

## WILLBRANDT Rubber Expansion Joint Type 50

### DN 20 - DN 1000

Type 50 is a low-corrugated, highly elastic rubber expansion joint. Its low corrugation helps to achieve very low flow resistance. It reduces up to 70 % of the incoming energy. It is also characterise by very high movement absorption in all directions and variety of rubber qualities, which means that a suitable rubber compound is available for every application.

Type 50 is used in building technology, plant engineering, water and wastewater technology, engine construction, shipbuilding and in solar and wind plant engineering. It especially used where it is specifically used to absorb expansion and vibration and to insulate sound.



#### Bellow design

Low-corrugated rubber bellow with reinforcement and shaped sealing bead with core ring, self-sealing (no additional seals required). Suitable for accommodating swiveling flanges.

#### Flange version

Both sides with swiveling flange made of galvanized steel with clearance holes, drilled according to DIN PN 10 (standard). Other materials and dimensions are possible.

#### Approvals/Conformity

Similar to DIN 4809 / TÜV approved, drinking water and shipbuilding approval, FDA and EG 1935/2004 conform

## Specifications for DN 20 - DN 400

| Bellow         |                                                                                     | Bellow design   |                    |                  | up to<br>DN | Permissible operating data |    |          |    |          |    |          |    |                      |                       | Surface resistance Ro |  |
|----------------|-------------------------------------------------------------------------------------|-----------------|--------------------|------------------|-------------|----------------------------|----|----------|----|----------|----|----------|----|----------------------|-----------------------|-----------------------|--|
| Colour<br>code | Colour<br>marking                                                                   | Core<br>(inner) | Rein-<br>forcement | Cover<br>(outer) |             | °C   bar                   |    | °C   bar |    | °C   bar |    | °C   bar |    | Short-<br>term<br>°C | Core<br>Ohm x cm      | Cover<br>Ohm x cm     |  |
| red Sp         |  | EPDM            | PEEK               | EPDM             | 400         | -40                        | 10 | 70       | 16 | 100      | 10 | 130      | 8  | 150                  | 4 x 10 <sup>3</sup>   | 4 x 10 <sup>3</sup>   |  |
| red            |  | IIR             | Polyamide          | EPDM             | 400         | -40                        | 10 | 50       | 16 | 70       | 12 | 100      | 10 | 120                  | 7 x 10 <sup>6</sup>   | 1 x 10 <sup>3</sup>   |  |
| red EPDM       |  | EPDM            | Polyamide          | EPDM             | 400         | -30                        | 10 | 50       | 16 | 70       | 12 | 90       | 10 | 100                  | -                     | -                     |  |
| yellow         |  | NBR             | Polyamide          | CR               | 400         | -20                        | 10 | 50       | 16 | 70       | 12 | 90       | 10 | 100                  | 2 x 10 <sup>2</sup>   | 1 x 10 <sup>3</sup>   |  |
| white          |  | NBR             | Polyamide          | CR               | 400         | -20                        | 10 | 50       | 16 | 70       | 12 | 90       | 10 | 100                  | 7 x 10 <sup>9</sup>   | 1 x 10 <sup>3</sup>   |  |
| green          |  | CSM             | Polyamide          | CSM              | 400         | -20                        | 10 | 50       | 16 | 70       | 12 | 100      | 10 | 110                  | 7 x 10 <sup>9</sup>   | 7 x 10 <sup>9</sup>   |  |
| orange         |  | NBR             | Polyamide          | CR               | 200         | -20                        | 10 | 50       | 25 | 70       | 20 | 90       | 15 | 100                  | 3 x 10 <sup>3</sup>   | 1 x 10 <sup>3</sup>   |  |
| black EPDM*    |  | IIR             | Polyamide          | EPDM             | 150         | -40                        | 10 | 50       | 10 | 70       | 8  | 90       | 6  | 120                  | 7 x 10 <sup>6</sup>   | 1 x 10 <sup>3</sup>   |  |
| black CR       | —                                                                                   | CR              | Polyamide          | CR               | 400         | -25                        | 10 | 50       | 16 | 70       | 12 | 90       | 10 | 100                  | 7 x 10 <sup>9</sup>   | 5 x 10 <sup>10</sup>  |  |
| yellow LT      |  | NBR-LT          | Polyamide          | CR               | 300         | -40                        | 10 | 50       | 16 | 70       | 12 | 90       | 10 | 100                  | 1 x 10 <sup>4</sup>   | 4 x 10 <sup>3</sup>   |  |
| yellow St      |  | NBR             | Steel cord         | CR               | 400         | -20                        | 10 | 60       | 16 | 70       | 12 | 90       | 10 | 100                  | 2 x 10 <sup>2</sup>   | 5 x 10 <sup>10</sup>  |  |
| yellow HNBR    |  | HNBR            | Steel cord         | CR               | 300         | -35                        | 10 | 60       | 16 | 70       | 12 | 100      | 10 | 120                  | 1,5 x 10 <sup>5</sup> | - 10 <sup>10</sup>    |  |
| BR             |  | BR/NR           | Polyester cord     | BR/NR            | 300         | -50                        | 10 | 50       | 16 | 70       | 12 | -        | -  | 90                   | -                     | -                     |  |

