | 45.75 | 75.05 | | | | | | | | |
| 170 | 6.82 | 12.10 | 19.02 | 31.12 | 48.60 | 79.72 | | | | | | | | |
| 180 | 7.22 | 12.81 | 20.13 | 32.94 | 51.44 | 84.38 | | | | | | | | |
| 190 | 7.62 | 13.52 | 21.24 | 34.76 | 54.28 | 89.04 | | | | | | | | |
| 200 | 8.02 | 14.23 | 22.35 | 36.58 | | | | | | | | | | |

## FLAMMER's 66 Series Capacity Tables

**Water** **Calculation according to API STD 520** **Capacities $m^3/hr$ at 10% overpressure**

| Orifices | D | E | F | G | H | J | K | L | M | N | P | Q | R | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $cm^2$ / Set pressure - barg | 0.71 | 1.26 | 1.98 | 3.24 | 5.06 | 8.30 | 11.86 | 18.41 | 23.22 | 28 | 41.2 | 71.2 | 103.2 | 168 |
| 1 | 2.66 | 4.73 | 7.4 | 12.2 | 19.0 | 31 | 44 | 69 | 87 | 105 | 155 | 267 | 387 | 630 |
| 1.5 | 3.26 | 5.79 | 9.1 | 14.9 | 23.2 | 38 | 54 | 85 | 107 | 129 | 189 | 327 | 474 | 772 |
| 2 | 3.77 | 6.68 | 10.5 | 17.2 | 26.8 | 44 | 63 | 98 | 123 | 149 | 219 | 378 | 547 | 891 |
| 2.5 | 4.21 | 7.47 | 11.7 | 19.2 | 30.0 | 49 | 70 | 109 | 138 | 166 | 244 | 422 | 612 | 996 |
| 3 | 4.61 | 8.19 | 12.9 | 21.1 | 32.9 | 54 | 77 | 120 | 151 | 182 | 268 | 463 | 670 | 1092 |
| 3.5 | 4.98 | 8.84 | 13.9 | 22.7 | 35.5 | 58 | 83 | 129 | 163 | 196 | 289 | 500 | 724 | 1179 |
| 4 | 5.33 | 9.45 | 14.9 | 24.3 | 38.0 | 62 | 89 | 138 | 174 | 210 | 309 | 534 | 774 | 1260 |
| 4.5 | 5.65 | 10.03 | 15.8 | 25.8 | 40.3 | 66 | 94 | 146 | 185 | 223 | 328 | 567 | 821 | 1337 |
| 5 | 5.96 | 10.57 | 16.6 | 27.2 | 42.4 | 70 | 99 | 154 | 195 | 235 | 346 | 597 | 866 | 1409 |
| 5.5 | 6.25 | 11.08 | 17.4 | 28.5 | 44.5 | 73 | 104 | 162 | 204 | 246 | 362 | 626 | 908 | 1478 |
| 6 | 6.52 | 11.58 | 18.2 | 29.8 | 46.5 | 76 | 109 | 169 | 213 | 257 | 379 | 654 | 948 | 1544 |
| 6.5 | 6.79 | 12.05 | 18.9 | 31.0 | 48.4 | 79 | 113 | 176 | 222 | 268 | 394 | 681 | 987 | 1607 |
| 7 | 7.05 | 12.50 | 19.7 | 32.2 | 50.2 | 82 | 118 | 183 | 230 | 278 | 409 | 707 | 1024 | 1667 |
| 8 | 7.53 | 13.37 | 21.0 | 34.4 | 53.7 | 88 | 126 | 195 | 246 | 297 | 437 | 755 | 1095 | 1782 |
| 8.5 | 7.76 | 13.78 | 21.7 | 35.4 | 55.3 | 91 | 130 | 201 | 254 | 306 | 451 | 779 | 1129 | 1837 |
| 9 | 7.99 | 14.18 | 22.3 | 36.5 | 56.9 | 93 | 133 | 207 | 261 | 315 | 464 | 801 | 1161 | 1891 |
| 9.5 | 8.21 | 14.57 | 22.9 | 37.5 | 58.5 | 96 | 137 | 213 | 268 | 324 | 476 | 823 | 1193 | 1942 |
| 10 | 8.42 | 14.95 | 23.5 | 38.4 | 60.0 | 98 | 141 | 218 | 275 | 332 | 489 | 845 | 1224 | 1993 |
| 11 | 8.83 | 15.68 | 24.6 | 40.3 | 63.0 | 103 | 148 | 229 | 289 | 348 | 513 | 886 | 1284 | 2090 |
| 12 | 9.23 | 16.37 | 25.7 | 42.1 | 65.8 | 108 | 154 | 239 | 302 | 364 | 535 | 925 | 1341 | 2183 |
| 13 | 9.60 | 17.04 | 26.8 | 43.8 | 68.4 | 112 | 160 | 249 | 314 | 379 | 557 | 963 | 1396 | 2272 |
| 14 | 9.97 | 17.68 | 27.8 | 45.5 | 71.0 | 116 | 166 | 258 | 326 | 393 | 578 | 999 | 1448 | 2358 |
| 15 | 10.31 | 18.31 | 28.8 | 47.1 | 73.5 | 121 | 172 | 267 | 337 | 407 | 599 | 1034 | 1499 | 2441 |
| 16 | 10.65 | 18.91 | 29.7 | 48.6 | 75.9 | 125 | 178 | 276 | 348 | 420 | 618 | 1068 | 1548 | 2521 |
| 18 | 11.30 | 20.05 | 31.5 | 51.6 | 80.5 | 132 | 189 | 293 | 370 | 446 | 656 | 1133 | 1642 | 2674 |
| 20 | 11.91 | 21.14 | 33.2 | 54.4 | 84.9 | 139 | 199 | 309 | 390 | 470 | 691 | 1194 | 1731 | 2818 |
| 22 | 12.49 | 22.17 | 34.8 | 57.0 | 89.0 | 146 | 209 | 324 | 409 | 493 | 725 | 1253 | | |
| 24 | 13.05 | 23.15 | 36.4 | 59.5 | 93.0 | 153 | 218 | 338 | 427 | 515 | 757 | 1308 | | |
| 26 | 13.58 | 24.10 | 37.9 | 62.0 | 96.8 | 159 | 227 | 352 | 444 | 536 | 788 | 1362 | | |
