# WILLBRANDT **PTFE Expansion Joint Type 81 HD**

■ not in stock

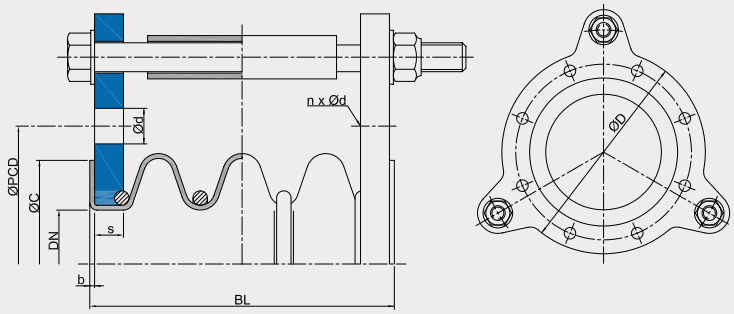
**DN 20 to DN 1500**

Type 81 HD is a 1 to 6 corrugated PTFE expansion joint with a constant wall thickness over the whole bellows area. It is characterised by its high resistance to pressure and temperature and its large movement absorption (depending on the number of corrugations). The PTFE material ensures high media resistance and good non-stick properties.

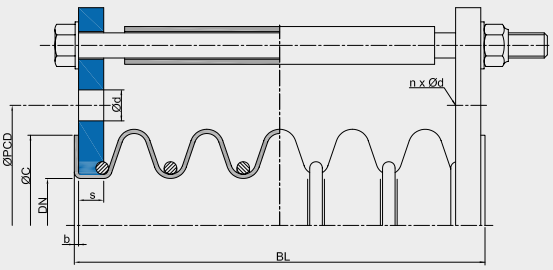
Type 81 HD is mainly used in chemical plants, where it absorbs movements and assembly inaccuracies and dampens noise. Due to its high elasticity and very low adjustment forces, it can also be used in pipework made of fragile materials such as glass, graphite or enamel.

| | |
|---|---|
| **Bellow design** | Multi-corrugated, PTFE bellow with stainless steel external stainless steel supporting rings, PTFE bead on both sides for steel flanges with integrated tie rods. Standard version: white PTFE, electrically insulating. Special version: black PTFE, electrically conductive. |
| **Flange version** | With bracing flange on both sides made of primed, galvanised steel, drilled to DIN PN 16 from DN 200 DIN PN 10 (standard). Other materials and dimensions are possible. |
| **Conformity** | FDA and EG 1935/2004<br>(Detailed overview on page 5.) |
| **Pressure resistance** | Max. 16 bar working pressure<br>(highly dependent on nominal diameter, number of corrugations and temperature<br>→ see tables) |
| **Vacuum resistance** | With vacuum supporting rings, vacuum-proof |
| **Special accessories** | - PTFE guide sleeves<br>- Flame-resistant protective covers<br>- Dust and splash protection covers<br>- Earth cover/sun protection cover<br>Further information on page 99 - 105. |

**Standard version, 3-corrugated - with tie rods**




**Standard version, 5-corrugated - with tie rods**




From DN 200, a threaded rod is used as a tie rod instead of a hexagon bolt.

## Important information

**No additional seals are required for normal, flat flange connections up to DN 300. From DN 350 and in the case of glass components or other connecting parts it is necessary to use elastic seals made of TFM with reinforcement (please refer to the required surface pressure). PTFE expansion joints may not be subject to torsion or vibration. Please refer to the planning instructions.**

