Braglia
FLUID SPRAYING AND ENGINEERING

# PRESSIONE E PORTATA

Le portate e le caratteristiche di spruzzo degli ugelli sono state ottenute sui nostri banchi prova impiegando acqua e controllando la pressione con manometri di precisione posizionati sul porta ugello.
Per calcolare le portate degli ugelli a pressioni non previste in tabella è possibile impiegare con approssimazione la formula:

$$Q_1\ (\text{l/min}) = Q_2\ (\text{l/min}) \sqrt{\frac{P_1\ (\text{bar})}{P_2\ (\text{bar})}}$$

Impiegando soluzioni o fluidi con densità diversa dall'acqua, i valori delle portate devono essere corretti utilizzando un fattore di conversione.

| **densità kg/l** | 0.85 | 0.90 | 0.95 | 1 | 1.10 | 1.20 | 1.30 | 1.40 | 1.50 |
|---|---|---|---|---|---|---|---|---|---|
| **moltiplicare per** | 0.92 | 0.95 | 0.97 | 1 | 1.05 | 1.10 | 1.14 | 1.18 | 1.22 |

## PERDITE DI CARICO IN BAR PER ACQUA
## Ø INTERNO TUBAZIONI - LUNGHEZZA 3 m

| **PORTATE l/min** | **DIAMETRI INTERNI DEI TUBI mm** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **6** | **8** | **10** | **13** | **19** | **20** | **25** | **30** |
| **1.0** | **0.04** | | | | | | | |
| **2.0** | **0.11** | **0.02** | | | | | | |
| **3.0** | 0.24 | **0.04** | **0.02** | | | | | |
| **5.0** | 0.66 | **0.10** | **0.04** | **0.02** | | | | |
| **8.0** | 1.70 | 0.20 | **0.09** | **0.04** | | | | |
| **10** | | 0.29 | 0.14 | **0.06** | **0.01** | | | |
| **20** | | | 0.56 | 0.21 | **0.03** | **0.02** | | |
| **50** | | | | 1.31 | 0.15 | 0.11 | **0.04** | |
| **80** | | | | | 0.45 | 0.30 | **0.09** | **0.03** |
| **100** | | | | | 0.80 | 0.47 | 0.15 | **0.05** |
| **120** | | | | | 1.14 | 0.70 | 0.21 | **0.07** |
| **150** | | | | | | 1.10 | 0.33 | 0.12 |
| **200** | | | | | | | | 0.20 |

| **DIAMETRI ESTERNI DEI TUBI** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **mm** | 10.3 | 13.7 | 17.2 | 21.3 | 26.9 | 33.7 | 42.4 | 48.3 | 60.3 |
| **inches** | 1/8 | 1/4 | 3/8 | 1/2 | 3/4 | 1 | 1 1/4 | 1 1/2 | 2 |
| **DN** | 6 | 8 | 10 | 15 | 20 | 25 | 32 | 40 | 50 |

| **CONVERSIONE UNITÀ DI MISURA** | | |
|---|---|---|
| **per ottenere** | **moltiplicare** | **per** |
| mm | **25.4** | pollici |
| m | **0.3048** | piedi (ft) |
| km | **1.609** | miglia (miles) |
| ha | **0.4047** | acri (acres) |
| l | **3.785** | galloni USA (USGal) |
| l | **4.545** | galloni imperial (Imp.) |
| bar | **0.069** | psi |

