

GEOFLEX®

Seismic Resilient Joint



TECHNICAL GUIDE 2.1
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GEOFLEX® is a range of ductile iron flexible fittings, capable of sliding, extending, compressing and rotating.

GEOFLEX® fittings are designed to protect water pipe works against stresses caused by occasional but major geological events such as earthquakes, seismic earth movements, tsunamis, tidal waves, etc. As well as subsidence of loose or unstable ground caused by landslides.



MAIN CHARACTERISTICS

EPDM elastomeric gaskets

Bolts & nuts: stainless steel grade 304

External and internal coating : Blue Epoxy Powder 250µm (PECB)

Performances comply with ISO 16134 standard

Type test (in part, where relevant) compliant with EN 545 standard

FIELD OF USE

Mainly water supply pipelines

Anti-seismic protection of pipelines

Protection of pipelines against landslides, subsidence of loose or unstable ground

Stress caused by earthquakes, seismic earth movements, tsunamis, tidal waves, etc.

PN16 bar

CONTACT SUPPORT

+64 9 448 5844

INFORMATIVE TYPE-INSTALLATION SKETCH

Refer to Fig. 1

GEOFLEX® fittings (see G on sketch) can be installed on Natural (see T on sketch), Classic or Integral pipes ranges via the use of spigot-flanged fittings and flanged socket fittings (see B on sketch).

The design of the fitting's central part (sleeve), sliding inside the ball-joint flanges at each extremity, allows contraction and expansion movements.

The overall sliding capacity (expansion/contraction) varies from 100 mm (+/- 50mm) up to 600 mm (+ 350mm/-250mm). A table recaps all these values DN per DN.

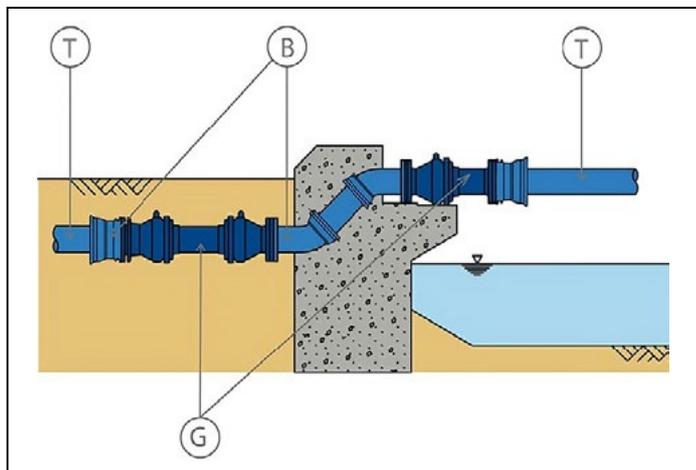


Fig. 1: Informative Type-Installation Sketch

PROJECT DESIGN, CHOICE CRITERIA

Refer to Fig. 2

GEOFLEX®: a wide choice, ranging from DN100 up to DN1800, PN16. The selection of a GEOFLEX® fitting for a given DN, depends on the expected subsidence magnitude, which it may have to withstand.

This subsidence is evaluated & assessed depending of geotechnics or seismic stresses, and on the nature of grounds met during the project design.

The selection of the right GEOFLEX® fitting is the responsibility of the consultant, once considered the geotechnics parameters of the project.

Several possible deflection values (h), ranging from 100 mm up to 600 mm and various deviation angles from +/-30° up to +/- 38°, address DN by DN the foreseeable stress levels.