# WILLBRANDT **PTFE Expansion Joint Type 81 HD**

## Dimensions

| DN | Di | Length BL | | | | | | Bellow | | | Flange PN 10*2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (bellow) | 1-corrugated | 2-corrugated | 3-corrugated | 4-corrugated | 5-corrugated | 6-corrugated | b | ØC | WF*1 | ØD | ØLK | Ød | n | s |
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm² | mm | mm | mm | | mm |
| **20** | **25** | 40 | 54 | 70 | 85 | 100 | 115 | 2.4 | 68 | 740 | 105 | 75 | M12*3 | 4 | 8 |
| **25** | **25** | 40 | 54 | 70 | 85 | 100 | 115 | 2.4 | 68 | 740 | 115 | 85 | M12*3 | 4 | 10 |
| **32** | **33** | 40 | 56 | 75 | 90 | 105 | 125 | 2.4 | 78 | 1280 | 140 | 100 | M16*3 | 4 | 10 |
| **40** | **39** | 40 | 56 | 80 | 98 | 115 | 132 | 2.4 | 88 | 1800 | 150 | 110 | M16*3 | 4 | 10 |
| **50** | **47** | 48 | 68 | 85 | 105 | 125 | 145 | 2.8 | 102 | 2820 | 165 | 125 | M16*3 | 4 | 12 |
| **65** | **62** | 54 | 78 | 100 | 122 | 145 | 168 | 2.8 | 122 | 4530 | 185 | 145 | (M16*3) 18 | 8 | 12 |
| **80** | **77** | 60 | 88 | 110 | 135 | 160 | 185 | 2.8 | 138 | 7020 | 200 | 160 | (M16*3) 18 | 8 | 12 |
| **100** | **96** | 64 | 88 | 110 | 137 | 165 | 192 | 3.2 | 158 | 10020 | 220 | 180 | (M16*3) 18 | 8 | 14 |
| **125** | **121** | 70 | 95 | 120 | 145 | 170 | 200 | 3.2 | 188 | 14290 | 250 | 210 | (M16*3) 18 | 8 | 14 |
| **150** | **144** | 75 | 105 | 130 | 155 | 180 | 210 | 3.6 | 212 | 19670 | 285 | 240 | (M20*3) 22 | 8 | 16 |
| **200** | **190** | 85 | 110 | 140 | 175 | 210 | - | 3.6 | 268 | 35450 | 340 | 295 | (M20*3) 22 | 8 | 20 |
| **250** | **240** | 93 | 128 | 165 | 195 | 240 | - | 4.0 | 320 | 54040 | 395 | 350 | (M20*3) 22 | 12 | 22 |
| **300** | **289** | 100 | 140 | 175 | 215 | 250 | - | 4.0 | 370 | 82100 | 445 | 400 | (M20*3) 22 | 12 | 25 |
| **350** | **329** | 103 | 145 | 190 | 235 | 265 | - | 4.8 | 430 | 104100 | 505 | 460 | (M20*3) 22 | 16 | 30 |
| **400** | **378** | 103 | 145 | 190 | 235 | 265 | - | 4.8 | 482 | 134600 | 565 | 515 | (M24*3) 26 | 16 | 30 |
| **450** | **434** | 103 | 145 | 190 | 235 | 280 | - | 4.8 | 532 | 181050 | 670 | 620 | (M24*3) 26 | 20 | 30 |
| **500** | **484** | 103 | 145 | 190 | 235 | 280 | - | 4.8 | 585 | 207500 | 670 | 620 | (M24*3) 26 | 20 | 30 |
| **600** | **584** | 103 | 145 | 190 | 235 | 280 | - | 4.8 | 685 | 296100 | 780 | 725 | (M27*3) 30 | 20 | 30 |
| **700** | **684** | - | - | 190 | - | - | - | 4.8 | 800 | 400400 | 895 | 840 | 30 | 24 | *4 |
| **800** | **784** | - | - | 190 | - | - | - | 4.8 | 905 | 520400 | 1015 | 950 | 33 | 24 | *4 |
| **900** | **884** | - | - | 190 | - | - | - | 4.8 | 1005 | 656100 | 1115 | 1050 | 33 | 28 | *4 |
| **1000** | **984** | - | - | 190 | - | - | - | 4.8 | 1110 | 807500 | 1230 | 1160 | 36 | 28 | *4 |
| **1200** | **1184** | - | - | 190 | - | - | - | 4.8 | 1330 | - | 1455 | 1380 | 39 | 32 | *4 |
| **1300** | **1284** | - | - | 190 | - | - | - | 4.8 | - | - | 1565 | 1485 | 42 | 32 | *4 |
| **1400** | **1384** | - | - | 190 | - | - | - | 4.8 | 1535 | - | 1675 | 1590 | 42 | 36 | *4 |
| **1500** | **1484** | - | - | 190 | - | - | - | 4.8 | - | - | 1795 | 1705 | 48 | 36 | *4 |

*1 WF = effective area
*2 Other dimensions such as DIN PN 6, PN 16, ANSI B16.5 - 150 lbs are possible.
*3 Up to and including DN 50 and for the 1-corrugated version (all nominal sizes), both flanges are designed with threaded holes.
For the 2-corrugated version DN 65 and DN 80, there is one flange with through holes and one flange with threaded holes.
*4 Designed according to operating data.