Bursting pressure DN 20 - 400 > 48 bar

\* Bursting pressure max. 30 bar, max. DN 150

For pressure loss see technical appendix.

## Specifications for DN 450 - DN 1000

| Bellow      |                                                                                     | Bellow design |               |               | up to DN | Permissible operating data |     |    |     |     |     |     |     | Short-term °C | Surface resistance Ro |                    |
|-------------|-------------------------------------------------------------------------------------|---------------|---------------|---------------|----------|----------------------------|-----|----|-----|-----|-----|-----|-----|---------------|-----------------------|--------------------|
| Colour code | Colour marking                                                                      | Core (inner)  | Reinforcement | Cover (outer) |          | °C                         | bar | °C | bar | °C  | bar | °C  | bar |               | Core<br>Ohm x cm      | Cover<br>Ohm x cm  |
| red Sp      |  | EPDM          | PEEK          | EPDM          | 1000     | -40                        | 8   | 70 | 10  | 100 | 7,5 | 130 | 6   | 150           | $4 \times 10^3$       | $4 \times 10^3$    |
| red         |  | IIR           | Polyamide     | EPDM          | 1000     | -40                        | 8   | 50 | 10  | 70  | 8   | 100 | 6   | 120           | $7 \times 10^6$       | $1 \times 10^3$    |
| red EPDM    |  | EPDM          | Polyamide     | EPDM          | 600      | -30                        | 8   | 50 | 10  | 70  | 8   | 90  | 6   | 100           | -                     | -                  |
| yellow      |  | NBR           | Polyamide     | CR            | 1000     | -20                        | 8   | 50 | 10  | 70  | 8   | 90  | 6   | 100           | $2 \times 10^2$       | $1 \times 10^3$    |
| white       |  | NBR           | Polyamide     | CR            | 600      | -20                        | 8   | 50 | 10  | 70  | 8   | 90  | 6   | 100           | $7 \times 10^9$       | $1 \times 10^3$    |
| green       |  | CSM           | Polyamide     | CSM           | 1000     | -20                        | 8   | 50 | 10  | 70  | 8   | 100 | 6   | 110           | $7 \times 10^9$       | $7 \times 10^9$    |
| black CR    | -                                                                                   | CRN           | Polyamide     | CR            | 1000     | -25                        | 8   | 50 | 10  | 70  | 8   | 90  | 6   | 100           | $7 \times 10^9$       | $5 \times 10^{10}$ |
| yellow St   |  | NBR           | Steel cord    | CR            | 600      | -20                        | 8   | 60 | 10  | 70  | 8   | 90  | 6   | 100           | $2 \times 10^2$       | $5 \times 10^{10}$ |

Bursting pressure DN 450 - 1000 > 30 bar

For pressure loss see technical appendix.

## Important information

For aggressive media, please see the resistance table (can be requested separately).

The bellows should not be painted or insulated. Please refer to the installation instructions.

++++ We will be happy to send you further information on the individual types and designs. +++++

## WILLBRANDT Rubber Expansion Joint Type 50

### Vacuum resistance



- DN 20 to 50 vacuum-resistant without additional accessories
- DN 65 to 250 without additional accessories to -300 mbar and with vacuum supporting spiral for full vacuum
- DN 300 to DN 1000 only vacuum-resistant with vacuum supporting ring
- Type 50 black EPDM DN 20 to DN 40 without additional accessories

to -300 mbar and with vacuum supporting spiral for full vacuum

### Accessories

- Guide sleeves
- Potential equalisation
- Flame-resistant protective covers
- Dust and splash protection covers
- Earth cover / sun protection hoods
- Segment tie rods

## Application

### Type 50 red Sp

For heating installations according to DIN 4809. For many years of operation under constant loading with hot water and heating water at 100 °C/110 °C at 10 bar/6 bar operating pressure. Electrically conductive surface. Not suitable for media with additives containing oil.

