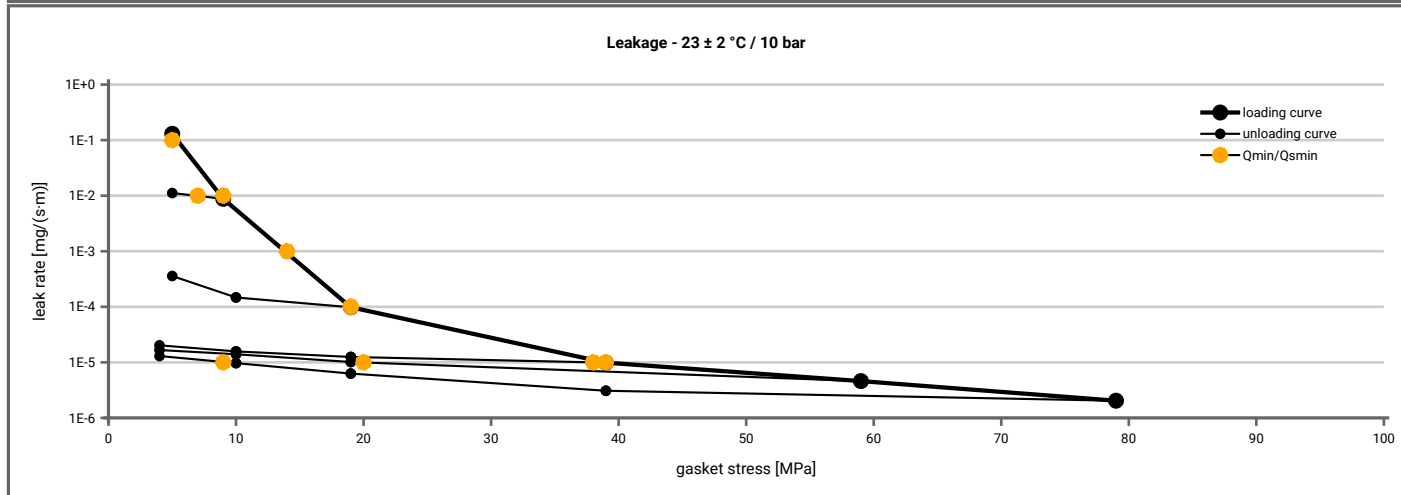
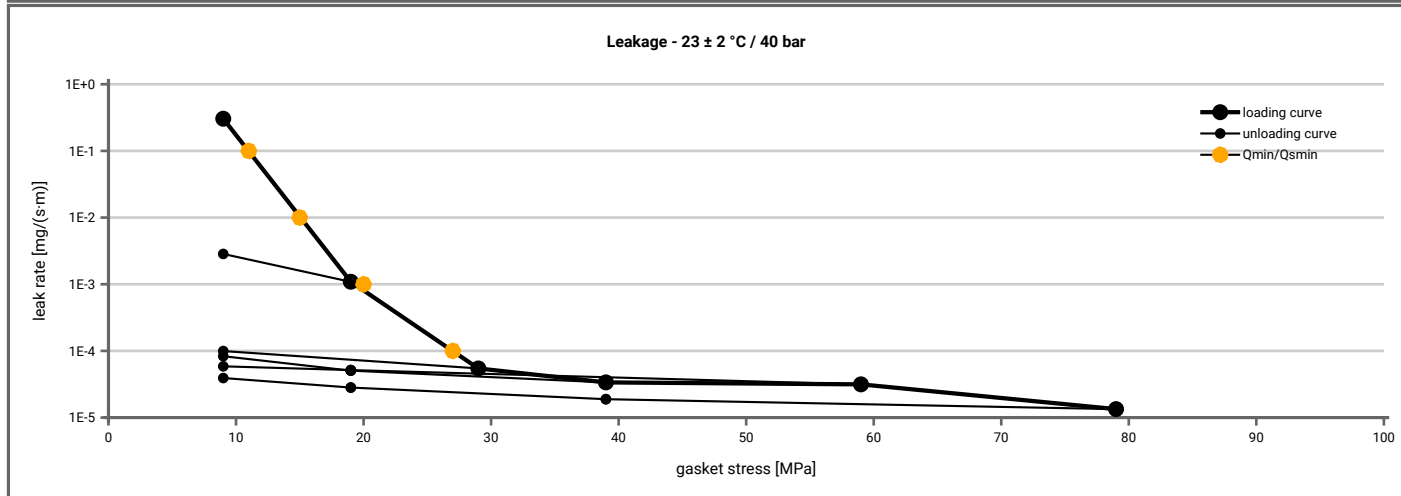