| 28 | 14.09 | 25.01 | 39.3 | 64.3 | 100.4 | 165 | 235 | 365 | 461 | 556 | 818 | 1413 | | |
| 30 | 14.59 | 25.89 | 40.7 | 66.6 | 104.0 | 171 | 244 | 378 | 477 | 575 | 846 | 1463 | | |
| 32 | 15.07 | 26.74 | 42.0 | 68.8 | 107.4 | 176 | 252 | 391 | 493 | 594 | 874 | 1511 | | |
| 34 | 15.53 | 27.56 | 43.3 | 70.9 | 110.7 | 182 | 259 | 403 | 508 | 612 | 901 | 1557 | | |
| 36 | 15.98 | 28.36 | 44.6 | 72.9 | 113.9 | 187 | 267 | 414 | 523 | 630 | 927 | 1602 | | |
| 38 | 16.42 | 29.14 | 45.8 | 74.9 | 117.0 | 192 | 274 | 426 | 537 | 647 | 953 | 1646 | | |
| 40 | 16.84 | 29.89 | 47.0 | 76.9 | 120.0 | 197 | 281 | 437 | 551 | 664 | 977 | 1689 | | |
| 42 | 17.26 | 30.63 | 48.1 | 78.8 | 123.0 | 202 | 288 | 448 | 564 | 681 | 1002 | | | |
| 44 | 17.67 | 31.35 | 49.3 | 80.6 | 125.9 | 207 | 295 | 458 | 578 | 697 | 1025 | | | |
| 46 | 18.06 | 32.06 | 50.4 | 82.4 | 128.7 | 211 | 302 | 468 | 591 | 712 | 1048 | | | |
| 48 | 18.45 | 32.75 | 51.5 | 84.2 | 131.5 | 216 | 308 | 478 | 603 | 728 | 1071 | | | |
| 50 | 18.83 | 33.42 | 52.5 | 85.9 | 134.2 | 220 | 315 | 488 | 616 | 743 | 1093 | | | |
| 52 | 19.21 | 34.08 | 53.6 | 87.6 | 136.9 | 225 | 321 | 498 | 628 | 757 | 1114 | | | |
| 54 | 19.57 | 34.73 | 54.6 | 89.3 | 139.5 | 229 | 327 | 507 | 640 | 772 | 1136 | | | |
| 56 | 19.93 | 35.37 | 55.6 | 90.9 | 142.0 | 233 | 333 | 517 | 652 | 786 | 1157 | | | |
| 58 | 20.28 | 36.00 | 56.6 | 92.6 | 144.6 | 237 | 339 | 526 | 663 | 800 | 1177 | | | |
| 60 | 20.63 | 36.61 | 57.5 | 94.1 | 147.0 | 241 | 345 | 535 | 675 | 814 | 1197 | | | |
| 65 | 21.47 | 38.11 | 59.9 | 98.0 | 153.0 | 251 | 359 | 557 | 702 | 847 | 1246 | | | |
| 70 | 22.28 | 39.54 | 62.1 | 101.7 | 158.8 | 260 | 372 | 578 | 729 | 879 | 1293 | | | |
| 75 | 23.06 | 40.93 | 64.3 | 105.3 | 164.4 | 270 | 385 | 598 | 754 | | | | | |
| 80 | 23.82 | 42.27 | 66.4 | 108.7 | 169.8 | 278 | 398 | 618 | | | | | | |
| 85 | 24.55 | 43.58 | 68.5 | 112.1 | 175.0 | 287 | 410 | 637 | | | | | | |
| 90 | 25.27 | 44.84 | 70.5 | 115.3 | 180.1 | 295 | 422 | 655 | | | | | | |
| 95 | 25.96 | 46.07 | 72.4 | 118.5 | 185.0 | 303 | 434 | 673 | | | | | | |
| 100 | 26.63 | 47.26 | 74.3 | 121.5 | 189.8 | 311 | 445 | 691 | | | | | | |
| 110 | 27.93 | 49.57 | 77.9 | 127.5 | 199.1 | 327 | 467 | | | | | | | |
| 120 | 29.17 | 51.77 | 81.4 | 133.1 | 207.9 | 341 | 487 | | | | | | | |
| 130 | 30.37 | 53.89 | 84.7 | 138.6 | 216.4 | 355 | 507 | | | | | | | |
| 140 | 31.51 | 55.92 | 87.9 | 143.8 | 224.6 | 368 | 526 | | | | | | | |
| 150 | 32.62 | 57.89 | 91.0 | 148.9 | 232.5 | 381 | 545 | | | | | | | |
| 160 | 33.69 | 59.78 | 93.9 | 153.7 | 240.1 | 394 | | | | | | | | |
| 170 | 34.72 | 61.62 | 96.8 | 158.5 | 247.5 | 406 | | | | | | | | |
| 180 | 35.73 | 63.41 | 99.6 | 163.1 | 254.7 | 418 | | | | | | | | |
| 190 | 36.71 | 65.15 | 102.4 | 167.5 | 261.6 | 429 | | | | | | | | |
| 200 | 37.66 | 66.84 | 105.0 | 171.9 | | | | | | | | | | |
| 220 | 39.50 | 70.10 | 110.2 | 180.3 | | | | | | | | | | |
| 240 | 41.26 | 73.22 | 115.1 | 188.3 | | | | | | | | | | |
| 260 | 42.94 | 76.21 | 119.8 | 196.0 | | | | | | | | | | |
| 280 | 44.57 | 79.09 | 124.3 | | | | | | | | | | | |
| 300 | 46.13 | 81.86 | 128.6 | | | | | | | | | | | |
| 320 | 47.64 | 84.55 | 132.9 | | | | | | | | | | | |
| 340 | 49.11 | 87.15 | 137.0 | | | | | | | | | | | |
| 360 | 50.53 | 89.68 | 140.9 | | | | | | | | | | | |
| 380 | 51.92 | 92.13 | | | | | | | | | | | | |
| 400 | 53.27 | 94.53 | | | | | | | | | | | | |
| 420 | 54.58 | 96.86 | | | | | | | | | | | | |