### Type 50 red

For drinking water, hot water, sea water, cooling water with chemical additives for treating water, saline solutions, weak acids and weak alkaline solutions. Electrically dissipative inner surface and electrically conductive outer surface. Not suitable for oil products or cooling water with additives containing oil.

### Type 50 red EPDM

Like Type 50 red, but not for drinking water. Temperature range: max. 90 °C at 10 bar.

### Type 50 yellow

For oils, lubricants, fuels, gases, city and natural gas (not liquefied) and DIN EN fuels with an aromatic content up to 50 %. Electrically conductive.

### Type 50 white

For foodstuffs containing oil and fat (rubber in food-grade). Not approved for drinking water. Electrically insulating inner surface and electrically conductive outer surface.

### Type 50 green

For chemicals, aggressive chemical wastewater and compressor air containing oil. Electrically insulating.

### Type 50 orange

Like Type 50 yellow, but also for liquid petroleum gas acc. to DIN EN 589. Electrically dissipative.

### Type 50 black EPDM

For drinking water, sea water, cooling water, weak acids and alkali solutions, technical alcohols, esters and ketones. Max. pressure 10 bar. Electrically dissipative inner surface and electrically conductive outer surface.

### Type 50 black CR

For hot and cold water, wastewater, swimming pool water, salt water, wastewater, cooling water with anti-corrosive products containing oil, oil mixtures and compressed air containing oil. Electrically insulating.

### Type 50 yellow LT

Like Type 50 yellow, but also for liquid gas. Electrically dissipative.

### Type 50 lilac

For flue gas desulphurisation systems and bio-diesel. Good resistance to benzene, xylene, toluene, fuels with an aromatic content of more than 50 %, aromatic/chlorinated hydrocarbons and mineral acids. Electrically insulating inner surface and electrically conductive outer surface.

### Type 50 yellow St

Like Type 50 yellow with additional flame-resistance for up to 30 minutes at 800 °C. Electrically conductive inner surface, electrically insulating outer surface.

### Type 50 yellow HNBR

Like Type 50 yellow St, but for temperatures up to +100 °C. Electrically dissipative inner surface, electrically insulating outer surface.

### Type 50 BR

Especially for abrasive media such as sludges, dustlike and powdery media, liquids with solids and emulsions. Also suitable for all kinds of water, as well as various chemicals. Not suitable for oil based products and cooling water with oily additives. Electrically dissipative.

### Note!

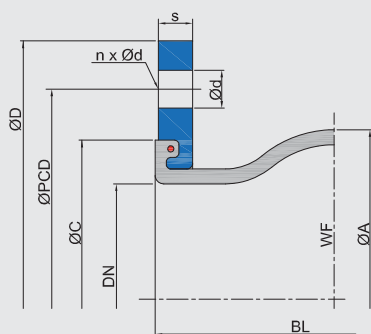
Detailed material descriptions on pages 5 - 7.

## WILLBRANDT Rubber Expansion Joint Type 50

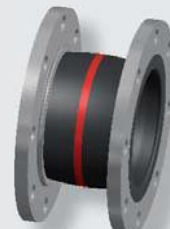
### Design A - without tie rods

Can be used for movement absorption in any direction (for combined movements, see the movement diagram in the technical appendix), noise and vibration insulation.

The expansion joint's reaction force must be absorbed via suitable piping.



