THE FIRST CHOICE OF ENGINEERS

FLOWTITE GREY HIGH IMPACT GRP PIPE







Flowtite Pr<u>oducts</u>

Revision V3 2017-06

FLOWTITE GREY HIGH IMPACT GRP PIPE

FLOWTITE GREY is a new Flowtite pipe. Grey is the culmination of a development programme in materials, pipe design and processing methodology to offer better pipe performance.

Flowtite Grey is more impact resistant, which means that more native backfill or larger crushed rocks can be used for the trench backfill. That lowers costs of installation.

Flowtite Grey is more abrasion resistant, which gives the pipe a longer lifetime if the water contains abrasive material like gravel and sand.

Flowtite Grey is more water jet resistant.

Continuously wound GRP, which was invented by Flowtite pioneers in the late 1960's, is a fantastic technology. With this new pipe, Flowtite Grey, Flowtite takes another step ahead of competition.

THE FIRST CHOICE OF ENGINEERS WORLDWIDE

WHY SHOULD YOU CHOOSE **FLOWTITE GREY?**





MORE WATER JET RESISTANT





HIGH IMPACT RESISTANCE



FLOWTITE GREY OFFERS up to 10 times higher impact resistance than the original Flowtite pipe. Flowtite glass reinforced plastic pipes have offered good resistance to impact over many decades, improved impact resistance has always been a goal. Flowtite Grey has a new pipe design which offers greater resistance to impact. Flowtite Grey maintains water tightness after impact to a higher degree than other GRP pipes.



▲ Flowtite Grey can be backfilled with bigger particles than other GRP pipes.



WHAT DOES **HIGHER IMPACT RESISTANCE MEAN** TO ENGINEERS AND INSTALLATION PROCEDURES?



HIGHER IMPACT RESISTANCE permits engineers to use larger backfill particles. This saves money since finer particles generally come at a higher cost, either from grinding, sourcing of special backfill materials or exclusion of more of the local native backfill. Flowtite Grey can now permit engineers to use up to 64 mm particle size for backfill on the largest pipes. Higher impact resistance gives engineers ease of mind – Flowtite Grey will resist liner cracking at higher energy impacts that may occur accidently during pipe shipping, storage or installation. Liner cracking on impact can potentially permit the passage of water through the pipe wall when in service.





Impact resistance is typically measured by falling mass testing on empty and/or water-filled pipes. Impacted pipes are then inspected for damage and additionally, pressure tested to ensure watertightness after impact.



 Impact testing at Flowtite Technology laboratory in Norway.

HIGH ABRASION RESISTANCE



TESTS CONDUCTED at the Flowtite Technology Laboratory in Norway show that Flowtite Grey has far better abrasion resistance than the original Flowtite pipe. Abrasion resistance is a concern for many pipe installations when water contaminated with sand, silt and gravel must be transported in the pipe at higher flow velocity. The suspended solids can cause erosion and abrasion wear and, when severe, can result in structural integrity issues and may even eventually require repair or rehabilitation. Flowtite Grey's new pipe design offers better resistance to abrasion for water and sewerage applications.

Abrasion Resistance Gravel abrasion to 100 000 cycles

< 0.2 mm

WHAT DOES **HIGHER ABRASION RESISTANCE** MEAN TO ENGINEERS?

HIGHER ABRASION RESISTANCE permits engineers to employ Flowtite pipes in applications with heavier loads of suspended solids. Higher resistance to abrasion reduces the frequency for costly shut downs

What is Abrasion Resistance?

Abrasion resistance is the resistance to internal damage on the pipe liner by suspended solids. The extent of the abrasion depends on flow velocity, concentration of the particles, chemical composition and shape of the particles.



for inspection and longer periods in operation are permitted. Better abrasion resistance can mean longer operating life for the pipeline.



▲ Abrasion testing at the Flowtite Technology certified laboratory in Sandefjord, Norway.