## FLAMMER's 66 Series Capacity Tables

### Air Calculation according to API STD 520 Capacities at 10% overpressure scfm at 32°F

| Orifices | D | E | F | G | H | J | K | L | M | N | P | Q | R | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| sq.in / Set pressure - Psig | 0.110 | 0.196 | 0.307 | 0.503 | 0.785 | 1.287 | 1.838 | 2.853 | 3.60 | 4.34 | 6.38 | 11.05 | 16 | 26 |
| 10 | 52 | 92 | 145 | 237 | 370 | 606 | 866 | 1344 | 1696 | 2045 | 3006 | 5207 | 7540 | 12252 |
| 15 | 63 | 112 | 176 | 288 | 449 | 736 | 1051 | 1632 | 2059 | 2483 | 3650 | 6322 | 9153 | 14874 |
| 20 | 74 | 132 | 207 | 338 | 528 | 866 | 1237 | 1920 | 2423 | 2921 | 4293 | 7436 | 10767 | 17496 |
| 25 | 85 | 152 | 238 | 389 | 607 | 996 | 1422 | 2208 | 2786 | 3358 | 4937 | 8550 | 12380 | 20118 |
| 30 | 96 | 171 | 269 | 440 | 687 | 1126 | 1608 | 2495 | 3149 | 3796 | 5580 | 9665 | 13994 | 22740 |
| 35 | 107 | 191 | 299 | 491 | 766 | 1255 | 1793 | 2783 | 3512 | 4234 | 6224 | 10779 | 15608 | 25362 |
| 40 | 118 | 211 | 330 | 541 | 845 | 1385 | 1978 | 3071 | 3875 | 4671 | 6867 | 11893 | 17221 | 27984 |
| 45 | 129 | 231 | 361 | 592 | 924 | 1515 | 2164 | 3358 | 4238 | 5109 | 7510 | 13008 | 18835 | 30606 |
| 50 | 141 | 250 | 392 | 643 | 1003 | 1645 | 2349 | 3646 | 4601 | 5547 | 8154 | 14122 | 20448 | 33228 |
| 55 | 152 | 270 | 423 | 694 | 1082 | 1775 | 2534 | 3934 | 4964 | 5984 | 8797 | 15236 | 22062 | 35851 |
| 60 | 163 | 290 | 454 | 744 | 1162 | 1904 | 2720 | 4222 | 5327 | 6422 | 9441 | 16351 | 23675 | 38473 |
| 65 | 174 | 310 | 485 | 795 | 1241 | 2034 | 2905 | 4509 | 5690 | 6860 | 10084 | 17465 | 25289 | 41095 |
| 70 | 185 | 330 | 516 | 846 | 1320 | 2164 | 3090 | 4797 | 6053 | 7297 | 10727 | 18580 | 26903 | 43717 |
| 75 | 196 | 349 | 547 | 896 | 1399 | 2294 | 3276 | 5085 | 6416 | 7735 | 11371 | 19694 | 28516 | 46339 |
| 80 | 207 | 369 | 578 | 947 | 1478 | 2424 | 3461 | 5373 | 6779 | 8173 | 12014 | 20808 | 30130 | 48961 |
| 85 | 218 | 389 | 609 | 998 | 1557 | 2553 | 3647 | 5660 | 7142 | 8610 | 12658 | 21923 | 31743 | 51583 |
| 90 | 229 | 409 | 640 | 1049 | 1637 | 2683 | 3832 | 5948 | 7505 | 9048 | 13301 | 23037 | 33357 | 54205 |
| 95 | 240 | 428 | 671 | 1099 | 1716 | 2813 | 4017 | 6236 | 7868 | 9486 | 13944 | 24151 | 34970 | 56827 |
| 100 | 252 | 448 | 702 | 1150 | 1795 | 2943 | 4203 | 6523 | 8231 | 9923 | 14588 | 25266 | 36584 | 59449 |
| 110 | 274 | 488 | 764 | 1252 | 1953 | 3202 | 4573 | 7099 | 8958 | 10799 | 15875 | 27495 | 39811 | 64693 |
| 120 | 296 | 527 | 826 | 1353 | 2112 | 3462 | 4944 | 7674 | 9684 | 11674 | 17162 | 29723 | 43038 | 69937 |
| 130 | 318 | 567 | 888 | 1454 | 2270 | 3721 | 5315 | 8250 | 10410 | 12549 | 18448 | 31952 | 46265 | 75181 |
| 140 | 340 | 606 | 950 | 1556 | 2428 | 3981 | 5685 | 8825 | 11136 | 13425 | 19735 | 34181 | 49493 | 80425 |
| 150 | 362 | 646 | 1012 | 1657 | 2587 | 4241 | 6056 | 9401 | 11862 | 14300 | 21022 | 36410 | 52720 | 85669 |
| 160 | 385 | 685 | 1073 | 1759 | 2745 | 4500 | 6427 | 9976 | 12588 | 15176 | 22309 | 38638 | 55947 | 90914 |
| 180 | 429 | 764 | 1197 | 1962 | 3062 | 5019 | 7168 | 11127 | 14040 | 16926 | 24882 | 43096 | 62401 | 101402 |
| 200 | 473 | 843 | 1321 | 2165 | 3378 | 5539 | 7910 | 12278 | 15492 | 18677 | 27456 | 47553 | 68855 | 111890 |
| 220 | 518 | 923 | 1445 | 2368 | 3695 | 6058 | 8651 | 13429 | 16945 | 20428 | 30030 | 52011 | 75310 | 122378 |
| 240 | 562 | 1002 | 1569 | 2570 | 4012 | 6577 | 9393 | 14580 | 18397 | 22178 | 32603 | 56468 | 81764 | 132866 |
| 260 | 606 | 1081 | 1693 | 2773 | 4328 | 7096 | 10134 | 15730 | 19849 | 23929 | 35177 | 60926 | 88218 | 143355 |
| 280 | 651 | 1160 | 1817 | 2976 | 4645 | 7615 | 10875 | 16881 | 21301 | 25680 | 37751 | 65383 | 94672 | 153843 |
| 300 | 695 | 1239 | 1940 | 3179 | 4962 | 8134 | 11617 | 18032 | 22754 | 27431 | 40324 | 69841 | 101127 | 164331 |
