# AGATEC

## Instrumentos de Medição e Solda


Pressão
Temperatura
Oxi-Combustíveis
Acessórios

# Informações Úteis

## Cálculo de pressão máxima para bourdon

$$P = \frac{F}{A}$$

em que
- P = Pressão (kg/cm²)
- F = Força (kg)
- A = Área (cm²)

$$A = \frac{\pi \cdot D}{4}$$

em que
- A = Pressão (Kg/cm²)
- π = Força (Kg)
- D = Área (cm²)

$$\therefore P\ máx. = \frac{4 \cdot F\ (kg)}{\pi \cdot D^2\ (cm^2)}$$

**Ex.:** Calcular a pressão máxima para F = 12 toneladas e Ø do pistão = 100mm.

1º passo: Transformar as unidades

1 t = 1.000 kg ∴ 12 Ton.= 12000Kg (F)

1 cm = 10 mm ∴ 100 mm = 10 cm (Ø)

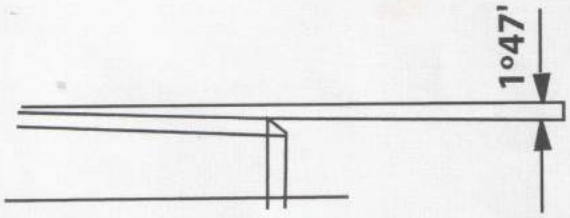
2º passo: Substituir os dados na fórmula

$$P\ máx. = \frac{4 \cdot 12.000}{3{,}1416 \cdot 10^2} \Rightarrow P\ máx. \cong 152{,}78\ kg/cm^2$$

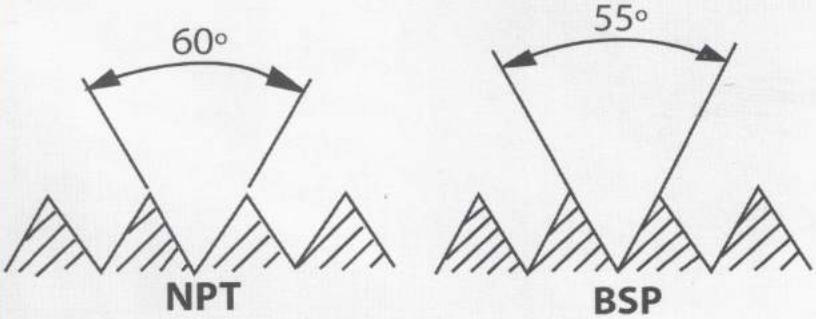
3º passo: Fazer a escolha do bourdon para P máx. = 150Kg/cm²

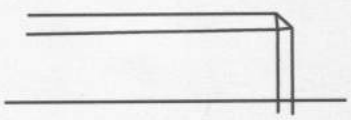
## Tabela de fios de rosca

| Rosca (polegada) | D.E. BSP (mm) | BSP nº de f. por pol | NPT nº de f. por pol |
|---|---|---|---|
| 1/8" | 9,72 | 28 | 27 |
| 1/4" | 13,15 | 19 | 18 |
| 3/8" | 16,66 | 19 | 18 |
| 1/2" | 20,95 | 14 | 14 |
| 3/4" | 26,44 | 14 | 14 |




NPT = Rosca cônica (1:16)