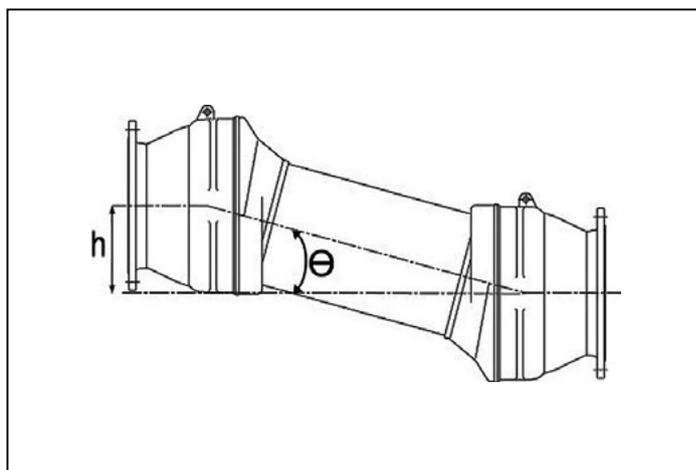


Fig. 2: Project Design, Choice Criteria

Between the 2 flanged extremities, the sliding central part (sleeve) of a GEOFLEX® fitting allows axial compression & expansion, varying from 100 mm (+/- 50mm) up to 600 mm (+ 350mm/-250mm), depending on the DN. A table recaps all values related to each DN

STRONG AND FLEXIBLE

GEOFLEX® uses a unique and innovative assembly technology: it comprises a sliding collar and two articulated flanged ball joints, all assembled in one piece without screws or nuts, which gives it excellent mechanical strength and resistance to displacement.

All the components in the range have a guaranteed resistance to tearing from 3 DkN, where D is the diameter, expressed in mm, based on ISO 16134 "Earthquake - and subsidence-resistant design of ductile iron pipelines". This level of performance corresponds to the standard's highest requirement class.

GEOFLEX® fittings, unlike other products in the range (pipes, joints and classical fittings) are designed and tested according to the specific standard ISO 16134.



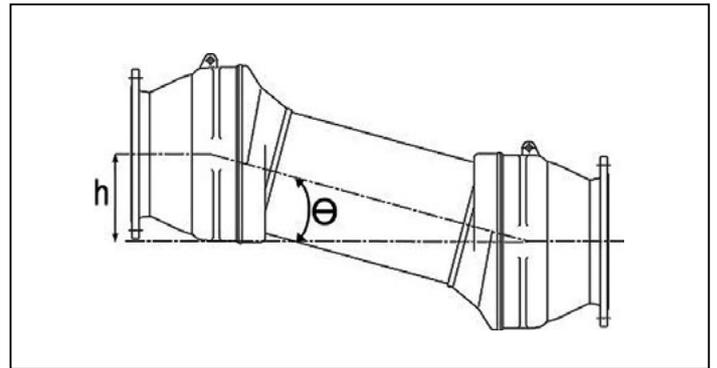
Figure 3. GEOFLEX range

PERFORMANCE

DEFLECTION AND ANGULAR DEFLECTION

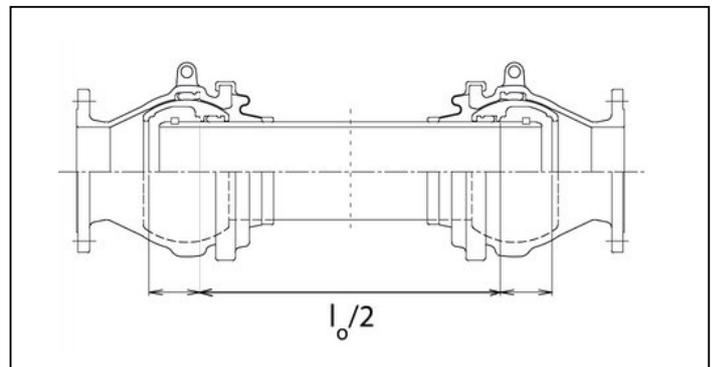
Each ball joint offers large angular deflection « θ » of +/-15° to +/-20° (depending on the diameter in question), which corresponds to an overall angular deviation of +/-30° to +/-40°.

With different collar lengths available, GEOFLEX® can offer a deflection capacity (subsidence) "h" of 100 to 600 mm. Wider ranges can be obtained by putting together two fittings consecutively in series.