| 320 | 740 | 1318 | 2064 | 3382 | 5278 | 8654 | 12358 | 19183 | 24206 | 29181 | 42898 | 74298 | | |
| 340 | 784 | 1397 | 2188 | 3585 | 5595 | 9173 | 13100 | 20334 | 25658 | 30932 | 45472 | 78756 | | |
| 360 | 828 | 1476 | 2312 | 3788 | 5912 | 9692 | 13841 | 21485 | 27110 | 32683 | 48045 | 83213 | | |
| 380 | 873 | 1555 | 2436 | 3991 | 6228 | 10211 | 14583 | 22636 | 28562 | 34434 | 50619 | 87671 | | |
| 400 | 917 | 1634 | 2560 | 4194 | 6545 | 10730 | 15324 | 23787 | 30015 | 36184 | 53192 | 92128 | | |
| 420 | 961 | 1713 | 2683 | 4397 | 6862 | 11249 | 16066 | 24937 | 31467 | 37935 | 55766 | 96586 | | |
| 440 | 1006 | 1792 | 2807 | 4600 | 7178 | 11769 | 16807 | 26088 | 32919 | 39686 | 58340 | 101043 | | |
| 460 | 1050 | 1871 | 2931 | 4802 | 7495 | 12288 | 17548 | 27239 | 34371 | 41436 | 60913 | 105500 | | |
| 480 | 1095 | 1950 | 3055 | 5005 | 7811 | 12807 | 18290 | 28390 | 35823 | 43187 | 63487 | 109958 | | |
| 500 | 1139 | 2029 | 3179 | 5208 | 8128 | 13326 | 19031 | 29541 | 37276 | 44938 | 66061 | 114415 | | |
| 520 | 1183 | 2109 | 3303 | 5411 | 8445 | 13845 | 19773 | 30692 | 38728 | 46689 | 68634 | 118873 | | |
| 540 | 1228 | 2188 | 3426 | 5614 | 8761 | 14364 | 20514 | 31843 | 40180 | 48439 | 71208 | 123330 | | |
| 560 | 1272 | 2267 | 3550 | 5817 | 9078 | 14884 | 21256 | 32994 | 41632 | 50190 | 73782 | 127788 | | |
| 580 | 1316 | 2346 | 3674 | 6020 | 9395 | 15403 | 21997 | 34144 | 43084 | 51941 | 76355 | 132245 | | |
| 600 | 1361 | 2425 | 3798 | 6223 | 9711 | 15922 | 22738 | 35295 | 44537 | 53691 | 78929 | 136703 | | |
| 650 | 1472 | 2622 | 4108 | 6730 | 10503 | 17220 | 24592 | 38173 | 48167 | 58068 | 85363 | | | |
| 700 | 1583 | 2820 | 4417 | 7237 | 11295 | 18518 | 26446 | 41050 | 51798 | 62445 | 91797 | | | |
| 750 | 1694 | 3018 | 4727 | 7745 | 12086 | 19816 | 28299 | 43927 | 55428 | 66822 | 98231 | | | |
| 800 | 1805 | 3215 | 5036 | 8252 | 12878 | 21114 | 30153 | 46804 | 59059 | 71199 | 104665 | | | |
| 850 | 1916 | 3413 | 5346 | 8759 | 13670 | 22411 | 32006 | 49681 | 62689 | 75575 | 111099 | | | |
| 900 | 2026 | 3611 | 5656 | 9266 | 14461 | 23709 | 33860 | 52558 | 66320 | 79952 | 117534 | | | |
| 950 | 2137 | 3808 | 5965 | 9774 | 15253 | 25007 | 35714 | 55436 | 69950 | 84329 | 123968 | | | |
| 1000 | 2248 | 4006 | 6275 | 10281 | 16045 | 26305 | 37567 | 58313 | 73581 | 88706 | 130402 | | | |
| 1100 | 2470 | 4401 | 6894 | 11295 | 17628 | 28901 | 41274 | 64067 | 80842 | | | | | |
| 1200 | 2692 | 4797 | 7513 | 12310 | 19211 | 31497 | 44981 | 69822 | | | | | | |
| 1300 | 2914 | 5192 | 8132 | 13324 | 20795 | 34093 | 48689 | 75576 | | | | | | |
| 1400 | 3136 | 5587 | 8752 | 14339 | 22378 | 36688 | 52396 | 81330 | | | | | | |
| 1500 | 3358 | 5983 | 9371 | 15354 | 23961 | 39284 | 56103 | 87085 | | | | | | |
| 1600 | 3579 | 6378 | 9990 | 16368 | 25545 | 41880 | 59810 | | | | | | | |
| 1700 | 3801 | 6773 | 10609 | 17383 | 27128 | 44476 | 63517 | | | | | | | |
| 1800 | 4023 | 7169 | 11228 | 18397 | 28711 | 47072 | 67225 | | | | | | | |
| 1900 | 4245 | 7564 | 11848 | 19412 | 30295 | 49668 | 70932 | | | | | | | |
| 2000 | 4467 | 7959 | 12467 | 20426 | 31878 | 52263 | 74639 | | | | | | | |
| 2200 | 4911 | 8750 | 13705 | 22455 | 35044 | 57455 | 82053 | | | | | | | |
| 2400 | 5354 | 9541 | 14944 | 24484 | 38211 | 62647 | | | | | | | | |
| 2600 | 5798 | 10331 | 16182 | 26513 | 41378 | 67838 | | | | | | | | |
| 2800 | 6242 | 11122 | 17421 | 28542 | | | | | | | | | | |
| 3000 | 6686 | 11913 | 18659 | 30572 | | | | | | | | | | |
| 3200 | 7129 | 12703 | 19897 | 32601 | | | | | | | | | | |
| 3400 | 7573 | 13494 | 21136 | 34630 | | | | | | | | | | |
| 3600 | 8017 | 14284 | 22374 | 36659 | | | | | | | | | | |
| 3800 | 8461 | 15075 | 23613 | | | | | | | | | | | |
| 4000 | 8904 | 15866 | 24851 | | | | | | | | | | | |
| 4500 | 10014 | 17842 | 27947 | | | | | | | | | | | |
| 5000 | 11123 | 19819 | 31043 | | | | | | | | | | | |