WATER JET RESISTANCE



FLOWTITE GREY is a pipe that can offer better resistance to water jet cleaning than standard Flowtite pressure pipes. Water jetting is common practice before a completed pipeline is handed over by the contractor to the pipeline owner. Water jet cleaning is also occasionally used in pressure mains during operation. For this purpose, Flowtite Grey offers an improved resistance.

For frequent water jetting, for example in gravity sewers, Flowtite FS, shall be the preferred choice.





WHAT DOES **HIGHER WATER JET RESISTANCE** MEAN TO ENGINEERS?

IMPROVED WATER JET RESISTANCE allows cleaning of pipes with the higher water pressures and modern cleaning equipment with lower risk of liner damage.

What is Water Jet Resistance?

Water jet resistance is the pipes' ability to withstand the high pressures of water jet cleaning without damage to the liner or the pipe wall. This resistance shall be offered throughout the pipes' service life for at least 50 years. Flowtite pipelines are designed for the longest service life in the pipe market. Flowtite Grey provides further security to pipeline owners, engineers and contractors. This picture was taken at a water jet test in 2016.

LOCATION: Germany



▲ Water jet test at the Flowtite Technology laboratory in Norway.

THE GREY LAMINATE

FLOWTITE GREY is a proprietary technology with patents pending. Flowtite Grey is the culmination of a development programme in materials, pipe design and processing methodology to offer better pipe performance – impact resistance is improved, abrasion resistance is improved, ease of installation is improved, operational performance is improved and pipe longevity is increased. Flowtite Grey technology is novel and patent is pending.





Standard Flowtite Properties

Flowtite pressure pipe is the most commonly used pipe for pressure and gravity applications, with a 50 year long proven track record. It is compliant with all international performance standards.

Impact Resistance

Good impact resistance, maintains resistance to burst. Some care in handling & installation required.

Abrasion Resistance

Good resistance in most pressure and gravity applications.

Water Jetting Resistance

Acceptable but limited water jetting resistance – lower cleaning pressures.

Backfill Particle Size

Nominal maximum particle size in the pipe zone (up to 300 mm over the pipe crown).

| DN | Max. size (mm) |
|-------------------|----------------|
| DN up to 450 | 13 mm |
| DN 500 to 600 | 19 mm |
| DN 700 to 900 | 25 mm |
| DN 1000 to 1200 | 32 mm |
| DN 1300 and above | 40 mm |

Estimated Lifetime More than 150 years!



Flowtite Grey Properties

Flowtite Grey takes Flowtite GRP another big step ahead. It goes beyond international standards, with new, innovative properties for demanding projects.

Impact Resistance

Improved impact resistance with up to 10 times better performance in impact testing (BS 5480, KIWA BRL). Maintains resistance to burst (hoop strength) after higher impact.

Abrasion Resistance

Improved resistance. Darmstadt gravel abrasion to 100 000 cycles estimated <0.2 mm loss in liner thickness. Abrasion test according to DIN 19565-1/EN 295-3.

Water Jetting Resistance

Improved water jetting resistance.

Backfill Particle Size

Larger particles permitted – up to 64 mm nominal maximum particle size (sieve size).

| DN | Max. size (mm) |
|-------------------|----------------|
| DN 250 to 500 | 25 mm |
| DN 600 to 1000 | 50 mm |
| DN 1100 and above | 64 mm |

Estimated Lifetime

More than 150 years! Flowtite Grey offers improved performance in standardised long-term pipe testing - strain corrosion, long-term stiffness and hydrostatic design basis testing. That means that Flowtite Grey is expected to last even longer than regular Flowtite pipes.