axial -



axial +



lateral ±



angular ±

### Dimensions for Design A

| DN   | Length | Bellow |        | Flange PN 10*2 |      |    |    |    |      | Movement absorption<br>(polyamide cord) |            |              |              | Movement absorption<br>(steel cord) |            |              |              | Weight |
|------|--------|--------|--------|----------------|------|----|----|----|------|-----------------------------------------|------------|--------------|--------------|-------------------------------------|------------|--------------|--------------|--------|
|      |        |        |        |                |      |    |    |    |      | axial<br>+                              | axial<br>- | lateral<br>± | angular<br>± | axial<br>+                          | axial<br>- | lateral<br>± | angular<br>± |        |
|      | mm     | mm     | mm²    | mm             | mm   | mm | n  | s  | mm   | mm                                      | mm         | mm           | mm           | mm                                  | mm         | mm           | mm           | mm     |
| 20   | 130    | 81     | 1700   | 105            | 75   | 12 | 4  | 14 | 66   | 30                                      | 30         | 30           | 30           | 15                                  | 30         | 15           | 20           | 1.5    |
| 25   | 130    | 81     | 1700   | 115            | 85   | 14 | 4  | 14 | 66   | 30                                      | 30         | 30           | 30           | 15                                  | 30         | 15           | 20           | 1.9    |
| 32   | 130    | 81     | 1700   | 140            | 100  | 18 | 4  | 15 | 66   | 30                                      | 30         | 30           | 30           | 15                                  | 30         | 15           | 20           | 3.1    |
| 40   | 130    | 86     | 1800   | 150            | 110  | 18 | 4  | 15 | 74   | 30                                      | 30         | 30           | 30           | 15                                  | 30         | 15           | 20           | 3.5    |
| 50   | 130    | 96     | 3200   | 165            | 125  | 18 | 4  | 16 | 86   | 30                                      | 30         | 30           | 30           | 15                                  | 30         | 15           | 20           | 3.7    |
| 65   | 130    | 111    | 5300   | 185            | 145  | 18 | 8  | 16 | 106  | 30                                      | 30         | 30           | 30           | 15                                  | 30         | 15           | 20           | 5.3    |
| 80   | 130    | 122    | 8500   | 200            | 160  | 18 | 8  | 18 | 118  | 30                                      | 30         | 30           | 30           | 15                                  | 30         | 15           | 20           | 6.8    |
| 100  | 130    | 142    | 12800  | 220            | 180  | 18 | 8  | 18 | 138  | 30                                      | 30         | 30           | 20           | 15                                  | 30         | 15           | 15           | 7.9    |
| 125  | 130    | 168    | 18700  | 250            | 210  | 18 | 8  | 18 | 166  | 30                                      | 30         | 30           | 20           | 15                                  | 30         | 15           | 15           | 9.6    |
| 150  | 130    | 192    | 25900  | 285            | 240  | 22 | 8  | 18 | 192  | 30                                      | 30         | 30           | 20           | 15                                  | 30         | 15           | 15           | 12.9   |
| 200  | 130    | 252    | 41000  | 340            | 295  | 22 | 8  | 20 | 252  | 30                                      | 30         | 30           | 12           | 20                                  | 15         | 10           | 5            | 16.2   |
| 250  | 130    | 302    | 59600  | 395            | 350  | 22 | 12 | 20 | 304  | 30                                      | 30         | 30           | 12           | 20                                  | 15         | 10           | 5            | 21.5   |
| 300  | 130    | 354    | 82200  | 445            | 400  | 22 | 12 | 22 | 354  | 30                                      | 30         | 30           | 12           | 20                                  | 15         | 10           | 5            | 24.5   |
| 350  | 200    | 420    | 117600 | 505            | 460  | 22 | 16 | 24 | 412  | 30                                      | 50         | 30           | 8            | 30                                  | 30         | 25           | 10           | 38.3   |
| 400  | 200    | 480    | 154700 | 565            | 515  | 26 | 16 | 25 | 470  | 30                                      | 50         | 30           | 8            | 30                                  | 40         | 25           | 5            | 38.0   |
| 450  | 200    | 530    | 204200 | 615            | 565  | 26 | 20 | 28 | 520  | 30                                      | 50         | 30           | 8            | -                                   | -          | -            | -            | 47.2   |
| 500  | 200    | 580    | 227900 | 670            | 620  | 26 | 20 | 30 | 570  | 30                                      | 50         | 30           | 8            | -                                   | -          | -            | -            | 56.5   |
| 600  | 200    | 680    | 311500 | 780            | 725  | 30 | 20 | 30 | 675  | 30                                      | 50         | 30           | 8            | -                                   | -          | -            | -            | 75.2   |
| 700  | *3250  | 800    | 434200 | 895            | 840  | 30 | 24 | 35 | 780  | 30                                      | 50         | 30           | 8            | -                                   | -          | -            | -            | 127.8  |
| 800  | 250    | 880    | 527400 | 1015           | 950  | 33 | 24 | 40 | 887  | 30                                      | 50         | 30           | 6            | -                                   | -          | -            | -            | 161.0  |
| 900  | 300    | 1038   | 737900 | 1115           | 1050 | 33 | 28 | 40 | 987  | 30                                      | 50         | 30           | 5            | -                                   | -          | -            | -            | 196.7  |
| 1000 | 300    | 1138   | 889400 | 1230           | 1160 | 36 | 28 | 40 | 1087 | 30                                      | 50         | 30           | 5            | -                                   | -          | -            | -            | 234.5  |

\*1 WF = effective area

\*2 Other standards/dimensions possible.