## FLAMMER's 66 Series Capacity Tables

### Saturated steam — Calculation according to API STD 520 — Capacities at 10% overpressure lbs/hr

| Orifices | D | E | F | G | H | J | K | L | M | N | P | Q | R | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| sq.in / Set pressure - Psig | 0.110 | 0.196 | 0.307 | 0.503 | 0.785 | 1.287 | 1.838 | 2.853 | 3.60 | 4.34 | 6.38 | 11.05 | 16 | 26 |
| 10 | 142 | 252 | 395 | 648 | 1011 | 1657 | 2367 | 3674 | 4636 | 5589 | 8216 | 14230 | 20605 | 33483 |
| 15 | 172 | 306 | 480 | 786 | 1227 | 2012 | 2874 | 4460 | 5628 | 6785 | 9975 | 17276 | 25014 | 40648 |
| 20 | 202 | 360 | 565 | 925 | 1444 | 2367 | 3380 | 5247 | 6620 | 7981 | 11733 | 20321 | 29424 | 47814 |
| 25 | 233 | 414 | 649 | 1064 | 1660 | 2721 | 3887 | 6033 | 7613 | 9177 | 13491 | 23366 | 33834 | 54980 |
| 30 | 263 | 468 | 734 | 1202 | 1876 | 3076 | 4393 | 6819 | 8605 | 10373 | 15249 | 26412 | 38243 | 62145 |
| 35 | 293 | 522 | 818 | 1341 | 2093 | 3431 | 4900 | 7606 | 9597 | 11570 | 17008 | 29457 | 42653 | 69311 |
| 40 | 324 | 577 | 903 | 1480 | 2309 | 3786 | 5406 | 8392 | 10589 | 12766 | 18766 | 32502 | 47062 | 76476 |
| 45 | 354 | 631 | 988 | 1618 | 2525 | 4140 | 5913 | 9178 | 11581 | 13962 | 20524 | 35548 | 51472 | 83642 |
| 50 | 384 | 685 | 1072 | 1757 | 2742 | 4495 | 6419 | 9964 | 12573 | 15158 | 22283 | 38593 | 55882 | 90808 |
| 55 | 415 | 739 | 1157 | 1895 | 2958 | 4850 | 6926 | 10751 | 13566 | 16354 | 24041 | 41639 | 60291 | 97973 |
| 60 | 445 | 793 | 1241 | 2034 | 3174 | 5204 | 7433 | 11537 | 14558 | 17550 | 25799 | 44684 | 64701 | 105139 |
| 65 | 475 | 847 | 1326 | 2173 | 3391 | 5559 | 7939 | 12323 | 15550 | 18746 | 27558 | 47729 | 69110 | 112304 |
| 70 | 505 | 901 | 1411 | 2311 | 3607 | 5914 | 8446 | 13110 | 16542 | 19942 | 29316 | 50775 | 73520 | 119470 |
| 75 | 536 | 955 | 1495 | 2450 | 3823 | 6268 | 8952 | 13896 | 17534 | 21138 | 31074 | 53820 | 77930 | 126636 |
| 80 | 566 | 1009 | 1580 | 2589 | 4040 | 6623 | 9459 | 14682 | 18526 | 22335 | 32833 | 56866 | 82339 | 133801 |
| 85 | 596 | 1063 | 1664 | 2727 | 4256 | 6978 | 9965 | 15468 | 19518 | 23531 | 34591 | 59911 | 86749 | 140967 |
| 90 | 627 | 1117 | 1749 | 2866 | 4472 | 7333 | 10472 | 16255 | 20511 | 24727 | 36349 | 62956 | 91158 | 148132 |
| 95 | 657 | 1171 | 1834 | 3004 | 4689 | 7687 | 10978 | 17041 | 21503 | 25923 | 38108 | 66002 | 95568 | 155298 |
| 100 | 687 | 1225 | 1918 | 3143 | 4905 | 8042 | 11485 | 17827 | 22495 | 27119 | 39866 | 69047 | 99978 | 162464 |
| 110 | 748 | 1333 | 2088 | 3420 | 5338 | 8751 | 12498 | 19400 | 24479 | 29511 | 43383 | 75138 | 108797 | 176795 |
| 120 | 809 | 1441 | 2257 | 3698 | 5771 | 9461 | 13511 | 20972 | 26464 | 31903 | 46899 | 81229 | 117616 | 191126 |
| 130 | 869 | 1549 | 2426 | 3975 | 6203 | 10170 | 14524 | 22545 | 28448 | 34296 | 50416 | 87319 | 126435 | 205457 |
| 140 | 930 | 1657 | 2595 | 4252 | 6636 | 10880 | 15537 | 24118 | 30432 | 36688 | 53933 | 93410 | 135254 | 219788 |
| 150 | 991 | 1765 | 2764 | 4529 | 7069 | 11589 | 16550 | 25690 | 32417 | 39080 | 57449 | 99501 | 144074 | 234120 |
| 160 | 1051 | 1873 | 2934 | 4807 | 7501 | 12298 | 17564 | 27263 | 34401 | 41472 | 60966 | 105592 | 152893 | 248451 |
| 180 | 1172 | 2089 | 3272 | 5361 | 8367 | 13717 | 19590 | 30408 | 38370 | 46257 | 67999 | 117773 | 170531 | 277113 |
| 200 | 1294 | 2305 | 3611 | 5916 | 9232 | 15136 | 21616 | 33553 | 42338 | 51041 | 75033 | 129955 | 188170 | 305775 |
| 220 | 1415 | 2521 | 3949 | 6470 | 10097 | 16555 | 23642 | 36698 | 46307 | 55825 | 82066 | 142136 | 205808 | 334438 |
| 240 | 1536 | 2737 | 4287 | 7025 | 10963 | 17973 | 25668 | 39843 | 50275 | 60610 | 89099 | 154318 | 223446 | 363100 |
| 260 | 1657 | 2953 | 4626 | 7579 | 11828 | 19392 | 27695 | 42988 | 54244 | 65394 | 96133 | 166499 | 241085 | 391763 |
| 280 | 1779 | 3169 | 4964 | 8134 | 12694 | 20811 | 29721 | 46134 | 58213 | 70179 | 103166 | 178681 | 258723 | 420425 |
| 300 | 1900 | 3385 | 5303 | 8688 | 13559 | 22230 | 31747 | 49279 | 62181 | 74963 | 110199 | 190862 | 276361 | 449087 |
| 320 | 2021 | 3601 | 5641 | 9243 | 14424 | 23649 | 33773 | 52424 | 66150 | 79747 | 117232 | 203044 | | |
| 340 | 2143 | 3818 | 5980 | 9797 | 15290 | 25067 | 35799 | 55569 | 70119 | 84532 | 124266 | 215225 | | |
| 360 | 2264 | 4034 | 6318 | 10352 | 16155 | 26486 | 37826 | 58714 | 74087 | 89316 | 131299 | 227407 | | |
| 380 | 2385 | 4250 | 6656 | 10906 | 17021 | 27905 | 39852 | 61859 | 78056 | 94101 | 138332 | 239588 | | |
| 400 | 2506 | 4466 | 6995 | 11461 | 17886 | 29324 | 41878 | 65004 | 82025 | 98885 | 145366 | 251770 | | |
| 420 | 2628 | 4682 | 7333 | 12015 | 18751 | 30743 | 43904 | 68150 | 85993 | 103670 | 152399 | 263951 | | |
| 440 | 2749 | 4898 | 7672 | 12570 | 19617 | 32161 | 45930 | 71295 | 89962 | 108454 | 159432 | 276133 | | |
| 460 | 2870 | 5114 | 8010 | 13124 | 20482 | 33580 | 47957 | 74440 | 93930 | 113238 | 166466 | 288314 | | |
| 480 | 2991 | 5330 | 8349 | 13679 | 21347 | 34999 | 49983 | 77585 | 97899 | 118023 | 173499 | 300496 | | |
| 500 | 3113 | 5546 | 8687 | 14233 | 22213 | 36418 | 52009 | 80730 | 101868 | 122807 | 180532 | 312677 | | |
| 520 | 3234 | 5762 | 9025 | 14788 | 23078 | 37836 | 54035 | 83875 | 105836 | 127592 | 187565 | 324859 | | |
| 540 | 3355 | 5978 | 9364 | 15342 | 23944 | 39255 | 56062 | 87020 | 109805 | 132376 | 194599 | 337040 | | |
| 560 | 3476 | 6194 | 9702 | 15897 | 24809 | 40674 | 58088 | 90166 | 113774 | 137160 | 201632 | 349222 | | |
| 580 | 3598 | 6410 | 10041 | 16451 | 25674 | 42093 | 60114 | 93311 | 117742 | 141945 | 208665 | 361403 | | |
| 600 | 3719 | 6626 | 10379 | 17006 | 26540 | 43512 | 62140 | 96456 | 121711 | 146729 | 215699 | 373585 | | |
| 650 | 4022 | 7167 | 11225 | 18392 | 28703 | 47059 | 67206 | 104319 | 131632 | 158690 | 233282 | | | |
| 700 | 4325 | 7707 | 12071 | 19778 | 30867 | 50606 | 72271 | 112182 | 141554 | 170651 | 250865 | | | |
| 750 | 4628 | 8247 | 12918 | 21165 | 33030 | 54153 | 77337 | 120044 | 151476 | 182612 | 268449 | | | |
| 800 | 4932 | 8787 | 13764 | 22551 | 35194 | 57700 | 82402 | 127907 | 161397 | 194573 | 286032 | | | |
| 850 | 5235 | 9327 | 14610 | 23937 | 37357 | 61246 | 87468 | 135770 | 171319 | 206534 | 303615 | | | |
| 900 | 5538 | 9868 | 15456 | 25323 | 39520 | 64793 | 92533 | 143633 | 181240 | 218495 | 321198 | | | |
| 950 | 5841 | 10408 | 16302 | 26710 | 41684 | 68340 | 97599 | 151496 | 191162 | 230456 | 338782 | | | |
| 1000 | 6144 | 10948 | 17148 | 28096 | 43847 | 71887 | 102664 | 159359 | 201084 | 242417 | 356365 | | | |
| 1100 | 6751 | 12028 | 18840 | 30868 | 48174 | 78981 | 112795 | 175084 | 220927 | | | | | |
| 1200 | 7357 | 13109 | 20532 | 33641 | 52501 | 86075 | 122926 | 190810 | | | | | | |
| 1300 | 7963 | 14189 | 22225 | 36413 | 56828 | 93169 | 133057 | 206536 | | | | | | |
| 1400 | 8569 | 15269 | 23917 | 39186 | 61155 | 100263 | 143189 | 222262 | | | | | | |
| 1500 | 9176 | 16350 | 25609 | 41959 | 65482 | 107357 | 153320 | 237987 | | | | | | |
| 1600 | 9782 | 17430 | 27301 | 44731 | 69809 | 114451 | 163451 | | | | | | | |
| 1700 | 10388 | 18510 | 28993 | 47504 | 74136 | 121545 | 173582 | | | | | | | |
| 1800 | 10995 | 19591 | 30685 | 50276 | 78463 | 128639 | 183713 | | | | | | | |
| 1900 | 11601 | 20671 | 32378 | 53049 | 82790 | 135733 | 193844 | | | | | | | |
| 2000 | 12207 | 21751 | 34070 | 55821 | 87117 | 142827 | 203975 | | | | | | | |
| 2200 | 13420 | 23912 | 37454 | 61366 | 95770 | 157015 | 224237 | | | | | | | |
| 2400 | 14633 | 26073 | 40839 | 66911 | 104424 | 171203 | | | | | | | | |
| 2600 | 15845 | 28234 | 44223 | 72456 | 113078 | 185390 | | | | | | | | |
| 2800 | 17058 | 30394 | 47607 | 78001 | | | | | | | | | | |