LOCATION: Spain

in remote areas. Flowtite Grey

STANDARDS

215 18



ACCREDITATION DOCUMENT **TEST 190**

Flowtite Technology AS, R&D Lab. P.O. Box 2059, 3202 Sandefjord, Norway

a semilar was initially granted 03.09.2004. The accreditation is given according to Leve in the free cuchange of goods in the European Economic Area" of 14 04 2003 as representen complies with the requirements in NS-EN ISO/IEC 17025 (2005)

ne acceleration requires regular surveillance, and is valid until 17.02.2000 a sense of accreditation made by Norwegian Accreditation inv has been found to faill the require

FLOWTITE PIPE HAS BEEN RIGOROUSLY TESTED TO VERIFY CONFORMANCE TO THE FOLLOWING INTERNATIONAL PERFORMANCE STANDARDS:

| STANDARD | PURPOSE |
|------------|--------------------|
| AWWA C950 | Water supply |
| AWWA M45 | Design manual |
| ISO 10639 | Water supply |
| ISO 10467 | Sewer and drainage |
| EN 1796 | Water supply |
| EN 14364 | Sewer and drainage |
| ASTM D3262 | Sewer |
| ASTM D3517 | Water supply |
| ASTM D3574 | Pressure sewer |

* Flowtite is in addition approved by most national standards.

To say of accordance is in accordance with the specifications on the following pages in this document.

Flowtite Technology has the world´s largest certified GRP pipe laboratory.



ALL YOU NEED TO KNOW



All you need to know about installation, couplings and fittings can be found in Flowtite company literature. This literature can be found in the brochures section at **www.flowtite.com** or **www.amiantit.eu**. The environmental impact of Flowtite pipes has been thoroughly documented by Flowtite, and has been certified and approved by an external body. Flowtite Grey is covered by the findings in the Flowtite Environmental Product Declaration (EPD).



COUPLINGS & FITTINGS

COUPLINGS

Flowtite Grey is intended for use with standard Pressure Coupling and Flowtite Angled Coupling. For the use of other couplings, please consult your local supplier. For more detailed information on Flowtite couplings, please see "The First Choice of Engineers" brochure at **www.flowtite.com.**

PRESSURE COUPLING

Commonly used for penstocks, water supply, irrigation and pressure sewer applications.



ANGLED COUPLING

Flowtite coupling for increased angular deflections up to 3 degrees.



Fittings are also manufactured and delivered according to the principles for ordinary Flowtite pipelines. For more information on Flowtite fittings, please see "The First Choice of Engineers" brochure at **www.flowtite.com**.

- Diameter range (DN): Up to DN 4000
- Pressure (PN): Up to 16 bar



TECHNICAL DATA

The following tables provide a selection of technical data. Comprehensive information can be found in the relevant Flowtite literature, such as installation instructions, test reports, technical notes, and other documents. The numbers in these tables are approximate, nominal values, and are subject to change without notice. For current, accurate values, please contact your local Flowtite supplier. Units used in the tables below: SN = N/m²; PN = bar; DN, DOSmax, ID MIN = mm; Weight = kg/m.