\*3 Building length 260 mm

Permissible degree of utilisation for movement areas:

- up to 50 °C: Utilisation ~ 100 %

- up to 70 °C: Utilisation ~ 75 %

- up to 90 °C: Utilisation ~ 60 %

### Important information

Please note the appropriate fixed point constructions and plain bearings in your piping system!

For more information please refer to our installation instructions.

For information on the tie rods, please see the technical appendix (p. 89 - 92)!

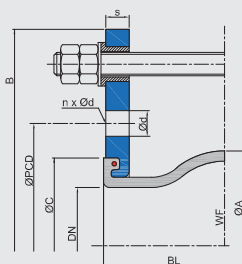
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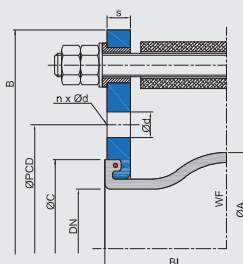
## Length limiters

There is a selection of various length limiters / tie rods to absorb the reaction force and to protect the bellow from overstretching or collapsing:

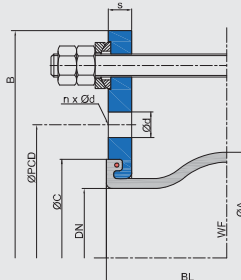
**Design B\***  
with tie rods



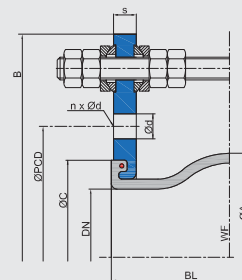
**Design C\***  
with tie rods/thrust limiters



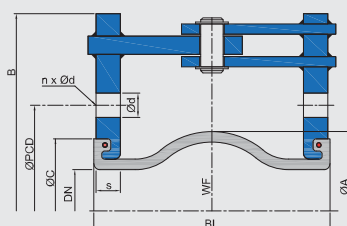
**Design E**  
with tie rods and spherical washers/conical sockets



**Design M**  
with tie rods/thrust limiters and spherical washers/conical sockets



**Design F**  
with hinge

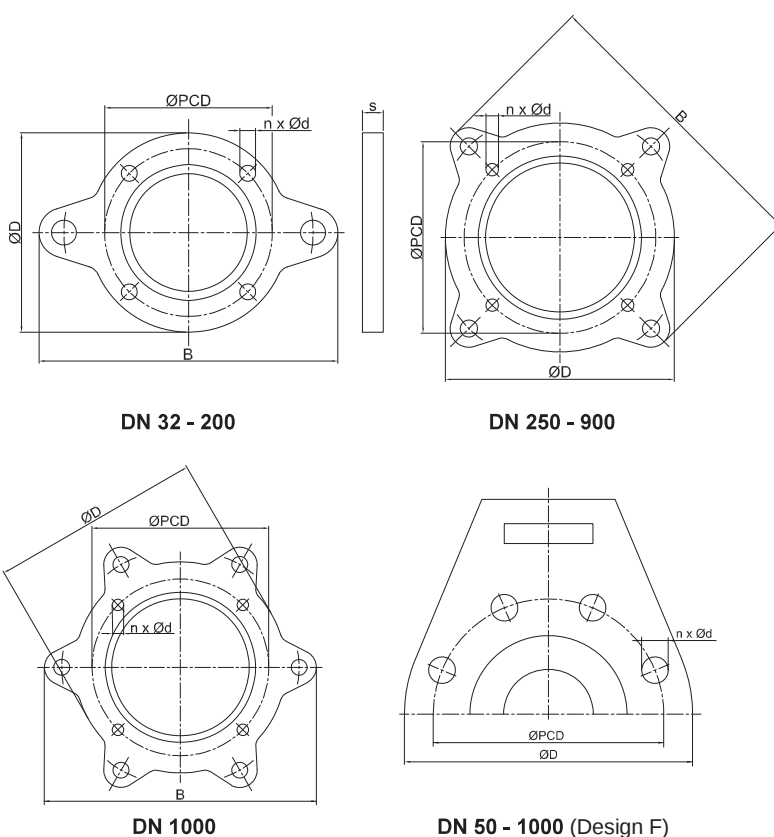


\*Note: For Designs B and C the lateral movement absorption is reduced by around 50 %.