## FLAMMER's 66 Series Capacity Tables

### Water Calculation according to API STD 520 Capacities at 10% overpressure usgpm

| Orifices | D | E | F | G | H | J | K | L | M | N | P | Q | R | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| sq.in / Set pressure - Psig | 0.110 | 0.196 | 0.307 | 0.503 | 0.785 | 1.287 | 1.838 | 2.853 | 3.60 | 4.34 | 6.38 | 11.05 | 16 | 26 |
| 10 | 142 | 252 | 395 | 648 | 1011 | 1657 | 2367 | 3674 | 4636 | 5589 | 8216 | 14230 | 20605 | 33483 |
| 15 | 172 | 306 | 480 | 786 | 1227 | 2012 | 2874 | 4460 | 5628 | 6785 | 9975 | 17276 | 25014 | 40648 |
| 20 | 202 | 360 | 565 | 925 | 1444 | 2367 | 3380 | 5247 | 6620 | 7981 | 11733 | 20321 | 29424 | 47814 |
| 25 | 233 | 414 | 649 | 1064 | 1660 | 2721 | 3887 | 6033 | 7613 | 9177 | 13491 | 23366 | 33834 | 54980 |
| 30 | 263 | 468 | 734 | 1202 | 1876 | 3076 | 4393 | 6819 | 8605 | 10373 | 15249 | 26412 | 38243 | 62145 |
| 35 | 293 | 522 | 818 | 1341 | 2093 | 3431 | 4900 | 7606 | 9597 | 11570 | 17008 | 29457 | 42653 | 69311 |
| 40 | 324 | 577 | 903 | 1480 | 2309 | 3786 | 5406 | 8392 | 10589 | 12766 | 18766 | 32502 | 47062 | 76476 |
| 45 | 354 | 631 | 988 | 1618 | 2525 | 4140 | 5913 | 9178 | 11581 | 13962 | 20524 | 35548 | 51472 | 83642 |
| 50 | 384 | 685 | 1072 | 1757 | 2742 | 4495 | 6419 | 9964 | 12573 | 15158 | 22283 | 38593 | 55882 | 90808 |
| 55 | 415 | 739 | 1157 | 1895 | 2958 | 4850 | 6926 | 10751 | 13566 | 16354 | 24041 | 41639 | 60291 | 97973 |
| 60 | 445 | 793 | 1241 | 2034 | 3174 | 5204 | 7433 | 11537 | 14558 | 17550 | 25799 | 44684 | 64701 | 105139 |
| 65 | 475 | 847 | 1326 | 2173 | 3391 | 5559 | 7939 | 12323 | 15550 | 18746 | 27558 | 47729 | 69110 | 112304 |
| 70 | 505 | 901 | 1411 | 2311 | 3607 | 5914 | 8446 | 13110 | 16542 | 19942 | 29316 | 50775 | 73520 | 119470 |
| 75 | 536 | 955 | 1495 | 2450 | 3823 | 6268 | 8952 | 13896 | 17534 | 21138 | 31074 | 53820 | 77930 | 126636 |
| 80 | 566 | 1009 | 1580 | 2589 | 4040 | 6623 | 9459 | 14682 | 18526 | 22335 | 32833 | 56866 | 82339 | 133801 |
| 85 | 596 | 1063 | 1664 | 2727 | 4256 | 6978 | 9965 | 15468 | 19518 | 23531 | 34591 | 59911 | 86749 | 140967 |
| 90 | 627 | 1117 | 1749 | 2866 | 4472 | 7333 | 10472 | 16255 | 20511 | 24727 | 36349 | 62956 | 91158 | 148132 |
| 95 | 657 | 1171 | 1834 | 3004 | 4689 | 7687 | 10978 | 17041 | 21503 | 25923 | 38108 | 66002 | 95568 | 155298 |
| 100 | 687 | 1225 | 1918 | 3143 | 4905 | 8042 | 11485 | 17827 | 22495 | 27119 | 39866 | 69047 | 99978 | 162464 |
| 110 | 748 | 1333 | 2088 | 3420 | 5338 | 8751 | 12498 | 19400 | 24479 | 29511 | 43383 | 75138 | 108797 | 176795 |
| 120 | 809 | 1441 | 2257 | 3698 | 5771 | 9461 | 13511 | 20972 | 26464 | 31903 | 46899 | 81229 | 117616 | 191126 |
| 130 | 869 | 1549 | 2426 | 3975 | 6203 | 10170 | 14524 | 22545 | 28448 | 34296 | 50416 | 87319 | 126435 | 205457 |
| 140 | 930 | 1657 | 2595 | 4252 | 6636 | 10880 | 15537 | 24118 | 30432 | 36688 | 53933 | 93410 | 135254 | 219788 |
| 150 | 991 | 1765 | 2764 | 4529 | 7069 | 11589 | 16550 | 25690 | 32417 | 39080 | 57449 | 99501 | 144074 | 234120 |
| 160 | 1051 | 1873 | 2934 | 4807 | 7501 | 12298 | 17564 | 27263 | 34401 | 41472 | 60966 | 105592 | 152893 | 248451 |
| 180 | 1172 | 2089 | 3272 | 5361 | 8367 | 13717 | 19590 | 30408 | 38370 | 46257 | 67999 | 117773 | 170531 | 277113 |
| 200 | 1294 | 2305 | 3611 | 5916 | 9232 | 15136 | 21616 | 33553 | 42338 | 51041 | 75033 | 129955 | 188170 | 305775 |
| 220 | 1415 | 2521 | 3949 | 6470 | 10097 | 16555 | 23642 | 36698 | 46307 | 55825 | 82066 | 142136 | 205808 | 334438 |
| 240 | 1536 | 2737 | 4287 | 7025 | 10963 | 17973 | 25668 | 39843 | 50275 | 60610 | 89099 | 154318 | 223446 | 363100 |
| 260 | 1657 | 2953 | 4626 | 7579 | 11828 | 19392 | 27695 | 42988 | 54244 | 65394 | 96133 | 166499 | 241085 | 391763 |
| 280 | 1779 | 3169 | 4964 | 8134 | 12694 | 20811 | 29721 | 46134 | 58213 | 70179 | 103166 | 178681 | 258723 | 420425 |
| 300 | 1900 | 3385 | 5303 | 8688 | 13559 | 22230 | 31747 | 49279 | 62181 | 74963 | 110199 | 190862 | 276361 | 449087 |
| 320 | 2021 | 3601 | 5641 | 9243 | 14424 | 23649 | 33773 | 52424 | 66150 | 79747 | 117232 | 203044 | | |