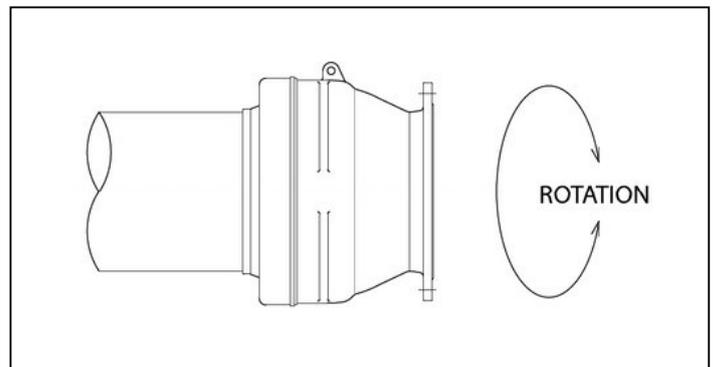
EXPANSION/CONTRACTION CAPACITY

The sliding design of the central collar on each ball joint allows relatively large displacement of the flanged ends when contracting or expanding. The total sliding « l_0 » varies from 200 mm (+/-100 mm) to 600 mm (+350 mm/ 250 mm) as the diameter increases up the range.



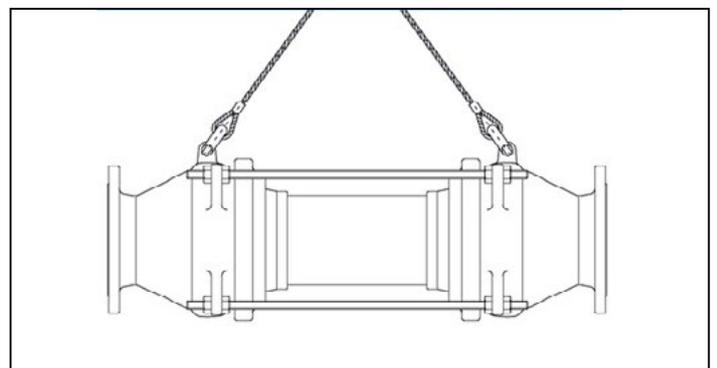
FREEDOM OF ROTATION

In addition to its capacity to absorb axial displacement and deflection, GEOFLEX® is also able to rotate at the ball joints, which helps prevent damage to flanges, valves and other structures that are attached to it.



SIMPLE INSTALLATION

Assembly instructions are supplied with each fitting. GEOFLEX® is shipped with its four rods in place so as to prevent deflection during transport and handling, as well as to keep the overall dimensions of the fitting unchanged.



MAIN GEOFLEX® FITTINGS PERFORMANCES

GEOFLEX® double ball-joints fittings

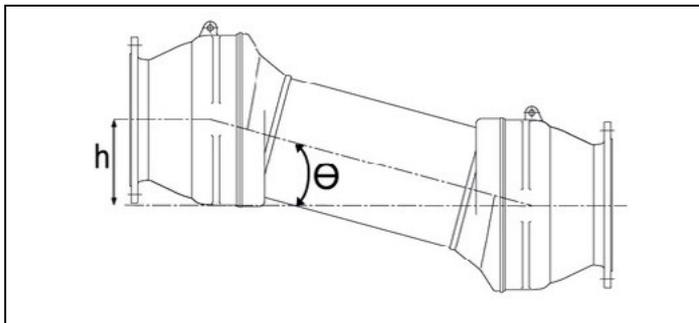
(*) The overall sliding (contraction/expansion) range depends on the length of the central part (sleeve) of the GEOFFLEX® fitting. The l_0 value mentioned is the sum of both contraction and expansion movements, expressed as +/-.

(**) DN100- Expansion / Contraction: +80 mm/ -20 mm in case of a 600 mm deflection (h).

(***) The maximum resistance to dismounting must be equal or superior to $3Xn$ (in mm) n expressed in kN. This resistance value is based on ISO 16134 standard: "Earthquake and subsidence-resistant design of ductile iron pipelines".