## Flange dimensions for Designs with tie rods

| DN   | Length<br>BL | Flange PN 10 (example dimensions) |      |      |    |    |    |      |
|------|--------------|-----------------------------------|------|------|----|----|----|------|
|      |              | B                                 | ØD   | ØPCD | Ød | n  | s  | ØC   |
|      | mm           | mm                                | mm   | mm   | mm |    | mm | mm   |
| 20   | 130          | 189                               | 105  | 75   | 12 | 4  | 14 | 66   |
| 25   | 130          | 205                               | 115  | 85   | 14 | 4  | 14 | 66   |
| 32   | 130          | 230                               | 140  | 100  | 18 | 4  | 15 | 66   |
| 40   | 130          | 240                               | 150  | 110  | 18 | 4  | 15 | 74   |
| 50   | 130          | 255                               | 165  | 125  | 18 | 4  | 16 | 86   |
| 65   | 130          | 275                               | 185  | 145  | 18 | 8  | 16 | 106  |
| 80   | 130          | 290                               | 200  | 160  | 18 | 8  | 18 | 118  |
| 100  | 130          | 310                               | 220  | 180  | 18 | 8  | 18 | 138  |
| 125  | 130          | 340                               | 250  | 210  | 18 | 8  | 18 | 166  |
| 150  | 130          | 375                               | 285  | 240  | 22 | 8  | 18 | 192  |
| 200  | 130          | 440                               | 340  | 295  | 22 | 8  | 20 | 252  |
| 250  | 130          | 509                               | 395  | 350  | 22 | 12 | 20 | 304  |
| 300  | 130          | 559                               | 445  | 400  | 22 | 12 | 22 | 354  |
| 350  | 200          | 619                               | 505  | 460  | 22 | 16 | 24 | 412  |
| 400  | 200          | 700                               | 565  | 515  | 26 | 16 | 25 | 470  |
| 450  | 200          | 760                               | 615  | 565  | 26 | 20 | 30 | 520  |
| 500  | 200          | 810                               | 670  | 620  | 26 | 20 | 30 | 570  |
| 600  | 200          | 930                               | 780  | 725  | 30 | 20 | 30 | 675  |
| 700  | *250         | 1045                              | 895  | 840  | 30 | 24 | 35 | 780  |
| 800  | 250          | 1175                              | 1015 | 950  | 33 | 24 | 40 | 887  |
| 900  | 300          | 1285                              | 1115 | 1050 | 33 | 28 | 40 | 987  |
| 1000 | 300          | 1400                              | 1230 | 1160 | 36 | 28 | 40 | 1087 |

\* Building length 260 mm



## WILLBRANDT Rubber Expansion Joint Type 50

### Axial stiffness rates

| DN   | Overall length<br>BL<br>mm | Stiffness rates (averages value from full way) |                  |                |                |                 |                 |
|------|----------------------------|------------------------------------------------|------------------|----------------|----------------|-----------------|-----------------|
|      |                            | 0 bar<br>Nm/mm                                 | 2,5 bar<br>Nm/mm | 4 bar<br>Nm/mm | 6 bar<br>Nm/mm | 10 bar<br>Nm/mm | 16 bar<br>Nm/mm |
| 20   | 130                        | 31                                             | 68               | 128            | 192            | 243             | 270             |
| 25   | 130                        | 31                                             | 68               | 128            | 192            | 243             | 270             |
| 32   | 130                        | 31                                             | 68               | 128            | 192            | 243             | 270             |
| 40   | 130                        | 30                                             | 66               | 124            | 186            | 236             | 261             |
| 50   | 130                        | 25                                             | 51               | 98             | 134            | 173             | 192             |
| 65   | 130                        | 24                                             | 53               | 100            | 150            | 190             | 211             |
| 80   | 130                        | 28                                             | 58               | 104            | 148            | 185             | 205             |
| 100  | 130                        | 35                                             | 71               | 116            | 206            | 274             | 304             |
| 125  | 130                        | 36                                             | 71               | 137            | 214            | 282             | 313             |
| 150  | 130                        | 49                                             | 102              | 189            | 293            | 390             | 433             |
| 200  | 130                        | 100                                            | 180              | 365            | 568            | 735             | 816             |
| 250  | 130                        | 105                                            | 207              | 388            | 609            | 778             | 864             |
| 300  | 130                        | 123                                            | 248              | 448            | 658            | 883             | 980             |
| 350  | 200                        | 105                                            | 177              | 349            | 567            | 753             | 836             |
| 400  | 200                        | 154                                            | 261              | 516            | 535            | 1090            | 1210            |
| 450  | 250                        | 167                                            | 320              | 581            | 903            | 1162            | 1290            |
| 500  | 200                        | 196                                            | 376              | 686            | 1060           | 1364            | 1514            |
| 600  | 200                        | 208                                            | 292              | 692            | 1123           | 1441            | 1600            |
| 700  | *250                       | 140                                            | 198              | 521            | 714            | 954             | -               |
| 800  | 250                        | 180                                            | 270              | 594            | 975            | 1258            | -               |
| 900  | 300                        | 200                                            | 380              | 690            | 1080           | 1395            | -               |
| 1000 | 300                        | 225                                            | 420              | 742            | 1248           | 1568            | -               |