| 340 | 2143 | 3818 | 5980 | 9797 | 15290 | 25067 | 35799 | 55569 | 70119 | 84532 | 124266 | 215225 | | |
| 360 | 2264 | 4034 | 6318 | 10352 | 16155 | 26486 | 37826 | 58714 | 74087 | 89316 | 131299 | 227407 | | |
| 380 | 2385 | 4250 | 6656 | 10906 | 17021 | 27905 | 39852 | 61859 | 78056 | 94101 | 138332 | 239588 | | |
| 400 | 2506 | 4466 | 6995 | 11461 | 17886 | 29324 | 41878 | 65004 | 82025 | 98885 | 145366 | 251770 | | |
| 420 | 2628 | 4682 | 7333 | 12015 | 18751 | 30743 | 43904 | 68150 | 85993 | 103670 | 152399 | 263951 | | |
| 440 | 2749 | 4898 | 7672 | 12570 | 19617 | 32161 | 45930 | 71295 | 89962 | 108454 | 159432 | 276133 | | |
| 460 | 2870 | 5114 | 8010 | 13124 | 20482 | 33580 | 47957 | 74440 | 93930 | 113238 | 166466 | 288314 | | |
| 480 | 2991 | 5330 | 8349 | 13679 | 21347 | 34999 | 49983 | 77585 | 97899 | 118023 | 173499 | 300496 | | |
| 500 | 3113 | 5546 | 8687 | 14233 | 22213 | 36418 | 52009 | 80730 | 101868 | 122807 | 180532 | 312677 | | |
| 520 | 3234 | 5762 | 9025 | 14788 | 23078 | 37836 | 54035 | 83875 | 105836 | 127592 | 187565 | 324859 | | |
| 540 | 3355 | 5978 | 9364 | 15342 | 23944 | 39255 | 56062 | 87020 | 109805 | 132376 | 194599 | 337040 | | |
| 560 | 3476 | 6194 | 9702 | 15897 | 24809 | 40674 | 58088 | 90166 | 113774 | 137160 | 201632 | 349222 | | |
| 580 | 3598 | 6410 | 10041 | 16451 | 25674 | 42093 | 60114 | 93311 | 117742 | 141945 | 208665 | 361403 | | |
| 600 | 3719 | 6626 | 10379 | 17006 | 26540 | 43512 | 62140 | 96456 | 121711 | 146729 | 215699 | 373585 | | |
| 650 | 4022 | 7167 | 11225 | 18392 | 28703 | 47059 | 67206 | 104319 | 131632 | 158690 | 233282 | | | |
| 700 | 4325 | 7707 | 12071 | 19778 | 30867 | 50606 | 72271 | 112182 | 141554 | 170651 | 250865 | | | |
| 750 | 4628 | 8247 | 12918 | 21165 | 33030 | 54153 | 77337 | 120044 | 151476 | 182612 | 268449 | | | |
| 800 | 4932 | 8787 | 13764 | 22551 | 35194 | 57700 | 82402 | 127907 | 161397 | 194573 | 286032 | | | |
| 850 | 5235 | 9327 | 14610 | 23937 | 37357 | 61246 | 87468 | 135770 | 171319 | 206534 | 303615 | | | |
| 900 | 5538 | 9868 | 15456 | 25323 | 39520 | 64793 | 92533 | 143633 | 181240 | 218495 | 321198 | | | |
| 950 | 5841 | 10408 | 16302 | 26710 | 41684 | 68340 | 97599 | 151496 | 191162 | 230456 | 338782 | | | |
| 1000 | 6144 | 10948 | 17148 | 28096 | 43847 | 71887 | 102664 | 159359 | 201084 | 242417 | 356365 | | | |
| 1100 | 6751 | 12028 | 18840 | 30868 | 48174 | 78981 | 112795 | 175084 | 220927 | | | | | |
| 1200 | 7357 | 13109 | 20532 | 33641 | 52501 | 86075 | 122926 | 190810 | | | | | | |
| 1300 | 7963 | 14189 | 22225 | 36413 | 56828 | 93169 | 133057 | 206536 | | | | | | |
| 1400 | 8569 | 15269 | 23917 | 39186 | 61155 | 100263 | 143189 | 222262 | | | | | | |
| 1500 | 9176 | 16350 | 25609 | 41959 | 65482 | 107357 | 153320 | 237987 | | | | | | |
| 1600 | 9782 | 17430 | 27301 | 44731 | 69809 | 114451 | 163451 | | | | | | | |
| 1700 | 10388 | 18510 | 28993 | 47504 | 74136 | 121545 | 173582 | | | | | | | |
| 1800 | 10995 | 19591 | 30685 | 50276 | 78463 | 128639 | 183713 | | | | | | | |
| 1900 | 11601 | 20671 | 32378 | 53049 | 82790 | 135733 | 193844 | | | | | | | |
| 2000 | 12207 | 21751 | 34070 | 55821 | 87117 | 142827 | 203975 | | | | | | | |
| 2200 | 13420 | 23912 | 37454 | 61366 | 95770 | 157015 | 224237 | | | | | | | |
| 2400 | 14633 | 26073 | 40839 | 66911 | 104424 | 171203 | | | | | | | | |
| 2600 | 15845 | 28234 | 44223 | 72456 | 113078 | 185390 | | | | | | | | |
| 2800 | 17058 | 30394 | 47607 | 78001 | | | | | | | | | | |
| 3000 | 18271 | 32555 | 50992 | 83547 | | | | | | | | | | |
| 3200 | 19483 | 34716 | 54376 | 89092 | | | | | | | | | | |
| 3400 | 20696 | 36876 | 57760 | 94637 | | | | | | | | | | |
| 3600 | 21909 | 39037 | 61145 | 100182 | | | | | | | | | | |
| 3800 | 23121 | 41198 | 64529 | | | | | | | | | | | |
| 4000 | 24334 | 43358 | 67913 | | | | | | | | | | | |
| 4500 | 27365 | 48760 | 76374 | | | | | | | | | | | |
| 5000 | 30397 | 54162 | 84835 | | | | | | | | | | | |

## FLAMMER's 66 Series Model Coding

Select the correct model number and designate the applicable options or accessories when ordering FLAMMER'S 66 SERIES valves.