|                      |                                                          |                                                      |
|----------------------|----------------------------------------------------------|------------------------------------------------------|
| Manufacturer address | KLINGER GmbH, Richard Klinger Str. 37, 65510 Idstein, DE | According to<br><b>DIN EN 13555</b><br><b>2014-7</b> |
| Product name         | KLINGER® top-chem-2003                                   |                                                      |
| Product dimensions   | 92 x 49 x 2 mm (DIN EN 1514-1 1997-8)                    |                                                      |

| Minimum stress to seal $Q_{min(L)}$ (at assembly), $Q_{smin(L)}$ (after off-loading) for $p = 10$ bar ( $T = 23 \pm 2$ °C) |                    |                     |                  |                  |                  |                  |                  |
|----------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|------------------|------------------|------------------|------------------|------------------|
| L [mg/(s·m)]                                                                                                               | $Q_{min(L)}$ [MPa] | $Q_{smin(L)}$ [MPa] |                  |                  |                  |                  |                  |
|                                                                                                                            |                    | $Q_A = 5$ [MPa]     | $Q_A = 10$ [MPa] | $Q_A = 20$ [MPa] | $Q_A = 40$ [MPa] | $Q_A = 60$ [MPa] | $Q_A = 80$ [MPa] |
| 1E-0                                                                                                                       | 5                  |                     | 5                | 5                | 5                | 5                | 5                |
| 1E-1                                                                                                                       | 5                  |                     | 5                | 5                | 5                | 5                | 5                |
| 1E-2                                                                                                                       | 10                 |                     | 7                | 5                | 5                | 5                | 5                |
| 1E-3                                                                                                                       | 15                 |                     |                  | 5                | 5                | 5                | 5                |
| 1E-4                                                                                                                       | 20                 |                     |                  | 19               | 5                | 5                | 5                |
| 1E-5                                                                                                                       | 40                 |                     |                  |                  | 39               | 21               | 9                |
| 1E-6                                                                                                                       |                    |                     |                  |                  |                  |                  |                  |
| 1E-7                                                                                                                       |                    |                     |                  |                  |                  |                  |                  |
| 1E-8                                                                                                                       |                    |                     |                  |                  |                  |                  |                  |



| Minimum stress to seal $Q_{min(L)}$ (at assembly), $Q_{smin(L)}$ (after off-loading) for $p = 40$ bar ( $T = 23 \pm 2$ °C) |                    |                     |                  |                  |                  |                  |                  |
|----------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|------------------|------------------|------------------|------------------|------------------|
| L [mg/(s·m)]                                                                                                               | $Q_{min(L)}$ [MPa] | $Q_{smin(L)}$ [MPa] |                  |                  |                  |                  |                  |
|                                                                                                                            |                    | $Q_A = 10$ [MPa]    | $Q_A = 20$ [MPa] | $Q_A = 30$ [MPa] | $Q_A = 40$ [MPa] | $Q_A = 60$ [MPa] | $Q_A = 80$ [MPa] |
| 1E-0                                                                                                                       | 10                 |                     | 10               | 10               | 10               | 10               | 10               |
| 1E-1                                                                                                                       | 12                 |                     | 10               | 10               | 10               | 10               | 10               |
| 1E-2                                                                                                                       | 16                 |                     | 10               | 10               | 10               | 10               | 10               |
| 1E-3                                                                                                                       | 20                 |                     |                  | 10               | 10               | 10               | 10               |
| 1E-4                                                                                                                       | 28                 |                     |                  | 10               | 10               | 10               | 10               |
| 1E-5                                                                                                                       |                    |                     |                  |                  |                  |                  |                  |
| 1E-6                                                                                                                       |                    |                     |                  |                  |                  |                  |                  |
| 1E-7                                                                                                                       |                    |                     |                  |                  |                  |                  |                  |
| 1E-8                                                                                                                       |                    |                     |                  |                  |                  |                  |                  |



|                                                                                    |             |                                         |
|------------------------------------------------------------------------------------|-------------|-----------------------------------------|
| Note: the content of darkened cells was not determined respectively is unnecessary | Rev.-No.: 3 | Creation date of this sheet: 2018-07-13 |
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|                      |                                                          |                                                      |
|----------------------|----------------------------------------------------------|------------------------------------------------------|
| Manufacturer address | KLINGER GmbH, Richard Klinger Str. 37, 65510 Idstein, DE | According to<br><b>DIN EN 13555</b><br><b>2014-7</b> |
| Product name         | KLINGER® top-chem-2003                                   |                                                      |
| Product dimensions   | 92 x 49 x 2 mm (DIN EN 1514-1 1997-8)                    |                                                      |