\* Building length 260 mm

Warning: Deviations (+/- 25 %) in the stiffness rates may occur due to use of different materials and manufacturing processes.

### Lateral stiffness rates

| DN   | Overall length<br>BL<br>mm | Stiffness rates (averages value from full way) |                  |                |                |                 |                 |
|------|----------------------------|------------------------------------------------|------------------|----------------|----------------|-----------------|-----------------|
|      |                            | 0 bar<br>Nm/mm                                 | 2,5 bar<br>Nm/mm | 4 bar<br>Nm/mm | 6 bar<br>Nm/mm | 10 bar<br>Nm/mm | 16 bar<br>Nm/mm |
| 20   | 130                        | 64                                             | 125              | 184            | 240            | 240             | 300             |
| 25   | 130                        | 64                                             | 125              | 184            | 240            | 240             | 300             |
| 32   | 130                        | 64                                             | 125              | 184            | 240            | 240             | 300             |
| 40   | 130                        | 62                                             | 121              | 178            | 233            | 256             | 291             |
| 50   | 130                        | 50                                             | 65               | 80             | 105            | 145             | 205             |
| 65   | 130                        | 40                                             | 78               | 115            | 150            | 165             | 188             |
| 80   | 130                        | 35                                             | 74               | 136            | 155            | 173             | 200             |
| 100  | 130                        | 55                                             | 88               | 143            | 168            | 192             | 228             |
| 125  | 130                        | 100                                            | 200              | 261            | 293            | 383             | 518             |
| 150  | 130                        | 120                                            | 260              | 309            | 366            | 466             | 616             |
| 200  | 130                        | 323                                            | 723              | 836            | 949            | 1219            | 1624            |
| 250  | 130                        | 379                                            | 806              | 1022           | 1173           | 1479            | 1938            |
| 300  | 130                        | 392                                            | 837              | 1068           | 1216           | 1542            | 2031            |
| 350  | 200                        | 305                                            | 610              | 762            | 875            | 1098            | 1433            |
| 400  | 200                        | 338                                            | 642              | 817            | 946            | 1199            | 1579            |
| 450  | 250                        | 342                                            | 639              | 821            | 971            | 1200            | 1544            |
| 500  | 200                        | 426                                            | 818              | 1048           | 1204           | 1495            | 1932            |
| 600  | 200                        | 456                                            | 834              | 1062           | 1295           | 1586            | 2023            |
| 700  | *250                       | 516                                            | 939              | 1191           | 1449           | 1775            | -               |
| 800  | 250                        | 558                                            | 960              | 1055           | 1557           | 1758            | -               |
| 900  | 300                        | 800                                            | 1480             | 1984           | 2248           | 2560            | -               |
| 1000 | 300                        | 960                                            | 1824             | 2361           | 2736           | 2976            | -               |

\* Building length 260 mm

Warning: Deviations (+/- 25 %) in the stiffness rates may occur due to use of different materials and manufacturing processes.