Example: for a DN150 GEOFFLEX fitting, the maximum guaranteed value of resistance to dismounting is calculated as follows:
R dismounting = $3 \times 1500 = 4500$ kN

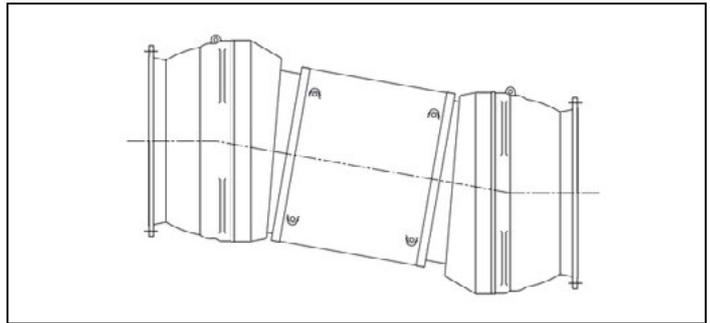
GEOFLEX® DOUBLE BALL JOINT DN 100 to DN 1000



DN/OD	Deflection	Angular Deflection	Expansion / Contraction	Resistance to Dismounting
mm	h (mm)	θ (degree)	l_0 in mm	kN
100	100 - 600	+/- 38°	100 (+/- 50) **	300
150	100 - 600	+/- 36°	160 (+/- 80)	450
200	100 - 600	+/- 34°	160 (+/- 80)	600
250	100 - 600	+/- 32°	160 (+/- 80)	750
300	100 - 600	+/- 30°	200 (+/- 100)	900
350	100 - 600	+/- 30°	200 (+/- 100)	1050
400	100 - 600	+/- 30°	240 (+/- 100)	1200
450	100 - 600	+/- 30°	240 (+/- 100)	1350
500	100 - 600	+/- 30°	300 (+/- 150)	1500
600	100 - 600	+/- 30°	300 (+/- 150)	1800
700	200 - 600	+/- 30°	400 (+/- 200)	2100
800	200 - 600	+/- 30°	400 (+/- 200)	2400
900	200 - 600	+/- 30°	440 (+/- 220)	2700
1000	200 - 600	+/- 30°	440 (+/- 220)	3000

GEOFLEX® DOUBLE BALL JOINT

DN 1100 to DN 1800

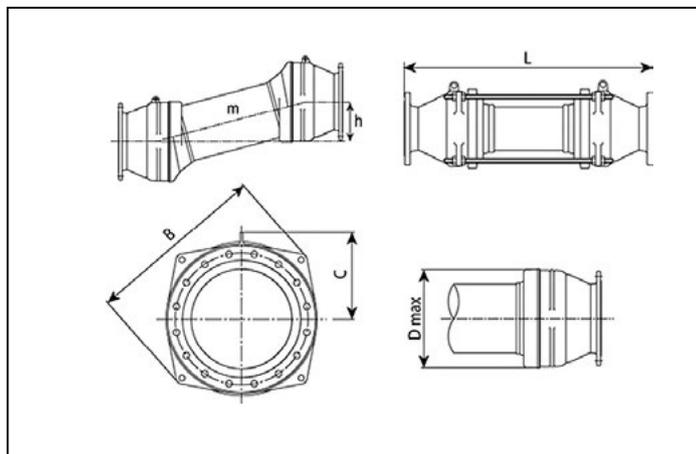


DN/OD	Deflection	Angular Deflection	Expansion / Contraction	Resistance to Dismounting
mm	h (mm)	θ (degree)	l_0 in mm	kN
1110	400	+/- 20°	600 (+350/-250)	3000
1200	400	+/- 20°	600 (+350/-250)	3600
1400	400	+/- 20°	600 (+350/-250)	4200
1500	400	+/- 20°	600 (+350/-250)	4500
1600	400	+/- 20°	600 (+350/-250)	4800
1800	500	+/- 20°	600 (+350/-250)	5400

DIMENSIONS AND MASS

GEOFLEX® double ball-joints fittings
 (*) the deflection value (h) mentioned depends on the central part m (sleeve), installed between the two ball-joint flanges.

