# TEG Gas Dehydration: Water Removed, Glycol Rate and Contactor Diameter

Water to remove from natural gas, TEG circulation from the glycol-to-water ratio, and glycol contactor diameter by Souders–Brown at operating pressure.

**Method:** Mokhatab; Poe and Speight; ...

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Gas flow (standard) | 20.000 | MMscfd |
| Water content of the inlet gas | 60.000 | lb/MMscf |
| Water content required at the outlet | 7.0000 | lb/MMscf |
| Glycol-to-water ratio | 3.0000 | US gal/lb |
| Contactor pressure (absolute) | 1,000.00 | psi |
| Contactor temperature | 37.778 | °C |
| Compressibility factor | 0.87000 | |
| Gas specific gravity | 0.65000 | |
| Lean glycol density | 1,110.0 | kg/m³ |
| K-factor reduction for glycol (0.6–0.8) | 0.70000 | |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Water removed | 20.034 | kg/h |
| Minimum TEG circulation | 501.57 | L/h |
| Souders–Brown coefficient | 0.055787 | m/s |
| Maximum superficial gas velocity | 0.23821 | m/s |
| Minimum contactor inside diameter | 694.57 | mm |

### Notes for this case

• Water contents come from a water-content chart or a measured dew point. The industry rule is 3 US gal TEG per lb of water removed (range 2–6); operate 10–30 % above the minimum rate. The K factor is the GPSA mist-pad fit given by Mokhatab, reduced for glycol; check tray or packing loading with the vendor.

## Formula and method

$$\dot{W}_r = Q_g(W_{in} - W_{out}), \quad Q_{TEG} = G\dot{W}_r, \quad V_{max} = K_{SB}\sqrt{\frac{\rho_L - \rho_G}{\rho_G}}, \quad D = \sqrt{\frac{4Q_a}{\pi V_{max}}}$$

$$K_{SB} = f\,[0.35 - 0.0001(P_{psig} - 100)]\ \text{ft/s}$$

### Variables

| | | |
|---|---|---|
| $Q_g$ | Gas flow (standard) | Nm³/s |
| $W_{in}$ | Water content of the inlet gas | kg/m³ |
| $W_{out}$ | Water content required at the outlet | kg/m³ |
| $G$ | Glycol-to-water ratio | m³/kg |
| $P$ | Contactor pressure (absolute) | Pa |

| | | |
|---|---|---|
| $T$ | Contactor temperature | K |
| $Z$ | Compressibility factor | - |
| $SG$ | Gas specific gravity | - |
| $\rho_L$ | Lean glycol density | kg/m³ |
| $f$ | K-factor reduction for glycol (0.6–0.8) | - |
| $\dot{W}_r$ | Water removed | kg/s |
| $Q_{TEG}$ | Minimum TEG circulation | m³/s |
| $K_{SB}$ | Souders–Brown coefficient | m/s |
| $V_{max}$ | Maximum superficial gas velocity | m/s |
| $D$ | Minimum contactor inside diameter | m |

### Method and standards

Water balance and Souders–Brown flooding velocity.

### Assumptions and limits

- Saturated inlet gas; mist-pad K fit.

### References

• Mokhatab
• Poe and Speight
• Handbook of Natural Gas Transmission and Processing (Gulf Professional Publishing, 2006)
• ch. 9
• eqs. 9-3 and 9-4
• and ch. 5
• eq. 5-8 (GPSA K factor)

## Report details

| | |
|---|---|
| Report reference | FCC-CX0H-9RC8 (the same inputs always give the same reference) |
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| Release checks | 2 reference cases of this calculator, computed independently, are checked on every release |

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

### This calculator online

https://calc.firecad.com/chemical/oil-gas/teg-dehydration-glycol-contactor

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.