## Model code system


**Position 1)**
P : FLAMMER's 66 Series
P3 / P4 / P S :
FLAMMER's 66 Series
S5

**Position 2) Inlet x outlet**
1 : 1'' (DN 25)
2 : 2'' (DN 50)
3 : 3'' (DN 80)
4 : 4'' (DN 100)
5 : 2½'' (DN 65)
6 : 6'' (DN 150)
7 : 1½'' (DN 40)
8 : 8'' (DN 200)
9 : 10'' (DN 250)
A : 12'' (DN 300)
B : 14'' (DN 350)

**Position 3) Orifice letter**
(according to API Std 526)
D-E-F-G-H-J-K-L-M-N-P-Q-R-T
Additional non standard orifices : V-W

**Position 4) Valve rating (ASME)**
1 : 150 lbs
2 : 300 lbs
3 : 600 lbs*
4 : 900 lbs
5 : 1500 lbs
6 : 2500 lbs
7 : 300 lbs (light - with 150 lbs maximum sressure)

**Position 5) Type**
3 : Conventional (closed bonnet)
4 : Balanced bellows
5 : Steam (open bonnet)

**Position 6) Configuration**
10 : A 351 Gr CF8M (Cryogenic)
14 : A 351 Gr CF3M
15 : A 351 Gr CF8C
16 : A 351 Gr CF8M (Std Application)
18 : A 351 Gr CF8M / A 352 Gr LCC
19 : A 352 Gr LCC
30 : A 216 Gr WCC
32 : A 217 Gr WC6
42 : A 217 Gr WC9
50 : A 216 Gr WCC (Steam / Hot Water – ST / BB)
52 : A 217 Gr C12A
A201 to A206 : Alloy 20
AL1 to AL6 : Alloy 625
AY1 to AY6 : Alloy 825
AV1 to AV6 : Alloy 254 SMO
CN1 to CN7 : A 351 Gr CN3MN
D1 to D6 : Duplex
H1 to H6 : Alloy C
M1 to M6 : Alloy 400
SD1 to SD6 : Superduplex
MRA & MRB : NACE MR0103
SGA & SGB : NACE MR0175 / ISO 15156

**Position 7) Flange Type**
A = ASME B16.5 or EN 1759-1
P, F, G = EN 1092-1 or DIN - see table below
Z = Special flanges

* Except T orifice is Class 300 flange.
** Today standard
- C '' '' Tongue face
- D2 '' '' Small groove face

**Position 11) Special**
- Nothing Nothing special
- Z Special device or requirement (see the comments on the datasheet or consult the factory with the serial #)

**Position 10) Flanges finish**
- M** Inlet or outlet smooth finish
- J Inlet flange finish RJ (according ASME B16.5)
- E2 '' '' Smallmaleface
- E1 '' '' Large male face
- E '' '' Male face
- F2 '' '' Small female face
- F1 '' '' Large female face
- F '' '' Female face
- C2 '' '' Smalltongue face
- C1 '' '' Largetongueface
- D1 '' '' Large groove face
- D '' '' Groove face
- H Inlet hub connectors

**Position 9) Options**
- Nothing No accessories
- L Packed lever for ST/BB
- S Stellited nozzle and disc
- B Stellited nozzle
- G Stellited disc
- K Long screwed spindle for on site tests.
- V Test gag
- R Plain lever for ST/BB
- Y Soft seat disc (FKM standard)
- Y1 Soft seat disc (PTFE)
- Y2 Soft seat disc (NBR)
- Y3 Soft seat disc (EPDM)
- Y4 Soft seat disc (HNBR standard)
- Y5 Soft seat disc (FFKM standard)
- Y6 Soft seat disc (PEEK)
- Y7 Soft seat disc (PCTFE)
- Y8 Soft seat disc (VMQ)
- Y9 Soft seat disc (FFKM hot temperature)
- Y0 Soft seat disc (Special soft material and/or design)
- H Bolted cap
- N With UV Stamp : gas or steam
- W With UV Stamp : liquid (without adjusting ring)

**Position 8) Spring materials**
D : Chromnium alloy, aluminized coated
D1 : Chromnium alloy, cadmium coated
Q : Stainless steel 316
T : 2% tungsten steel U
: 9% tungsten steel H :
Alloy 600
J : Alloy X750
M : Alloy 400
K : Stainless steel 17.4PH
X : Special material : to be defined

| Pressure series according to position 3 | Inlet Ø PN | 1'' | 1½'' | 2'' | 2½'' | 3'' | 4'' | 6'' | 8'' | 10'' | 12'' | 14'' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10 | | | | | | | | F | F | F | F |
| | 16 | | | | P | P | P | P | G | G | G | G |
| 2 | 25 | P | P | P | | | | | F | F | F | F |
| | 40 | | | | P | P | P | P | G | G | G | G |
| 3 | 64 | | | F | F | F | F | F | - | - | - | - |
| | 100 | P | P | G | G | G | G | G | - | - | - | - |

## How to choose a FLAMMER'S 66 SERIES valve 1 - Data

- Required flow rate
- Set pressure
- Allowable overpressure
- Fluid data
  - gas (molecular weight, $C_p/C_v$, compressibility factor)
  - liquid (density, viscosity)
  - steam (temperature)
- Service conditions (back pressure, temperature)
- Environmental requirements (corrosion)
- Flange standards

### 2 - Orifice selection

Using capacity tables for known fluids (air/steam/water) and given overpressure, select the orifice size corresponding to minimum required flow rate.

### 3 - Valve selection

Using the capacity table or relevant orifice selection chart, select the model number that is suitable for pressure/temperature rating.

### 4 - Valve characteristics

- Selection table shows inlet x outlet sizes and flange ratings as well as valve dimensions and weights.
- Bills of material may be obtained from the appropriate section of this catalogue.

### 5 - Options and accessories

Options and accessories must be separately specified.

## Order information

For proper and timely processing of your order, the following information should be given:

1 - Quantity
2 - Inlet and outlet size
3 - FLAMMER'S 66 SERIES model number
4 - Inlet and outlet flange rating and facing if different from standard
5 - Materials of construction if different from standard
6 - Soft seat material required
7 - Set pressure
8 - Maximum inlet pressure
9 - Maximum allowable overpressure
10 - Service: liquid: specific gravity (water= 1), viscosity - gas: molecular weight and compressibility factor - steam: temperature
11 - Back pressure, constant or variable, and value
12 - Required capacity
13 - Accessories: lever, test gag, other
14 - Code requirements

When possible, we check the sizing and selection of the valves.

FLAMMER

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