* **Le portate consigliate sono in grassetto**

## FORI / PORTATE

| **Ø mm** | **PORTATA l/min** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **1 bar** | **2 bar** | **3 bar** | **4 bar** | **5 bar** | **6 bar** | **7 bar** | **10 bar** | **20 bar** |
| **0.5** | 0.11 | 0.16 | 0.20 | 0.23 | 0.25 | 0.28 | 0.30 | 0.36 | 0.51 |
| **0.7** | 0.23 | 0.32 | 0.39 | 0.46 | 0.51 | 0.56 | 0.60 | 0.72 | 1.0 |
| **1.0** | 0.48 | 0.66 | 0.83 | 0.96 | 1.1 | 1.2 | 1.3 | 1.6 | 2.3 |
| **1.2** | 0.70 | 0.98 | 1.2 | 1.4 | 1.5 | 1.7 | 1.8 | 2.2 | 3.1 |
| **1.5** | 1.1 | 1.6 | 2.0 | 2.3 | 2.5 | 2.8 | 3.0 | 3.6 | 5.1 |
| **2.0** | 1.8 | 2.6 | 3.2 | 3.6 | 4.1 | 4.5 | 4.8 | 5.8 | 8.2 |
| **2.5** | 3.0 | 4.2 | 5.1 | 5.9 | 6.6 | 7.2 | 7.8 | 9.3 | 13.1 |
| **3.0** | 4.1 | 5.8 | 7.1 | 8.2 | 9.2 | 10 | 10.8 | 12.9 | 18.3 |
| **3.5** | 6.7 | 9.5 | 11.6 | 13.4 | 15 | 16.4 | 17.7 | 21.2 | 30 |
| **4.0** | 9.1 | 12.9 | 15.8 | 18.2 | 20 | 22 | 24 | 29 | 41 |
| **4.5** | 11.7 | 16.5 | 20.3 | 23.5 | 26.2 | 28.7 | 30.9 | 37 | 52 |
| **5.0** | 14 | 19.8 | 24.2 | 28 | 31.3 | 34.2 | 37 | 44 | 62.5 |
| **6.0** | 23 | 32 | 39 | 46 | 51 | 56 | 60 | 72 | 102 |
| **6.5** | 27 | 38 | 47 | 54 | 61 | 66 | 71 | 85 | 121 |
| **7.5** | 34 | 48 | 59 | 68 | 76 | 84 | 90 | 108 | 153 |
| **8.5** | 48 | 68 | 83 | 96 | 107 | 118 | 127 | 152 | 215 |
| **9.5** | 57 | 81 | 99 | 114 | 127 | 140 | 151 | 180 | 255 |
| **11.0** | 80 | 113 | 138 | 160 | 179 | 196 | 212 | 253 | 358 |
| **15.5** | 160 | 225 | 275 | 320 | 355 | 390 | 420 | 510 | 720 |
| **19.0** | 226 | 319 | 391 | 452 | 505 | 553 | 598 | 715 | 1010 |
| **20.0** | 262 | 370 | 454 | 524 | 586 | 641 | 693 | 828 | 1172 |
| **25.4** | 410 | 580 | 710 | 820 | 920 | 1010 | 1090 | 1300 | 1840 |
| **26.5** | 456 | 645 | 790 | 912 | 1019 | 1117 | 1206 | 1442 | 2040 |

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# PRESSURE AND FLOW RATE

*Flow rates and spray tips features have been obtained on our test facility with clear water checking the pressure with high precision gauges located on the tip holder.*
*To obtain the flow rates at pressures not shown on our charts, please use the following formula:*

$$Q_1 \text{ (USGal/min)} = Q_2 \text{ (USGal/min)} \sqrt{\frac{P_1 \text{ (psi)}}{P_2 \text{ (psi)}}}$$

*Using various chemical density, data must be corrected using the appropriate conversion factor.*

| density kg/l | 0.85 | 0.90 | 0.95 | 1 | 1.10 | 1.20 | 1.30 | 1.40 | 1.50 |
|---|---|---|---|---|---|---|---|---|---|
| multiply for | 0.92 | 0.95 | 0.97 | 1 | 1.05 | 1.10 | 1.14 | 1.18 | 1.22 |

## PRESSURE DROP IN PSI FOR WATER
## PIPES INTERNAL Ø - 10 FT LENGHT

| Flow rate USGal/min | PIPES INTERNAL Ø - INCHES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1/4 | 3/8 | 7/16 | 1/2 | 3/4 | 1 | 1 1/4 | 1 1/2 |
| **0.3** | **0.6** | | | | | | | |
| **0.5** | 1.4 | **0.2** | | | | | | |
| **0.8** | 3.3 | **0.5** | **0.2** | | | | | |
| **1.5** | | 1.4 | **0.6** | **0.4** | | | | |
| **2.0** | | 2.4 | **1.1** | **0.6** | | | | |
| **2.5** | | | 1.7 | **0.9** | | | | |
| **5.0** | | | | 2.9 | **0.4** | | | |
| **15** | | | | | 3.0 | **0.8** | **0.3** | |
| **20** | | | | | | 1.4 | **0.5** | **0.2** |
| **25** | | | | | | 2.0 | **0.7** | **0.3** |
| **30** | | | | | | 2.8 | **0.9** | **0.4** |
| **40** | | | | | | | 1.6 | **0.6** |
| **50** | | | | | | | 2.5 | **0.8** |