BSP = Rosca paralela

# Informações Úteis

## Tabela de conversão de unidades de pressão

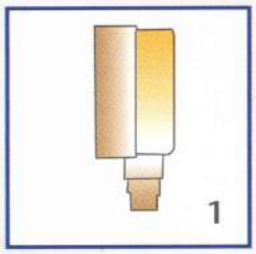
| De \ Para | psi (lbf/pol²) | mbar | atm | Pa | kPa | Mpa | (cm $H_2O$) mm CA | (mm $H_2O$) m CA | (m $H_2O$) cm CA | (pol $H_2O$) pol CA |
|---|---|---|---|---|---|---|---|---|---|---|
| psi (lbf/pol²) | 1 | 68.9476 | 0.068046 | 6895 | 6.8947 | $6.8947 \times 10^{3}$ | 70.433 | 704.33 | 0.70433 | 27.730 |
| mbar | 0.014504 | 1 | 0.000987 | 100 | 0.100 | $1.0 \times 10^{4}$ | 1.0215 | 10.215 | 0.010215 | 0.40218 |
| atm | 14.6959 | 1013.250 | 1 | 101300 | 101.3 | 0.1013 | 1035.08 | 10350.8 | 10.3508 | 407.513 |
| Pa | 0.000145 | 0.01 | 0.00000987 | 1 | 0.001 | $1.0 \times 10^{6}$ | 0.010215 | 00.10215 | $1.0215 \times 10^{-4}$ | 0.00402 |
| kPa | 0.14504 | 10.0 | 0.00987 | 1000 | 1 | $1 \times 10^{3}$ | 102150 | 102.15 | 0.10215 | 4.021 |
| Mpa | 145.04 | 10000 | 9.87 | $1 \times 10^{6}$ | 1000 | 1 | 10215 | 102150 | 102.15 | 4021 |
| (cm $H_2O$) cm CA | 0.014198 | 0.97891 | 0.000966 | 97.8 | 0.0978 | $97.8 \times 10^{6}$ | 1 | 10 | 0.01 | 0.3937 |
| (mm $H_2O$) mm CA | 0.0014190 | 0.097891 | $9.66 \times 10^{-5}$ | 9.78 | 0.00978 | $9.78 \times 10^{6}$ | 0.1 | 1 | 0.001 | 0.03937 |
| (m $H_2O$) m CA | 1.498 | 97.891 | 0.0966 | 9780 | 9.78 | $9.78 \times 10^{3}$ | 100 | 1000 | 1 | 39.37 |
| (pol $H_2O$) m CA | 0.036063 | 2.4864 | 0.002454 | 248.6 | 0.2486 | $2.486 \times 10^{4}$ | 2.5400 | 25.4 | 0.0254 | 1 |
| (pé $H_2O$) pé CA | 0.432756 | 29.8368 | 0.029448 | 2983.6 | 2.9836 | $2.9836 \times 10^{3}$ | 30.48 | 304.8 | 0.3048 | 12 |
| mm Hg (torr) | 0.019337 | 1.3332 | 0.001316 | 133.3 | 0.1333 | $1.333 \times 10^{4}$ | 1.3619 | 13.619 | 0.013619 | 0.53620 |
| cm Hg | 0.19337 | 13.332 | 0.01316 | 1333 | 1.333 | $1.333 \times 10^{3}$ | 13.619 | 136.19 | 0.13619 | 5.3620 |
| pol Hg | 0.49115 | 33.864 | 0.033421 | 3386.4 | 3.3864 | $3.3864 \times 10^{3}$ | 34.593 | 345.93 | 0.34593 | 13.619 |
| g/cm² | 0.014223 | 0.980665 | 0.0009678 | 98.06 | 0.09806 | $98.06 \times 10^{6}$ | 1.00180 | 10.0180 | 0.010018 | 0.39441 |
| kgf/cm² kp/cm² | 14.223 | 980.665 | 0.967842 | 98060 | 98.06 | $98.06 \times 10^{3}$ | 1001.80 | 10018 | 10.018 | 394.41 |
| pol CA mar | 0.037108 | 2.5585 | 0.002525 | 255.676 | 0.25568 | $2.5568 \times 10^{3}$ | 2.61365 | 26.1365 | 0.0261365 | 1.029 |
| pé CA mar | 0.4453 | 30.7024 | 0.03030 | 3070.24 | 3.0702 | $3.0702 \times 10^{3}$ | 31.36381 | 313.6381 | 0.3136381 | 12.34817 |
| bar | 14.504 | 1000 | 0.9869 | 100000 | 100 | 0.1 | 1021.5 | 10215 | 10.215 | 402.18 |