PIPE DIMENSIONS

| SN : | 5000 | FLOWTITE GREY PIPE – ID MIN | | | | | WEIGH | WEIGHT SPAN | |
|------|---------|-----------------------------|--------|--------|--------|--------|-------|-------------|-------|
| DN | DOS max | PN 6 | PN 10 | PN 16 | PN 20 | PN 25 | PN 32 | from | to |
| 300 | 324,5 | 312,7 | 312,8 | 313,6 | 314,7 | 314,7 | | 9,0 | 10,5 |
| 350 | 376,4 | 362,9 | 363,4 | 364,2 | 365,4 | 365,4 | | 12,0 | 14,5 |
| 400 | 427,3 | 412,1 | 412,8 | 413,9 | 415,0 | 415,1 | | 15,2 | 19,0 |
| 450 | 478 | 461,2 | 462,1 | 463,4 | 464,5 | 464,6 | | 18,8 | 23,9 |
| 500 | 530,1 | 511,9 | 512,8 | 514,0 | 515,3 | 515,5 | | 23,0 | 29,1 |
| 600 | 617 | 596,1 | 597,4 | 598,8 | 600,2 | 600,4 | | 30,8 | 39,5 |
| 700 | 719 | 695,3 | 696,7 | 698,4 | 699,8 | 700,0 | | 41,4 | 53,1 |
| 800 | 821 | 794,4 | 796,0 | 797,9 | 799,4 | 799,6 | | 53,5 | 68,7 |
| 900 | 923 | 893,5 | 895,1 | 897,4 | 899,0 | 899,3 | | 67,3 | 86,7 |
| 1000 | 1025 | 992,5 | 994,3 | 997,0 | 998,6 | 998,9 | | 82,5 | 106,7 |
| 1100 | 1127 | 1091,7 | 1093,5 | 1096,5 | 1098,2 | 1098,5 | | 99,4 | 128,3 |
| 1200 | 1229 | 1190,8 | 1192,8 | 1196,0 | 1197,8 | 1198,2 | | 117,8 | 152,2 |
| 1300 | 1331 | 1289,7 | 1292,2 | 1295,6 | 1297,4 | 1297,8 | | 137,8 | 179,1 |
| 1400 | 1433 | 1388,6 | 1391,3 | 1395,1 | 1397,0 | 1397,4 | | 159,2 | 208,0 |
| 1500 | 1535 | 1487,8 | 1490,7 | 1494,7 | 1496,6 | 1497,1 | | 182,4 | 237,7 |
| 1600 | 1637 | 1586,8 | 1589,9 | 1594,2 | 1596,2 | 1596,7 | | 207,1 | 270,4 |
| 1700 | 1739 | 1685,8 | 1689,1 | 1693,8 | 1695,8 | 1696,3 | | 233,3 | 305,2 |
| 1800 | 1841 | 1784,9 | 1788,4 | 1793,3 | 1795,4 | 1795,9 | | 261,2 | 341,3 |
| 1900 | 1943 | 1884,1 | 1887,7 | 1892,8 | 1895,0 | 1895,6 | | 290,5 | 379,5 |
| 2000 | 2045 | 1983,2 | 1987,0 | 1992,3 | 1994,6 | 1995,2 | | 321,3 | 419,8 |
| 2100 | 2147 | 2082,2 | 2086,3 | 2091,9 | 2094,2 | 2094,8 | | 354,4 | 462,9 |

SN 5000 STIS continues

| SN | 5000 | | FLOWTITE GREY PIPE – ID MIN | | | | | WEIGH | WEIGHT SPAN | |
|------|---------|--------|-----------------------------|--------|--------|--------|-------|--------|-------------|--|
| DN | DOS max | PN 6 | PN 10 | PN 16 | PN 20 | PN 25 | PN 32 | from | to | |
| 2200 | 2249 | 2181,3 | 2185,5 | 2191,4 | 2193,8 | 2194,5 | | 387,1 | 506,8 | |
| 2300 | 2351 | 2280,4 | 2284,8 | 2291,0 | 2293,4 | 2294,1 | | 422,2 | 553,6 | |
| 2400 | 2453 | 2379,5 | 2384,0 | 2390,5 | 2393,0 | 2393,7 | | 461,2 | 601,7 | |
| 2500 | 2555 | 2478,5 | 2483,3 | 2490,0 | 2492,6 | | | 513,6 | 653,9 | |
| 2600 | 2657 | 2577,6 | 2582,6 | 2589,6 | 2592,2 | | | 556,6 | 706,7 | |
| 2700 | 2759 | 2676,7 | 2681,9 | 2689,1 | 2691,8 | | | 598,0 | 761,1 | |
| 2800 | 2861 | 2775,7 | 2781,1 | 2788,7 | 2791,4 | | | 642,5 | 818,7 | |
| 2900 | 2963 | 2874,8 | 2880,3 | 2888,2 | 2891,0 | | | 689,2 | 877,8 | |
| 3000 | 3065 | 2974,0 | 2979,6 | 2987,7 | 2990,6 | | | 737,6 | 938,0 | |
| 3100 | 3167 | 3073,1 | 3078,9 | 3087,3 | | | | 818,4 | 1000,3 | |
| 3200 | 3269 | 3172,1 | 3178,2 | 3186,8 | | | | 872,0 | 1066,6 | |
| 3300 | 3371 | 3271,1 | 3277,4 | 3286,3 | | | | 926,5 | 1134,6 | |
| 3400 | 3473 | 3370,2 | 3376,7 | 3385,9 | | | | 982,7 | 1202,9 | |
| 3500 | 3575 | 3469,4 | 3476,0 | | | | | 1183,1 | 1272,7 | |
| 3600 | 3677 | 3568,4 | 3575,2 | | | | | 1251,7 | 1347,8 | |
| 3700 | 3779 | 3667,5 | 3674,5 | | | | | 1321,9 | 1423,0 | |
| 3800 | 3881 | 3766,5 | 3773,8 | | | | | 1394,0 | 1500,7 | |
| 3900 | 3983 | | 3873,1 | | | | | 1467,0 | 1467,0 | |
| 4000 | 4085 | | 3972,3 | | | | | | | |