GEOFLEX® double ball-joints fittings



DN	Deflection h	Overall length	B	C	Ø D maxi	Mass	References
mm	mm	mm	mm	mm	mm	kg	
100	100	630	331	157	247	53	BBB10GD2ETT
100	200	920	331	157	247	59	BBB10GD2JTT
100	300	1210	331	157	247	66	BBB10GD2KTT
100	400	1500	331	157	247	72	BBB10GD2LTT
100	500	1790	331	157	247	79	BBB10GD2MTT
100	600	2620	331	157	247	99	BBB10GD2NTT
150	100	680	390	185	307	87	BBB15GD2ETT
150	200	990	390	185	307	98	BBB15GD2JTT
150	300	1300	390	185	307	108	BBB15GD2KTT
150	400	1610	390	185	307	118	BBB15GD2LTT
150	500	1910	390	185	307	128	BBB15GD2MTT
150	600	2620	390	185	307	152	BBB15GD2NTT
200	100	790	449	219	367	126	BBB20GD2ETT
200	200	1120	449	219	367	144	BBB20GD2JTT
200	300	1450	449	219	367	157	BBB20GD2KTT
200	400	1770	449	219	367	171	BBB20GD2LTT
200	500	2100	449	219	367	185	BBB20GD2MTT
200	600	2730	449	219	367	211	BBB20GD2NTT
250	100	830	516	252	432	179	BBB25GD2ETT
250	200	1180	516	252	432	197	BBB25GD2JTT
250	300	1530	516	252	432	217	BBB25GD2KTT
250	400	1880	516	252	432	235	BBB25GD2LTT
250	500	2230	516	252	432	254	BBB25GD2MTT
250	600	2730	516	252	432	281	BBB25GD2NTT
300	100	860	590	280	492	256	BBB30GD2ETT
300	200	1230	590	280	492	282	BBB30GD2JTT
300	300	1600	590	280	492	307	BBB30GD2KTT
300	400	1970	590	280	492	332	BBB30GD2LTT
300	500	2350	590	280	492	357	BBB30GD2MTT
300	600	2730	590	280	492	382	BBB30GD2NTT
350	100	1170	651	313	545	360	BBB35GD2ETT

DN	Deflection h	Overall length	B	C	Ø D maxi	Mass	References
mm	mm	mm	mm	mm	mm	kg	
350	200	1490	651	313	545	386	BBB35GD2JTT
350	300	1860	651	313	545	418	BBB35GD2KTT
350	400	2240	651	313	545	452	BBB35GD2LTT
350	500	2610	651	313	545	481	BBB35GD2MTT
350	600	2980	651	313	545	510	BBB35GD2NTT
400	100	1220	711	345	621	487	BBB40GD2ETT
400	200	1500	711	345	621	514	BBB40GD2JTT
400	300	1870	711	345	621	550	BBB40GD2KTT
400	400	2250	711	345	621	586	BBB40GD2LTT
400	500	2620	711	345	621	622	BBB40GD2MTT
400	600	2990	711	345	621	658	BBB40GD2NTT
450	100	1260	766	372	676	598	BBB45GD2ETT
450	200	1530	766	372	676	629	BBB45GD2JTT
450	300	1910	766	372	676	672	BBB45GD2KTT
450	400	2280	766	372	676	715	BBB45GD2LTT
450	500	2660	766	372	676	757	BBB45GD2MTT
450	600	3020	766	372	676	797	BBB45GD2NTT
500	100	1390	844	418	748	781	BBB50GD2ETT
500	200	1610	844	418	748	813	BBB50GD2JTT
500	300	2000	844	418	748	868	BBB50GD2KTT
500	400	2380	844	418	748	923	BBB50GD2LTT
500	500	2770	844	418	748	978	BBB50GD2MTT
500	600	3120	844	418	748	1028	BBB50GD2NTT
600	100	1530	969	476	880	1104	BBB60GD2ETT
600	200	1740	969	476	880	1142	BBB60GD2JTT
600	300	2120	969	476	880	1213	BBB60GD2KTT
600	400	2510	969	476	880	1284	BBB60GD2LTT
600	500	2890	969	476	880	1356	BBB60GD2MTT
600	600	3250	969	476	880	1425	BBB60GD2NTT
700	200	1850	1108	535	996	1429	BBB70GD2JTT
700	300	2220	1108	535	996	1513	BBB70GD2KTT
700	400	2590	1108	535	996	1598	BBB70GD2LTT
700	500	2970	1108	535	996	1682	BBB70GD2MTT
700	600	3340	1108	535	996	1764	BBB70GD2NTT