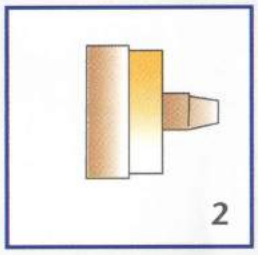
| De \ Para | (pé $H_2O$) pe CA | mm Hg (torr) | cm Hg | pol Hg | g/cm² | kgf/cm² kp/cm² | pol CA mar | pé CA mar | bar |
|---|---|---|---|---|---|---|---|---|---|
| psi (lbf/pol²) | 2.3108 | 51.715 | 5.1715 | 2.03601 | 70.30865 | 0.070308 | 26.9481 | 2.24568 | 0.0689 |
| mbar | 0.03352 | 0.75006 | 0.075006 | 0.02953 | 1.0197 | 0.001020 | 0.38085 | 0.032571 | 0.001 |
| atm | 33.959 | 760.0 | 76.0 | 29.9213 | 1033.227 | 1.03323 | 396.0396 | 33.0033 | 1.013 |
| Pa | 0.000335 | 0.00750 | 0.00075 | 0.000295 | 0.0102 | 0.0000102 | 0.003911 | 0.000326 | 0.00001 |
| kPa | 0.3352 | 7.5006 | 0.75006 | 0.2953 | 10.2 | 0.0102 | 3.91123 | 0.32593 | 0.010 |
| Mpa | 335.2 | 7500.6 | 750.06 | 295.3 | 102.00 | 10.20 | 3911.23 | 325.93 | 10 |
| (cm $H_2O$) cm CA | 0.03281 | 0.73424 | 0.073424 | 0.028907 | 0.99821 | 0.000998 | 0.38261 | 0.03188 | 0.000978 |
| (mm $H_2O$) mm CA | 0.003281 | 0.073424 | 0.0073424 | 0.0028907 | 0.099821 | $9.98 \times 10^{-5}$ | 0.038261 | $3.188 \times 10^{-3}$ | $9.78 \times 10^{-5}$ |
| (m $H_2O$) m CA | 3.281 | 73.424 | 7.3424 | 2.8907 | 99.821 | 0.0998 | 38.261 | 3.188 | 0.0978 |
| (pol $H_2O$) m CA | 0.083333 | 1.8650 | 0.18650 | 0.073424 | 2.5354 | 0.002535 | 0.97180 | 0.080984 | 0.0248 |
| (pé $H_2O$) pé CA | 1 | 22.38 | 2.238 | 0.881089 | 30.425 | 0.030435 | 116618 | 0.97182 | 0.02983 |
| mm Hg (torr) | 0.04468 | 1 | 0.1 | 0.03937 | 1.3595 | 0.0013595 | 0.52109 | 0.04342 | 0.00133 |
| cm Hg | 0.4468 | 10 | 1 | 0.3937 | 13.595 | 0.013595 | 5.2109 | 0.4342 | 0.0133 |
| pol Hg | 1.13496 | 25.400 | 2.54 | 1 | 34531 | 0.034531 | 13.23568 | 1.10297 | 0.03386 |
| g/cm² | 0.032868 | 0.73556 | 0.073556 | 0.028959 | 1 | 0.001 | 0.38329 | 0.03194 | 0.0009806 |
| kgf/cm² kp/cm² | 32.868 | 735.56 | 73.556 | 28.959 | 1000 | 1 | 383.2886 | 31.94072 | 0.9806 |
| pol CA mar | 0.08575 | 1.91906 | 0.191906 | 0.07555 | 2.60904 | 0.002609 | 1 | 0.08338 | 0.002558 |
| pé CA mar | 1.02900 | 23.02868 | 2.302869 | 0.90664 | 31.30844 | 0.031308 | 12 | 1 | 0.03070 |
| bar | 33.52 | 750.06 | 75.006 | 29.530 | 1019.7 | 1.0197 | 390.85 | 32.571 | 1 |

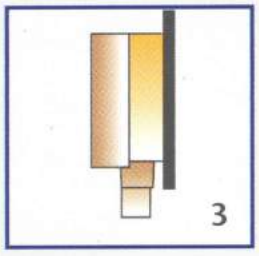
# Informações Úteis

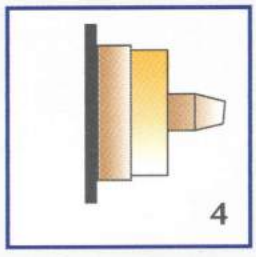
## Tabela de montagem

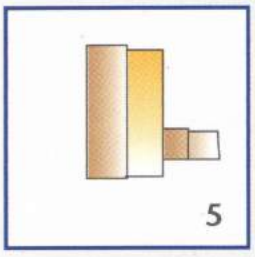
### Manômetros - Manovacuômetros - Vacuômetros