## Movement absorption

| DN | 1-corrugated | | | 2-corrugated | | | 3-corrugated | | | 4-corrugated | | | 5-corrugated | | | 6-corrugated | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | axial +/- mm | lateral +/- mm | angular +/- <° | axial +/- mm | lateral +/- mm | angular +/- <° | axial +/- mm | lateral +/- mm | angular +/- <° | axial +/- mm | lateral +/- mm | angular +/- <° | axial +/- mm | lateral +/- mm | angular +/- <° | axial +/- mm | lateral +/- mm | angular +/- <° |
| **20** | 3 | 2 | 2 | 6 | 3 | 4 | 10 | 5 | 6 | 13 | 6 | 8 | 15 | 8 | 10 | 20 | 10 | 13 |
| **25** | 3 | 2 | 2 | 6 | 3 | 4 | 10 | 5 | 6 | 13 | 6 | 8 | 15 | 8 | 10 | 20 | 10 | 13 |
| **32** | 3 | 2 | 2 | 6 | 3 | 4 | 10 | 5 | 6 | 13 | 6 | 8 | 15 | 8 | 10 | 20 | 10 | 13 |
| **40** | 3 | 2 | 2 | 6 | 3 | 4 | 15 | 5 | 6 | 18 | 6 | 8 | 20 | 8 | 12 | 30 | 10 | 15 |
| **50** | 5 | 2 | 2 | 10 | 5 | 5 | 15 | 8 | 8 | 20 | 10 | 9 | 25 | 12 | 12 | 30 | 14 | 16 |
| **65** | 6 | 3 | 3 | 12 | 5 | 5 | 20 | 8 | 8 | 25 | 10 | 10 | 30 | 12 | 14 | 40 | 14 | 16 |
| **80** | 7 | 3 | 3 | 15 | 5 | 6 | 20 | 8 | 10 | 26 | 12 | 11 | 35 | 15 | 16 | 40 | 18 | 20 |
| **100** | 7 | 3 | 4 | 15 | 8 | 6 | 25 | 12 | 10 | 33 | 15 | 13 | 40 | 18 | 16 | 50 | 22 | 20 |
| **125** | 8 | 4 | 4 | 15 | 8 | 5 | 25 | 12 | 10 | 33 | 15 | 13 | 40 | 18 | 14 | 50 | 22 | 18 |
| **150** | 9 | 4 | 4 | 15 | 8 | 5 | 25 | 12 | 8 | 33 | 15 | 12 | 40 | 18 | 13 | 50 | 22 | 16 |
| **200** | 10 | 4 | 3 | 15 | 10 | 5 | 30 | 14 | 8 | 35 | 18 | 10 | 40 | 22 | 13 | - | - | - |
| **250** | 10 | 5 | 3 | 20 | 10 | 4 | 30 | 14 | 6 | 40 | 18 | 10 | 50 | 22 | 12 | - | - | - |
| **300** | 10 | 5 | 3 | 20 | 10 | 4 | 30 | 14 | 6 | 40 | 18 | 9 | 50 | 22 | 10 | - | - | - |
| **350** | -16/+10 | 5 | 2 | 20 | 10 | 4 | -44/+35 | 18 | 6 | -60/+42 | 22 | 8 | -62/+56 | 25 | 10 | - | - | - |
| **400** | -16/+10 | 5 | 2 | 20 | 12 | 3 | -44/+35 | 18 | 6 | -60/+42 | 22 | 8 | -62/+56 | 25 | 8 | - | - | - |
| **450** | -16/+10 | 5 | 2 | 20 | 12 | 3 | -44/+35 | 18 | 5 | -60/+42 | 22 | 7 | -75/+50 | 25 | 8 | - | - | - |
| **500** | -16/+10 | 5 | 2 | 20 | 12 | 3 | -44/+35 | 20 | 5 | -60/+42 | 22 | 6 | -75/+50 | 25 | 7 | - | - | - |
| **600** | -16/+10 | 5 | 2 | 20 | 12 | 2 | -44/+35 | 20 | 4 | -60/+42 | 22 | 6 | -75/+50 | 25 | 6 | - | - | - |
| **700** | - | - | - | - | - | - | -44/+35 | 20 | 4 | - | - | - | - | - | - | - | - | - |
| **800** | - | - | - | - | - | - | 35 | 20 | 3 | - | - | - | - | - | - | - | - | - |
| **900** | - | - | - | - | - | - | 35 | 20 | 3 | - | - | - | - | - | - | - | - | - |
| **1000** | - | - | - | - | - | - | -25/+35 | 20 | 3 | - | - | - | - | - | - | - | - | - |
| **1200** | - | - | - | - | - | - | -25/+35 | 20 | 3 | - | - | - | - | - | - | - | - | - |
| **1300** | - | - | - | - | - | - | -25/+35 | 20 | 2 | - | - | - | - | - | - | - | - | - |
| **1400** | - | - | - | - | - | - | -25/+35 | 20 | 2 | - | - | - | - | - | - | - | - | - |
| **1500** | - | - | - | - | - | - | -25/+35 | 20 | 2 | - | - | - | - | - | - | - | - | - |