PIPE DIMENSIONS

| SN 1 | 0000 | | FLOWTITE GREY PIPE – ID MIN | | | | | | |
|------|---------|-------|-----------------------------|-------|-------|-------|-------|------|------|
| DN | DOS max | PN 6 | PN 10 | PN 16 | PN 20 | PN 25 | PN 32 | from | to |
| 300 | 324,5 | 310,0 | 310,0 | 311,0 | 312,4 | 312,7 | 312,7 | 11,1 | 13,6 |
| 350 | 376,4 | 359,7 | 359,7 | 361,3 | 362,7 | 362,9 | 363,1 | 14,7 | 18,7 |
| 400 | 427,3 | 408,9 | 408,9 | 410,6 | 412,0 | 412,3 | 412,5 | 18,8 | 23,7 |
| 450 | 478 | 457,8 | 457,8 | 459,6 | 461,1 | 461,5 | 461,7 | 23,3 | 29,4 |
| 500 | 530,1 | 508,0 | 508,0 | 510,2 | 511,6 | 512,0 | 512,3 | 28,4 | 36,0 |
| 600 | 617 | 591,8 | 591,8 | 594,1 | 595,8 | 596,4 | 596,7 | 38,2 | 48,6 |
| 700 | 719 | 690,1 | 690,1 | 692,8 | 694,7 | 695,3 | 695,7 | 51,4 | 65,8 |
| 800 | 821 | 788,3 | 788,3 | 791,6 | 793,6 | 794,3 | 794,7 | 66,6 | 85,6 |

| SN 10000 STIS coi | ntinues |
|-------------------|---------|
|-------------------|---------|