GEOFLEX® FITTINGS

Dimensions and Mass.

DN	Deflection h	Overall length	B	C	Ø D maxi	Mass	References
mm	mm	mm	mm	mm	mm	kg	
800	200	2050	1238	609	1110	2000	BBB80GD2JTT
800	300	2320	1238	609	1110	2075	BBB80GD2KTT
800	400	2700	1238	609	1110	2204	BBB80GD2LTT
800	500	3070	1238	609	1110	2282	BBB80GD2MTT
800	600	3440	1238	609	1110	2360	BBB80GD2NTT
900	200	2160	1402	686	1259	2878	BBB90GD2JTT
900	300	2540	1402	686	1259	3006	BBB90GD2KTT
900	400	2930	1402	686	1259	3134	BBB90GD2LTT
900	500	3320	1402	686	1259	3263	BBB90GD2MTT
900	600	3610	1402	686	1259	3359	BBB90GD2NTT
1000	200	2230	1496	738	1363	3425	BBC10GD2JTT
1000	300	2610	1496	738	1363	3585	BBC10GD2KTT
1000	400	3000	1496	738	1363	3727	BBC10GD2LTT
1000	500	3390	1496	738	1363	3878	BBC10GD2MTT
1000	600	3680	1496	738	1363	3990	BBC10GD2NTT
1100	400	3160	1540	748	1390	4410	BBC11GD2LTT
1200	400	3310	1700	837	1550	5520	BBC12GD2LTT
1400	400	3410	1863	935	1723	7110	BBC14GD2LTT
1500	400	3460	-	-	-	8520	BBC15GD2LTT
1600	400	-	-	-	-	-	BBC16GD2LTT
1800	500	3870	2415	1235	2256	13730	BBC18GD2MTT

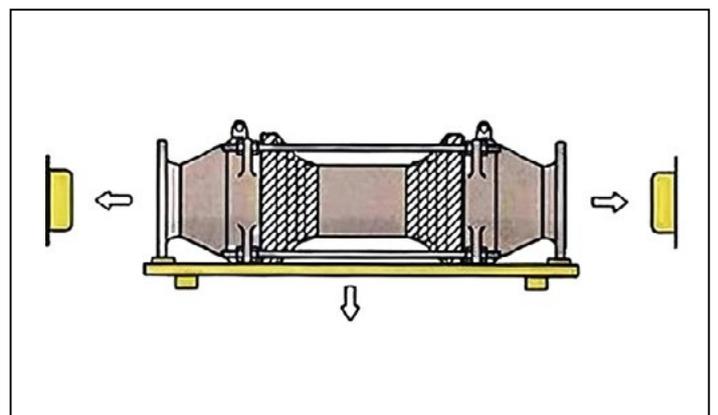
PACKAGING

GEOFLEX® fittings are individually packed on pallets, which are then shrink-wrapped (transparent plastic film).

(The 2 extremities of GEOFLEX® fittings are fitted with PE protective caps. GEOFLEX® fittings feature 4 threaded retaining rods (see installation sheet), aiming:

- To prevent any axial unexpected sliding movement during transport & handling
- To keep the overall distance (between flanges) identical to the factory-settings, until the fitting assembly and the overall pipeline installation is hydraulically tested & approved.

Each fitting is fitted with 2 PE sleeve and 2 securing wires, which will be installed on each pipeline extremity, prior to the installation of the GEOFLEX® fitting. See installation sheet.



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