## WILLBRANDT Rubber Expansion Joint Type 50

### Angular stiffness torque

| DN   | Overall length<br>BL<br>mm | Stiffness torque (averages value from full way) |                 |               |               |                |                |
|------|----------------------------|-------------------------------------------------|-----------------|---------------|---------------|----------------|----------------|
|      |                            | 0 bar<br>Nm/°                                   | 2,5 bar<br>Nm/° | 4 bar<br>Nm/° | 6 bar<br>Nm/° | 10 bar<br>Nm/° | 16 bar<br>Nm/° |
| 20   | 130                        | 0.2                                             | 0.5             | 0.9           | 1.3           | 1.7            | 1.9            |
| 25   | 130                        | 0.2                                             | 0.5             | 0.9           | 1.3           | 1.7            | 1.9            |
| 32   | 130                        | 0.2                                             | 0.5             | 0.9           | 1.3           | 1.7            | 1.9            |
| 40   | 130                        | 0.3                                             | 0.6             | 1.1           | 1.6           | 2.0            | 2.3            |
| 50   | 130                        | 0.3                                             | 0.6             | 1.1           | 1.6           | 2.0            | 2.2            |
| 65   | 130                        | 0.4                                             | 0.9             | 1.7           | 2.5           | 3.2            | 3.6            |
| 80   | 130                        | 1.0                                             | 1.0             | 2.0           | 3.0           | 4.0            | 5.0            |
| 100  | 130                        | 1.0                                             | 2.0             | 4.0           | 7.0           | 9.0            | 10.0           |
| 125  | 130                        | 2.0                                             | 3.0             | 6.0           | 10.0          | 13.0           | 15.0           |
| 150  | 130                        | 3.0                                             | 7.0             | 12.0          | 19.0          | 25.0           | 28.0           |
| 200  | 130                        | 11.0                                            | 20.0            | 41.0          | 63.0          | 82.0           | 91.0           |
| 250  | 130                        | 18.0                                            | 35.0            | 65.0          | 102.0         | 130.0          | 144.0          |
| 300  | 130                        | 29.0                                            | 58.0            | 105.0         | 154.0         | 206.0          | 229.0          |
| 350  | 200                        | 34.0                                            | 57.0            | 113.0         | 183.0         | 244.0          | 270.0          |
| 400  | 200                        | 65.0                                            | 110.0           | 218.0         | 226.0         | 460.0          | 511.0          |
| 450  | 250                        | 87.0                                            | 168.0           | 304.0         | 473.0         | 609.0          | 676.0          |
| 500  | 200                        | 125.0                                           | 239.0           | 436.0         | 674.0         | 868.0          | 963.0          |
| 600  | 200                        | 186.0                                           | 261.0           | 618.0         | 1004.0        | 1288.0         | 1429.0         |
| 700  | *250                       | 167.0                                           | 237.0           | 861.0         | 853.0         | 1140.0         | -              |
| 800  | 250                        | 277.0                                           | 416.0           | 914.0         | 1501.0        | 1937.0         | -              |
| 900  | 300                        | 386.0                                           | 733.0           | 1330.0        | 2082.0        | 2689.0         | -              |
| 1000 | 300                        | 531.0                                           | 991.0           | 1751.0        | 2945.0        | 3700.0         | -              |

\* Building length 260 m

Warning: Deviations (+/- 25 %) in the stiffness torque may occur due to use of different materials and manufacturing processes.

### Frictional force

| DN   | Overall length<br>BL<br>mm | For designs E and M<br>Frictional force<br>N/bar | for design F<br>frictional moment<br>Nm/bar |
|------|----------------------------|--------------------------------------------------|---------------------------------------------|
|      |                            |                                                  |                                             |
| 20   | 130                        | 7                                                | 0.2                                         |
| 25   | 130                        | 7                                                | 0.2                                         |
| 32   | 130                        | 7                                                | 0.2                                         |
| 40   | 130                        | 7                                                | 0.2                                         |
| 50   | 130                        | 12                                               | 0.3                                         |
| 65   | 130                        | 20                                               | 0.5                                         |
| 80   | 130                        | 35                                               | 1.0                                         |
| 100  | 130                        | 51                                               | 1.4                                         |
| 125  | 130                        | 75                                               | 2.1                                         |
| 150  | 130                        | 118                                              | 4.4                                         |
| 200  | 130                        | 167                                              | 6.2                                         |
| 250  | 130                        | 243                                              | 11.2                                        |
| 300  | 130                        | 335                                              | 15.4                                        |
| 350  | 200                        | 120                                              | 17.0                                        |
| 400  | 200                        | 160                                              | 22.9                                        |
| 450  | 250                        | 171                                              | 40.5                                        |
| 500  | 200                        | 266                                              | 63.5                                        |
| 600  | 200                        | 634                                              | 138.5                                       |
| 700  | *250                       | 662                                              | 180.9                                       |
| 800  | 250                        | 896                                              | 326.2                                       |
| 900  | 250                        | 1105                                             | 402.4                                       |
| 1000 | 250                        | 1357                                             | 617.3                                       |

\* Building length 260 m

Warning: Deviations (+/- 25 %) in the frictional force may occur due to use of different materials and manufacturing processes.