The movement absorption values are maximum values and must not occur in combination. Please refer to the movement diagram in the technical appendix.

# WILLBRANDT **PTFE Expansion Joint Type 81 HD**

## Permissible pressure load under temperature

| | Pressure (bar) | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1-corrugated | | | 2-corrugated | | | 3-corrugated | | | 4-corrugated | | | 5-corrugated | | | 6-corrugated | | |
| Temp. / DN | 20 °C | 100 °C | 200 °C | 20 °C | 100 °C | 200 °C | 20 °C | 100 °C | 200 °C | 20 °C | 100 °C | 200 °C | 20 °C | 100 °C | 200 °C | 20 °C | 100 °C | 200 °C |
| 20 | 16.0 | 12.8 | 7.3 | 16.0 | 12.9 | 6.9 | 16.0 | 12.3 | 6.2 | 16.0 | 10.7 | 5.8 | 12.9 | 8.4 | 4.2 | 11.7 | 6.3 | 3.8 |
| 25 | 16.0 | 12.8 | 7.3 | 16.0 | 12.9 | 6.9 | 16.0 | 12.3 | 6.2 | 16.0 | 10.7 | 5.8 | 12.9 | 8.4 | 4.2 | 11.7 | 6.3 | 3.8 |
| 32 | 16.0 | 12.1 | 6.7 | 16.0 | 12.3 | 6.4 | 16.0 | 11.5 | 5.8 | 16.0 | 10.2 | 5.4 | 12.3 | 8.0 | 4.0 | 11.7 | 6.3 | 3.8 |
| 40 | 16.0 | 11.5 | 6.2 | 16.0 | 11.7 | 6.0 | 16.0 | 10.9 | 5.4 | 16.0 | 9.7 | 5.1 | 11.8 | 7.6 | 3.8 | 11.7 | 6.3 | 3.8 |
| 50 | 16.0 | 10.9 | 5.8 | 16.0 | 11.2 | 5.6 | 16.0 | 10.3 | 5.1 | 15.5 | 9.2 | 4.7 | 11.2 | 7.2 | 3.7 | 11.7 | 6.3 | 3.8 |
| 65 | 16.0 | 10.2 | 5.3 | 16.0 | 10.6 | 5.2 | 16.0 | 9.6 | 4.8 | 14.6 | 8.7 | 4.4 | 10.6 | 6.8 | 3.5 | 11.7 | 6.3 | 3.8 |
| 80 | 16.0 | 9.7 | 4.9 | 16.0 | 10.2 | 4.9 | 15.9 | 9.1 | 4.5 | 13.9 | 8.2 | 4.1 | 10.2 | 6.5 | 3.3 | 11.7 | 6.3 | 3.8 |
| 100 | 16.0 | 9.1 | 4.5 | 16.0 | 9.7 | 4.6 | 14.9 | 8.5 | 4.3 | 13.2 | 7.7 | 3.9 | 9.6 | 6.2 | 3.1 | 11.7 | 6.3 | 3.8 |
| 125 | 15.3 | 8.6 | 4.1 | 16.0 | 9.3 | 4.3 | 14.0 | 8.0 | 4.0 | 12.4 | 7.3 | 3.6 | 9.1 | 5.8 | 2.9 | 11.7 | 6.3 | 3.8 |