| PIPES EXTERNAL Ø | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| mm | 10.3 | 13.7 | 17.2 | 21.3 | 26.9 | 33.7 | 42.4 | 48.3 | 60.3 |
| inches | 1/8 | 1/4 | 3/8 | 1/2 | 3/4 | 1 | 1 1/4 | 1 1/2 | 2 |
| DN | 6 | 8 | 10 | 15 | 20 | 25 | 32 | 40 | 50 |

| UNITS CONVERSION | | |
|---|---|---|
| to obtain | multiply | by |
| inches | **0.0394** | mm |
| feet | **3.281** | m |
| miles | **0.6214** | Km |
| acres | **2.471** | ha |
| USGal | **0.2642** | l |
| Imp. Gal | **0.22** | l |
| psi | **14.5** | bar |

** Recommended flow rates are write in bold*

## HOLES / FLOW RATES

| HOLE Ø mm | FLOW RATES USGal/min | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 15 psi | 30 psi | 45 psi | 60 psi | 70 psi | 90 psi | 100 psi | 150 psi | 300 psi |
| **0.5** | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.076 | 0.08 | 0.1 | 0.14 |
| **0.7** | 0.06 | 0.08 | 0.10 | 0.12 | 0.13 | 0.15 | 0.16 | 0.23 | 0.27 |
| **1.0** | 0.13 | 0.17 | 0.22 | 0.25 | 0.29 | 0.32 | 0.35 | 0.43 | 0.62 |
| **1.2** | 0.2 | 0.26 | 0.3 | 0.37 | 0.39 | 0.46 | 0.48 | 0.6 | 0.84 |
| **1.5** | 0.3 | 0.4 | 0.5 | 0.6 | 0.65 | 0.76 | 0.8 | 0.95 | 1.4 |
| **2.0** | 0.5 | 0.7 | 0.8 | 0.95 | 1.07 | 1.22 | 1.28 | 1.6 | 2.2 |
| **2.5** | 0.8 | 1.1 | 1.3 | 1.6 | 1.7 | 1.9 | 2.1 | 2.5 | 3.5 |
| **3.0** | 1.1 | 1.6 | 1.9 | 2.2 | 2.4 | 2.7 | 2.9 | 3.5 | 4.9 |
| **3.5** | 1.8 | 2.6 | 3.1 | 3.6 | 3.9 | 4.4 | 4.7 | 5.7 | 8.1 |
| **4.0** | 2.5 | 3.5 | 4.2 | 4.9 | 5.2 | 5.9 | 6.4 | 7.8 | 11 |
| **4.5** | 3.1 | 4.4 | 5.4 | 6.3 | 6.8 | 7.7 | 8.2 | 10 | 14 |
| **5.0** | 3.8 | 5.3 | 6.5 | 7.5 | 8.1 | 9.2 | 9.8 | 11.9 | 16.9 |
| **6.0** | 6.2 | 8.6 | 10.5 | 12.4 | 13.3 | 15.1 | 16 | 19.4 | 27.5 |
| **6.5** | 7.2 | 10.2 | 12.6 | 14.5 | 15.9 | 17.8 | 19 | 23 | 32.7 |
| **7.5** | 9.1 | 12.9 | 15.9 | 18.3 | 19.8 | 22.7 | 24 | 29 | 41.3 |
| **8.5** | 13 | 18.3 | 22.3 | 25.8 | 27.8 | 31.9 | 34 | 41 | 58 |
| **9.5** | 15.3 | 21.8 | 26.6 | 30.6 | 33 | 38 | 40 | 49 | 69 |
| **11.0** | 21.5 | 30.4 | 37 | 43 | 46.5 | 53 | 56 | 68 | 96.5 |
| **15.5** | 43 | 60.5 | 74 | 86 | 92.3 | 105 | 112 | 138 | 194 |
| **19.0** | 60.7 | 85.7 | 105 | 121.5 | 131 | 149 | 159 | 193 | 273 |
| **20.0** | 70.4 | 99.4 | 122 | 141 | 152 | 173 | 184 | 224 | 316 |
| **25.4** | 110 | 155 | 191 | 220 | 239 | 273 | 290 | 351 | 497 |
| **26.5** | 122.5 | 173 | 212 | 245 | 265 | 302 | 321 | 389 | 550 |