| SN 1 | 0000 | FLOWTITE GREY PIPE – ID MIN | | | | WEIGHT SPAN | | | |
|------|---------|-----------------------------|--------|--------|--------|-------------|--------|--------|--------|
| DN | DOS max | PN 6 | PN 10 | PN 16 | PN 20 | PN 25 | PN 32 | from | to |
| 900 | 923 | 886,7 | 886,7 | 890,3 | 892,5 | 893,3 | 893,7 | 83,7 | 107,7 |
| 1000 | 1025 | 985,0 | 985,0 | 989,0 | 991,4 | 992,2 | 992,8 | 102,7 | 132,7 |
| 1100 | 1127 | 1083,2 | 1083,2 | 1087,8 | 1090,2 | 1091,2 | 1091,8 | 124,1 | 160,6 |
| 1200 | 1229 | 1181,5 | 1181,5 | 1186,5 | 1189,1 | 1190,2 | 1190,8 | 147,1 | 190,8 |
| 1300 | 1331 | 1279,9 | 1279,9 | 1285,3 | 1288,0 | 1289,1 | 1289,8 | 172,2 | 223,3 |
| 1400 | 1433 | 1378,2 | 1378,2 | 1384,0 | 1386,9 | 1388,1 | 1388,8 | 199,2 | 258,3 |
| 1500 | 1535 | 1476,5 | 1476,5 | 1482,8 | 1485,8 | 1487,1 | 1487,9 | 228,1 | 296,6 |
| 1600 | 1637 | 1574,8 | 1574,8 | 1581,5 | 1584,7 | 1586,0 | 1586,9 | 259,0 | 336,8 |
| 1700 | 1739 | 1673,1 | 1673,1 | 1680,3 | 1683,5 | 1685,0 | 1685,9 | 291,3 | 379,7 |
| 1800 | 1841 | 1771,5 | 1771,5 | 1779,1 | 1782,4 | 1784,0 | 1784,9 | 326,2 | 425,1 |
| 1900 | 1943 | 1869,8 | 1869,8 | 1877,8 | 1881,3 | 1882,9 | | 376,7 | 473,0 |
| 2000 | 2045 | 1968,3 | 1968,3 | 1976,5 | 1980,2 | 1981,9 | | 417,0 | 522,8 |
| 2100 | 2147 | 2066,5 | 2066,5 | 2075,2 | 2079,1 | 2080,9 | | 459,3 | 576,6 |
| 2200 | 2249 | 2164,8 | 2164,8 | 2174,0 | 2178,0 | 2179,9 | | 503,3 | 632,7 |
| 2300 | 2351 | 2263,2 | 2263,2 | 2272,8 | 2276,8 | 2278,8 | | 548,9 | 690,4 |
| 2400 | 2453 | 2361,5 | 2361,5 | 2371,5 | 2375,7 | 2377,8 | | 597,2 | 751,5 |
| 2500 | 2555 | 2459,9 | 2459,9 | 2470,2 | 2474,6 | | | 676,9 | 815,0 |
| 2600 | 2657 | 2558,2 | 2558,2 | 2569,0 | 2573,5 | | | 730,8 | 880,7 |
| 2700 | 2759 | 2656,5 | 2656,5 | 2667,7 | 2672,3 | | | 786,3 | 950,0 |
| 2800 | 2861 | 2754,9 | 2754,9 | 2766,5 | 2771,2 | | | 846,1 | 1019,5 |
| 2900 | 2963 | 2853,1 | 2853,1 | 2865,3 | 2870,1 | | | 906,2 | 1095,1 |
| 3000 | 3065 | 2951,5 | 2951,5 | 2964,0 | 2969,0 | | | 970,7 | 1170,6 |
| 3100 | 3167 | 3049,9 | 3049,9 | 3062,8 | | | | 1091,4 | 1249,3 |
| 3200 | 3269 | 3148,2 | 3148,2 | 3161,4 | | | | 1163,4 | 1330,7 |
| 3300 | 3371 | 3246,5 | 3246,5 | 3260,2 | | | | 1236,5 | 1414,3 |
| 3400 | 3473 | 3344,8 | 3344,8 | 3358,9 | | | | 1312,5 | 1501,8 |
| 3500 | 3575 | | | | | | | | |
| 3600 | 3677 | | | | | | | | |
| 3700 | 3779 | | | | | | | | |
| 3800 | 3881 | | | | | | | | |
| 3900 | 3983 | | | | | | | | |
| 4000 | 4085 | | | | | | | | |
| 3900 | 3 983.0 | | | | | | | | |
| 4000 | 4 085.0 | | | | | | | | |







Distributed by

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This brochure is intended as a presentation only. Flowtite has separate handbooks and manuals for engineering and installing Flowtite products, which should be used for such purposes.

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