| 150 | 14.8 | 8.2 | 3.9 | 16.0 | 8.9 | 4.0 | 13.2 | 7.6 | 3.8 | 11.8 | 6.9 | 3.4 | 8.7 | 5.5 | 2.8 | 11.7 | 6.3 | 3.8 |
| 200 | 13.9 | 7.6 | 3.4 | 15.0 | 8.4 | 3.7 | 12.1 | 6.9 | 3.5 | 10.9 | 6.3 | 3.1 | 8.1 | 5.1 | 2.6 | - | - | - |
| 250 | 13.3 | 7.2 | 3.1 | 14.3 | 8.0 | 3.4 | 11.2 | 6.4 | 3.3 | 10.2 | 5.9 | 2.9 | 7.6 | 4.7 | 2.4 | - | - | - |
| 300 | 12.8 | 6.8 | 2.9 | 13.8 | 7.7 | 3.2 | 10.5 | 6.0 | 3.1 | 9.6 | 5.5 | 2.8 | 7.2 | 4.5 | 2.3 | - | - | - |
| 350 | 12.4 | 6.5 | 2.7 | 13.3 | 7.4 | 3.1 | 9.9 | 5.7 | 3.0 | 9.2 | 5.2 | 2.6 | 6.8 | 4.2 | 2.2 | - | - | - |
| 400 | 12.0 | 6.3 | 2.6 | 12.9 | 7.2 | 2.9 | 9.4 | 5.5 | 2.9 | 8.8 | 5.0 | 2.5 | 6.5 | 4.0 | 2.1 | - | - | - |
| 450 | 11.7 | 6.1 | 2.4 | 12.6 | 7.0 | 2.9 | 9.0 | 5.2 | 2.8 | 8.4 | 4.8 | 2.4 | 6.2 | 3.9 | 2.0 | - | - | - |
| 500 | 11.4 | 5.9 | 2.3 | 12.3 | 6.9 | 2.7 | 8.6 | 5.0 | 2.7 | 8.1 | 4.6 | 2.4 | 6.0 | 3.7 | 1.9 | - | - | - |
| 600 | 11.0 | 5.6 | 2.1 | 11.8 | 6.6 | 2.6 | 7.9 | 4.7 | 2.6 | 7.5 | 4.2 | 2.2 | 5.6 | 3.4 | 1.8 | - | - | - |
| 700 | - | - | - | - | - | - | 7.4 | 4.4 | 2.4 | - | - | - | - | - | - | - | - | - |
| 800 | - | - | - | - | - | - | 6.9 | 4.1 | 2.3 | - | - | - | - | - | - | - | - | - |
| 900 | - | - | - | - | - | - | 6.5 | 3.9 | 2.3 | - | - | - | - | - | - | - | - | - |
| 1000 | - | - | - | - | - | - | 6.2 | 3.7 | 2.2 | - | - | - | - | - | - | - | - | - |
| 1200 | - | - | - | - | - | - | 5.6 | 3.4 | 2.1 | - | - | - | - | - | - | - | - | - |
| 1300 | - | - | - | - | - | - | 5.1 | 3.2 | 2.0 | - | - | - | - | - | - | - | - | - |
| 1400 | - | - | - | - | - | - | 5.1 | 3.2 | 2.0 | - | - | - | - | - | - | - | - | - |
| 1500 | - | - | - | - | - | - | 5.1 | 3.2 | 2.0 | - | - | - | - | - | - | - | - | - |

