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# Pressure Relief Valve Sizing & Selection Report

| No | Prpd. | Chk. | Appr. | Date | Revision |
|---|---|---|---|---|---|
| 0 | | | | 7-jul.-2021 | |

*Quote Number: 094-092*

Client: *INTECSA*
Location: *CARTAGENA*
Project: *REPSOL C43*
End-User Ref. No.:
Project Ref. No.: *697751586*

## Valve ID

| | |
|---|---|
| Tag No. | *660-TSV -F17-30* |
| Service | *LINEA BIOJET A BRAZO 660-K-F17/105* |
| PID No. | *660-A-C31-A-64580 hoja 1* |
| Line No. | *C43-1"P-00924-B4* |
| Quantity | 1 |

## GENERAL

| | | | |
|---|---|---|---|
| Valve Type | *Conventional, Direct Spring-Op* | | |
| Safety / Relief | *Safety Relief* | Balanced | *No* |
| Nozzle | *Full* | Bonnet | *Closed* |

## CONNECTIONS

| | | | | |
|---|---|---|---|---|
| Inlet | *3/4"* | *Thrd.* | *MNPT* | Standard |
| Outlet | *1"* | *Thrd.* | *FNPT* | *ASME B1.20.1* |

## MATERIALS OF CONSTRUCTION

| | |
|---|---|
| Body Cylinder | *CS SA216-WCB* |
| Body Base | *316 SST* |
| Connections | *N/A* |
| Disc | *316 SST* |
| Seat | *316 SST* |
| Seals | *N/A* |
| Spindle | *416 SST* |
| Guide | *316 SST* |
| Spring | *17-7 PH SST* |
| Cap Type | *Screwed & Test Rod* |
| NACE MR0175/ISO 15156:2015 | *No* |

Accessories

## SIZING / SELECTION SUMMARY

| | | | | | |
|---|---|---|---|---|---|
| Valve Model No. | | | *961101MFB-P* | | |
| Brand | | | *Crosby®* | | |
| Area ($mm^2$) | Calculated | Selected | *29.639* | *70.968* | |
| | Data Set | Orifice | *API* | *6* | |
| Flow | Unit | Required | $m^3/hr$ | 4.92 | |
| | | Maximum | | 11.802 | |
| Reaction Force, Open Discharge | | | *14 N* | | |
| Noise Level (db), Open Discharge | | | *N/A* | | |

## SIZING DATA

| | | | |
|---|---|---|---|
| Design Code | *ASME Section VIII* | Sizing Std. | *API 520* |
| Sizing Basis | *Blocked Discharge* | | |
| Fluid State at Inlet | *Liquid* | | |
| Relieving Case | *Pressure Relief* | | |

### *Fluid Properties*

| | |
|---|---|
| Fluid Name | *BIOJET* |
| Sp. Gravity, G | *0.725* |
| Viscosity | *1.10000 cP* |
| Reynolds No. | *120533.49* |
| Reynolds No. (max) | *289125.5* |

### *Sizing Coefficients*

| | | | |
|---|---|---|---|
| | | Unit | - |
| Effective K, Liquid | | *0.65* | |
| Kw | Kc | *1.0* | *1* |
| Kv | Kv (max) | *0.998* | *1.0* |

### *Required Capacity*

| | | |
|---|---|---|
| | Unit | $m^3/hr$ |
| Total | *4.92* | |

### *Pressures*

| | | | |
|---|---|---|---|
| | | Unit | $kg/cm^2$ g |
| MAWP | Operating | *17* | *2.5* |
| Set | CDTP | *17* | *17.00* |
| Over Pressure | | *1.7* | *10%* |
| Back Pressure | Built-Up | | *0.057* |
| | Constant Superimposed | | *0* |
| | Variable Superimposed | | *0* |
| | Total | | *0.057* |
| Inlet Loss | | *0* | *0%* |
| Atmospheric (Barometric) | | *1.033* | *kg/cm² a* |

### *Temperatures*

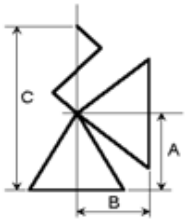
| | | | |
|---|---|---|---|
| | Normal System | Unit | °C |
| Operating | Relieving | *35* | *35* |
| Design Min | Design Max | | *93* |

**Tag Notes**

1. Standard paint C4 M acc. ISO 12944.
2. Frosio Certificate.
3. Special nameplate.
4. Thermal relief valves monitoring include.
5. ASME STAMP required.
6. Go Switch: 7J-1356F-JSP. Type: Magnetic/24VDC wires/24V/Ex ia IIC T6 Ga
7. Full Nozzle and removable.
8. Opening Adjustment ±5%
9. Certificate ATEX (2014 / 34 EU)