| Relaxation ratio $P_{QR}$ for stiffness $C = 500$ [kN/mm]                      |           |                      |                        |                      |                        |                      |          |                      |          |                      |
|--------------------------------------------------------------------------------|-----------|----------------------|------------------------|----------------------|------------------------|----------------------|----------|----------------------|----------|----------------------|
| Gasket stress                                                                  | 23 ± 2 °C |                      | Temperature 1 [100 °C] |                      | Temperature 2 [150 °C] |                      |          |                      |          |                      |
|                                                                                | $P_{QR}$  | $\Delta e_{Gc}$ [µm] | $P_{QR}$               | $\Delta e_{Gc}$ [µm] | $P_{QR}$               | $\Delta e_{Gc}$ [µm] | $P_{QR}$ | $\Delta e_{Gc}$ [µm] | $P_{QR}$ | $\Delta e_{Gc}$ [µm] |
| Stress level 1 [10 MPa]                                                        | 0.88      | 10                   | 0.83                   | 14                   | 0.77                   | 20                   |          |                      |          |                      |
| Stress level 2 [20 MPa]                                                        | 0.90      | 17                   | 0.75                   | 43                   | 0.76                   | 40                   |          |                      |          |                      |
|                                                                                |           |                      |                        |                      |                        |                      |          |                      |          |                      |
|                                                                                |           |                      |                        |                      |                        |                      |          |                      |          |                      |
|                                                                                |           |                      |                        |                      |                        |                      |          |                      |          |                      |
|                                                                                |           |                      |                        |                      |                        |                      |          |                      |          |                      |
|                                                                                |           |                      |                        |                      |                        |                      |          |                      |          |                      |
| $P_{QR}$ and $\Delta e_{Gc}$ at maximum gasket stress to be applied $Q_{smax}$ |           |                      |                        |                      |                        |                      |          |                      |          |                      |
| $P_{QR}$ at $Q_{smax}$                                                         | 0.79      | 141                  | 0.60                   | 102                  | 0.76                   | 40                   |          |                      |          |                      |
| $Q_{smax}$                                                                     | 80 MPa    |                      | 30 MPa                 |                      | 20 MPa                 |                      |          |                      |          |                      |

| Sekant unloading modulus of the gasket E <sub>G</sub> [MPa] and gasket thickness e <sub>G</sub> [mm] |                      |                     |                        |                     |                        |                     |                      |                     |                      |                     |
|------------------------------------------------------------------------------------------------------|----------------------|---------------------|------------------------|---------------------|------------------------|---------------------|----------------------|---------------------|----------------------|---------------------|
| Gasket stress [MPa]                                                                                  | 23 ± 2 °C            |                     | Temperature 1 [100 °C] |                     | Temperature 2 [150 °C] |                     |                      |                     |                      |                     |
|                                                                                                      | E <sub>G</sub> [MPa] | e <sub>G</sub> [mm] | E <sub>G</sub> [MPa]   | e <sub>G</sub> [mm] | E <sub>G</sub> [MPa]   | e <sub>G</sub> [mm] | E <sub>G</sub> [MPa] | e <sub>G</sub> [mm] | E <sub>G</sub> [MPa] | e <sub>G</sub> [mm] |
| 0                                                                                                    | 0                    | 1.950               | 0                      | 1.968               | 0                      | 1.968               |                      |                     |                      |                     |
| 1                                                                                                    | 0                    | 1.950               | 0                      | 1.968               | 0                      | 1.968               |                      |                     |                      |                     |
| 20                                                                                                   | 1446                 | 1.789               | 1245                   | 1.586               | 1681                   | 1.295               |                      |                     |                      |                     |
| 30                                                                                                   | 2222                 | 1.716               | 2322                   | 1.230               |                        |                     |                      |                     |                      |                     |
| 40                                                                                                   | 3654                 | 1.635               |                        |                     |                        |                     |                      |                     |                      |                     |
| 50                                                                                                   | 8091                 | 1.541               |                        |                     |                        |                     |                      |                     |                      |                     |
| 60                                                                                                   | 10463                | 1.448               |                        |                     |                        |                     |                      |                     |                      |                     |
| 80                                                                                                   | 6523                 | 1.306               |                        |                     |                        |                     |                      |                     |                      |                     |