For flow velocities above 3 m/s, a guide sleeve should be used.
This can be designed in PTFE up to 5 m/s and in stainless steel above this.

## Permissible vacuum load under temperature

| | Pressure (bar) | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1-corrugated | | | 2-corrugated | | | 3-corrugated | | | 4-corrugated | | | 5-corrugated | | | 6-corrugated | | |
| Temp. / DN* | 20 °C | 100 °C | 200 °C | 20 °C | 100 °C | 200 °C | 20 °C | 100 °C | 200 °C | 20 °C | 100 °C | 200 °C | 20 °C | 100 °C | 200 °C | 20 °C | 100 °C | 200 °C |
| 20 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 |
| 25 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 |
| 32 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 |
| 40 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 |
| 50 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 |
| 65 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -0.90 |
| 80 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -0.83 | -1 | -1 | -0.79 |
| 100 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -0.74 | -1 | -0.90 | -0.70 |
| 125 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -0.72 | -1 | -0.90 | -0.65 | -0.90 | -0.79 | -0.61 |
| 150 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -0.77 | -1 | -1 | -0.63 | -0.90 | -0.80 | -0.56 | -0.79 | -0.70 | -0.53 |
| 200 | -1 | -1 | -0.81 | -1 | -1 | -0.72 | -1 | -1 | -0.62 | -1 | -0.90 | -0.54 | -0.80 | -0.70 | -0.47 | -0.70 | -0.61 | -0.43 |
| 250 | -1 | -1 | -0.62 | -1 | -1 | -0.60 | -1 | -0.84 | -0.47 | -0.90 | -0.76 | -0.45 | -0.70 | -0.67 | -0.38 | -0.61 | -0.59 | -0.36 |
| 300 | -1 | -1 | -0.46 | -1 | -0.84 | -0.48 | -0.85 | -0.70 | -0.40 | -0.77 | -0.63 | -0.36 | -0.68 | -0.56 | -0.32 | -0.60 | -0.49 | -0.29 |
| 350 | - | - | - | - | - | - | -0.71 | -0.57 | -0.30 | - | - | - | - | - | - | - | - | - |
| 400 | - | - | - | - | - | - | -0.60 | -0.48 | -0.20 | - | - | - | - | - | - | - | - | - |
| 450 | - | - | - | - | - | - | -0.52 | -0.39 | -0.12 | - | - | - | - | - | - | - | - | - |
| 500 | - | - | - | - | - | - | -0.44 | -0.33 | -0.10 | - | - | - | - | - | - | - | - | - |
| 600 | - | - | - | - | - | - | -0.32 | -0.24 | -0.02 | - | - | - | - | - | - | - | - | - |

* No use under vacuum is possible from DN 700

For flow velocities above 3 m/s, a guide sleeve should be used.
This can be designed in PTFE up to 5 m/s and in stainless steel above this.

## Important information

**Please note the appropriate fixed point constructions and plain bearings in your piping system!**
**For more information please refer to our planning instructions.**

# WILLBRANDT **PTFE Expansion Joint Type 81 HD**

## Stiffness rates (1 to 3 corrugations)

| DN* | 1-corrugated | | | | 2-corrugated | | | | 3-corrugated | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | axial compression N/mm | axial elongation N/mm | lateral N/mm | angular Nm/° | axial compression N/mm | axial elongation N/mm | lateral N/mm | angular Nm/° | axial compression N/mm | axial elongation N/mm | lateral N/mm | angular Nm/° |
| **20** | 330 | 330 | 225 | 4.5 | 165 | 165 | 113 | 2.3 | 110 | 110 | 75 | 1.5 |
| **25** | 330 | 330 | 225 | 4.5 | 165 | 165 | 113 | 2.3 | 110 | 110 | 75 | 1.5 |
| **32** | 342 | 342 | 324 | 6.6 | 171 | 171 | 162 | 3.3 | 114 | 114 | 108 | 2.2 |
| **40** | 366 | 366 | 426 | 8.7 | 183 | 183 | 213 | 4.4 | 122 | 122 | 142 | 2.9 |
| **50** | 558 | 558 | 495 | 9.9 | 279 | 279 | 247 | 5.0 | 186 | 186 | 165 | 3.3 |
| **65** | 462 | 462 | 588 | 11.4 | 231 | 231 | 294 | 5.7 | 154 | 154 | 196 | 3.8 |
| **80** | 462 | 462 | 693 | 14.1 | 231 | 231 | 347 | 7.1 | 154 | 154 | 231 | 4.7 |
| **100** | 576 | 576 | 780 | 16.2 | 288 | 288 | 390 | 8.1 | 192 | 192 | 260 | 5.4 |
| **125** | 900 | 900 | 1005 | 21.3 | 450 | 450 | 503 | 10.7 | 300 | 300 | 335 | 7.1 |
| **150** | 1098 | 1098 | 1155 | 31.8 | 549 | 549 | 578 | 15.9 | 366 | 366 | 385 | 10.6 |
| **200** | 393 | 261 | 1260 | 33.6 | 197 | 131 | 630 | 16.8 | 131 | 87 | 420 | 11.2 |
| **250** | 507 | 333 | 1524 | 47.4 | 254 | 167 | 762 | 23.7 | 169 | 111 | 508 | 15.8 |
| **300** | 630 | 417 | 1830 | 69.3 | 315 | 209 | 915 | 34.7 | 210 | 139 | 610 | 23.1 |
| **350** | 720 | 477 | 2100 | 82.5 | 360 | 239 | 1050 | 41.3 | 240 | 159 | 700 | 27.5 |
| **400** | 819 | 540 | 2400 | 99.3 | 410 | 270 | 1200 | 49.7 | 273 | 180 | 800 | 33.1 |
| **450** | 960 | 633 | 2700 | 114.0 | 480 | 317 | 1350 | 57.0 | 320 | 211 | 900 | 38.0 |
| **500** | 1047 | 690 | 3000 | 129.0 | 524 | 345 | 1500 | 64.5 | 349 | 230 | 1000 | 43.0 |
| **600** | 1272 | 840 | 3600 | 180.0 | 636 | 420 | 1800 | 90.0 | 424 | 280 | 1200 | 60.0 |
| **700** | - | - | - | - | - | - | - | - | 500 | 330 | 1400 | 78.0 |
| **800** | - | - | - | - | - | - | - | - | 576 | 380 | 1600 | 97.0 |
| **900** | - | - | - | - | - | - | - | - | 652 | 430 | 1800 | 118.0 |
| **1000** | - | - | - | - | - | - | - | - | 728 | 580 | 2000 | 142.0 |