**Valve Dimensions**

| | | |
|---|---|---|
| mm | A | 79.38 |
| | B | 49.21 |
| | C | 307.98 |
| kg | Weight | 4.54 |



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# Pressure Relief Valve Calculation Report

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Client: *INTECSA*
Location: *CARTAGENA*
Project: *REPSOL C43*
End-User Ref. No.:
Project Ref. No.: *697751586*

| | VALVE ID | | | |
|---|---|---|---|---|
| Tag No. | 660-TSV -F17-30 | | | |
| Valve Model No. | 961101MFB-P | Qty. 1 | | |

| | SIZING DATA | | | |
|---|---|---|---|---|
| Design Code | ASME Section VIII | Sizing Std. | API 520 | |
| Fluid State at Inlet | Liquid | | | |

**CALCULATION NOTES**

1. Standard paint C4 M acc. ISO 12944.
2. Frosio Certificate.
3. Special nameplate.
4. Thermal relief valves monitoring include.
5. ASME STAMP required.
6. Go Switch: 7J-1356F-JSP. Type: Magnetic/24VDC wires/24V/Ex ia IIC T6 Ga
7. Full Nozzle and removable.
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9. Certificate ATEX (2014 / 34 EU)

**CALCULATION SUMMARY**

| | | | | | | |
|---|---|---|---|---|---|---|
| Flow | Required | 4.92 m³/hr | Area | Required | 29.639 mm² |
| | Maximum | 11.802 m³/hr | | Selected | 70.968 mm² |
| Reaction Force, Open Discharge | | 14 N | | | |

| Variable Type | Variable Name | Symbol | Input Value / Units | Equation Value / Units |
|---|---|---|---|---|
| Fluid Properties | Specific Gravity | SG | 0.725 | 0.725 |
| | Viscosity | μ | 1.10000 cP | 1.10000 cP |
| Process Cond. | Required Volumetric Flow | VL,req | 4.92 m³/hr | 21.662 GPM (US) |
| | Set Pressure | Pset | 17 kg/cm² g | 241.797 psig |
| | Over Pressure | Pover | 1.7 kg/cm² g | 24.18 psig |
| | Inlet Line Loss | Ploss | 0 kg/cm² g | 0 psig |
| | Back Pressure | Pback | 0.057 kg/cm² g | 0.811 psig |
| | Rupture Disc CCF | Kc | 1 | 1 |
| Valve Data | Discharge Coefficient (API) | K,API | 0.65 | 0.65 |
| | | | | |
| | Orifice Area | A | 70.968 mm² | 0.110 in² |
| | Back Press. Correction Factor | Kw | 1.0 | 1.0 |
| | Viscosity Correction (Rqd Flow) | Kv | 0.998 | 0.998 |
| | Viscosity Correction (Max Flow) | Kv,max | 1.0 | 1.0 |
| | Outlet Diameter | Do | 26.64 mm | 1.05 in |

**Calculate Inlet Relieving and Outlet Pressures**

Pa = Pset + Pover - Ploss — **Pa** — 265.977 psig
Pb = Pback — **Pb** — 0.811 psig

**Calculate Capacity of Selected Valve** — **VL** — 11.802 m³/hr — 51.961 GPM (US)

VL = 38 * A * K,API * Kw * Kc * Kv,max * [(Pa - Pb) / SG]^0.5

**Calculate Reynolds Number** — **R** — 120533.49

R = 2800 * VL,req * SG / (μ * A^0.5)

R,max = 2800 * VL * SG / (μ * A^0.5) — **R,max** — 289125.5

**Calculate Required Orifice Area** — **Areq** — 29.639 mm² — 0.046 in²

Areq = (A * VL,req * Kv,max) / (VL * Kv)

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Project: *REPSOL C43*

End-User Ref. No.:
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| | VALVE ID | | | |
|---|---|---|---|---|
| 2 | Tag No. | 660-TSV -F17-30 | | |
| 3 | Valve Model No. | 961101MFB-P | Qty. 1 | |
| 4 | **SIZING DATA** | | | |
| 5 | Design Code | ASME Section VIII | Sizing Std. | API 520 |
| 6 | Fluid State at Inlet | Liquid | | |

**CALCULATION NOTES**

1. Standard paint C4 M acc. ISO 12944.
2. Frosio Certificate.
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**CALCULATION SUMMARY**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 8 | Flow | Required | 4.92 m³/hr | 18 | Area | Required | 29.639 mm² |
| 9 | | Maximum | 11.802 m³/hr | 19 | | Selected | 70.968 mm² |
| 10 | Reaction Force, Open Discharge | | 14 N | 20 | | | |

**Calculate Reaction Force for Open Discharge** **Fr** 14 N 3.1 lbf

Ao = (π * Do^2) / 4

Fr = [2.002 * Pa * (A * K,API * Kv,max)^2] / Ao