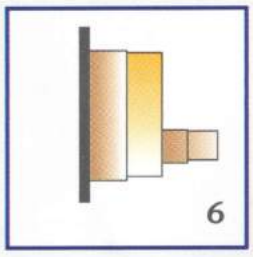


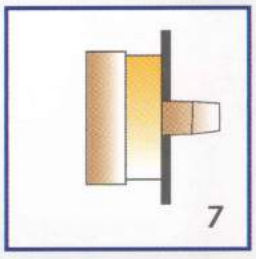



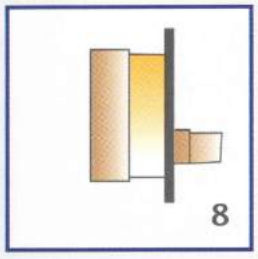



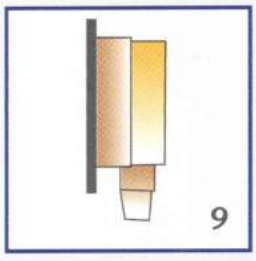



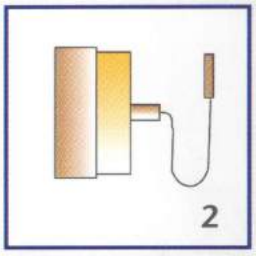



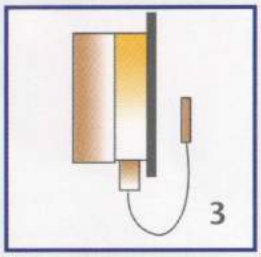



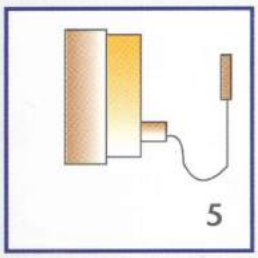



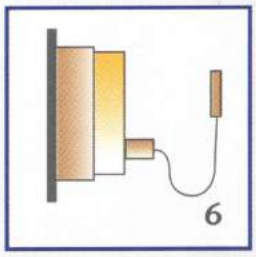



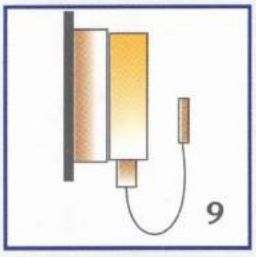

### Termômetros Capilares



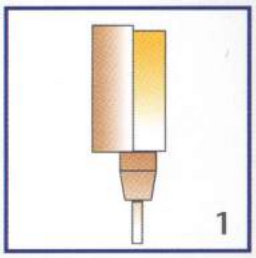



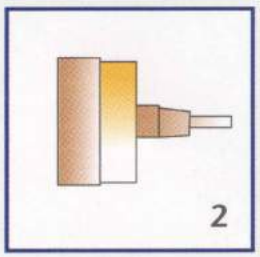



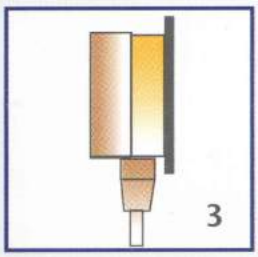



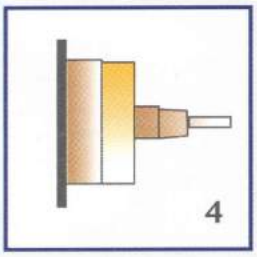




### Termômetros Bimetálicos




**1** - Conexão inferior (reto)
**2** - Conexão traseira (angular) concêntrica
**3** - Conexão inferior (reto) com flange traseira
**4** - Conexão traseira (angular) concêntrica com flange dianteira
**5** - Conexão traseira (angular) excêntrica
**6** - Conexão traseira (angular) excêntrica com flange dianteira
**7** - Conexão traseira (angular) concêntrica com flange traseira
**8** - Conexão traseira (angular) excêntrica com flange traseira
**9** - Conexão inferior (reto) com flange dianteira

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