* Values for DN 1100 to 1500, 3-curogated on request

The stiffness rates are valid for 20 °C +/- 30 %.
For higher temperatures, please note the correction factors below.

## Stiffness rates (4 to 6 corrugations)

| DN | 3-corrugated | | | | 4-corrugated | | | | 5-corrugated | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | axial compression N/mm | axial elongation N/mm | lateral N/mm | angular Nm/° | axial compression N/mm | axial elongation N/mm | lateral N/mm | angular Nm/° | axial compression N/mm | axial elongation N/mm | lateral N/mm | angular Nm/° |
| **20** | 83 | 83 | 57 | 1.2 | 66 | 66 | 45 | 0.9 | 55 | 55 | 38 | 0.8 |
| **25** | 83 | 83 | 57 | 1.2 | 66 | 66 | 45 | 0.9 | 55 | 55 | 38 | 0.8 |
| **32** | 86 | 86 | 81 | 1.7 | 69 | 69 | 65 | 1.4 | 57 | 57 | 54 | 1.1 |
| **40** | 92 | 92 | 107 | 2.2 | 74 | 74 | 86 | 1.8 | 61 | 61 | 71 | 1.5 |
| **50** | 140 | 140 | 124 | 2.5 | 112 | 112 | 99 | 2.0 | 93 | 93 | 83 | 1.7 |
| **65** | 116 | 116 | 147 | 2.9 | 93 | 93 | 118 | 2.3 | 77 | 77 | 98 | 1.9 |
| **80** | 116 | 116 | 174 | 3.6 | 93 | 93 | 139 | 2.9 | 77 | 77 | 116 | 2.4 |
| **100** | 144 | 144 | 195 | 4.1 | 116 | 116 | 156 | 3.3 | 96 | 96 | 130 | 2.7 |
| **125** | 225 | 225 | 252 | 5.4 | 180 | 180 | 201 | 4.3 | 150 | 150 | 168 | 3.6 |
| **150** | 275 | 275 | 289 | 8.0 | 220 | 220 | 231 | 6.4 | 183 | 183 | 193 | 5.3 |
| **200** | 99 | 66 | 315 | 8.4 | 79 | 53 | 252 | 6.8 | - | - | - | - |
| **250** | 127 | 84 | 381 | 11.9 | 102 | 67 | 305 | 9.5 | - | - | - | - |
| **300** | 158 | 105 | 458 | 17.4 | 126 | 84 | 366 | 13.9 | - | - | - | - |
| **350** | 180 | 120 | 525 | 20.7 | 144 | 96 | 420 | 16.5 | - | - | - | - |
| **400** | 205 | 135 | 600 | 24.9 | 164 | 108 | 480 | 19.9 | - | - | - | - |
| **450** | 240 | 159 | 675 | 28.5 | 192 | 127 | 540 | 22.8 | - | - | - | - |
| **500** | 262 | 173 | 750 | 32.3 | 210 | 138 | 600 | 25.8 | - | - | - | - |
| **600** | 318 | 210 | 900 | 45.0 | 255 | 168 | 720 | 36.0 | - | - | - | - |

The stiffness rates are valid for 20 °C +/- 30 %.
For higher temperatures, please note the correction factors below.

## Correction factor for temperatures

| Temperature | 80 °C | 120 °C | 150 °C |
|---|---|---|---|
| Factor | 0.65 | 0.50 | 0.40 |