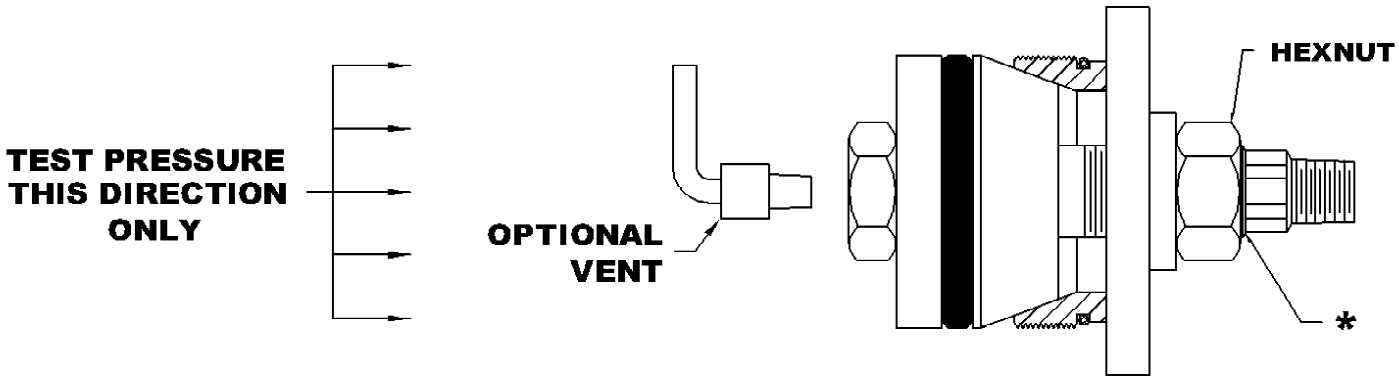
OPERATING PROCEDURES FOR GRIPTIGHT™ HIGH PRESSURE TEST PLUGS WITH ALTERNATE SEAL MATERIALS

Description: GripTight plugs supplied with alternate seal materials will have lower pressure ratings and in some cases a different installation torque. The table below cross-references the most commonly requested alternate materials with the standard material. These instructions apply *ONLY* to the alternate seal materials listed in the table. See Page 2 for replacement seal instructions. For standard plug instructions, see DC2510 Operating instructions and DC2512 replacement part instructions.

ID RANGE in (mm)	SHAFT DIA in (mm)	STANDARD SEAL MATERIAL qty, in (mm)	ALTERNATE SEAL MATERIAL qty, in (mm)
.93 - 1.20 (23.6 - 30.5)	1/2 (12.7)	URETHANE BLUE - (1) 1/2" (12.7)	NEOPRENE BLACK, EPDM BLACK, SILICONE AND FLUOROELASTOMER; VITON OR EQUIVALENT - (1) 1/2" (12.7)
1.13 - 1.43 (28.7 - 36.30)	5/8 (15.9)		
1.41 - 2.45 (35.8 - 62.20)	7/8 (22.2)		
2.44 - 4.34 (62.0 - 110.2)	1-1/4 (31.8)	URETHANE RED - (1) 1/2" (12.7)	
4.28 - 6.82 (108.7 - 173.2)	1-1/2 (38.1)	URETHANE RED - (1) 1/2" (12.7) AND NEOPRENE BLACK - (1) 1/2" (12.7)	NEOPRENE BLACK, EPDM BLACK, SILICONE AND FLUOROELASTOMER; VITON OR EQUIVALENT - (1) 1" (25.4)

INSURE PARTS ARE ASSEMBLED AS SHOWN



* **NOTE:** Threads on shaft have been deformed to prevent plug disassembly and improper re-assembly. Hex nut should never be removed! *

WARNING! FOR PROPER OPERATION, GRIPTIGHT PLUGS MUST BE ASSEMBLED AS SHOWN.

- ***PRESSURE TESTING IS INHERENTLY DANGEROUS. STRICT ADHERENCE TO THESE OPERATION INSTRUCTIONS AND INDUSTRY SAFETY PRACTICES COULD PREVENT INJURY TO PERSONNEL***
- ***ALL PERSONNEL MUST BE CLEAR OF TEST PLUG WHEN PRESSURE TESTING***
- ***FOR SAFETY, AN INCOMPRESSIBLE LIQUID SUCH AS WATER SHOULD BE USED AS THE TEST MEDIUM. RESIDUAL AIR OR GAS IS TO BE EVACUATED FROM THE PIPE PRIOR TO TESTING. IN NON-VERTICAL APPLICATIONS THE OPTIONAL VENT, SHOWN ABOVE, WILL ALLOW FOR VENTING MOST AIR OR GAS.***
- ***PLUG SIZES AND OPERATING PRESSURES DO NOT APPLY TO COATED PIPE. CONTACT EST PRIOR TO USE OF GRIP TIGHT PLUG ON ANY TYPE OF COATED PIPE / TUBE.***

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1. PRIOR TO USE, replace damaged or worn grippers and seal(s). The surface between the cone and grippers must be free of friction producing dirt or corrosion. Verify proper operation of the test plug by hand tightening the hex nut so that the grippers move freely to the end of the tapered cone surface. Fully loosen the hex nut. Should the grippers not fully retract, apply a light lubricant to the tapered surface of the cone and wipe away any excess. Threads should be kept well lubricated with antiseize. Inspect threads and apply antiseize if necessary before testing. If the nut cannot be easily advanced to allow full gripper expansion, **DO NOT USE THIS PLUG FOR TESTING** and contact EST Customer Service for assistance.

2. **The pipe ID to be tested must be within the limits specified on the plug.** Schedule 5 wall thickness pipe, or tubes with a wall thickness thinner than equivalent schedule 10 pipe, must have an OD restraint. Contact EST Customer Service for information. Position the test plug in clean, lubricant free pipe end so that all of the gripper teeth are within the pipe.

3. Center the plug within the pipe while hand tightening the hex nut. Tighten hex nut until the test plug has gripped the pipe ID. Slight wiggling of the hand-tightened plug may allow further hand tightening of the hex nut.

4. Tighten the hex nut to the installation torque specified in Table 1. Use of a calibrated torque wrench is recommended.

WARNING! FAILURE TO APPLY THE INSTALLATION TORQUE SPECIFIED IN TABLE 1 COULD RESULT IN UNSAFE OPERATION OR LEAKAGE.

5. Install the pressure source or vent to the plug, leak tight. For plugs not being used to pressurize or vent the system, install a pipe cap or pipe plug that is rated at or above the GripTight test plug working pressure. Tighten so that it is leak tight.

6. Fill the pipe with test medium while evacuating any residual air or gas. Slowly introduce the test pressure. The test pressure must never exceed the strength of the weakest component within the system being tested.

7. As pressure increases, movement of the shaft as large as 0.10”(2.54mm) may be detected. This movement indicates additional squeeze of the seal and expansion of the grippers and is normal for this plug design. Should movement of the shaft or plug exceed 0.10”(2.54mm), release **ALL** pressure immediately, remove plug, examine, reinstall and begin testing in accordance with this operating procedure. Should movement of the shaft or plug during the test still exceed 0.10”(2.54mm), contact EST Customer Service for technical assistance.

8. Imperfections within the pipe being tested may cause small plug leaks as the test pressure is being increased. Should small leaks develop, additional tightening of the plug may be required. Prior to additional tightening remove pressurization from the system. Tighten the hex nut further and re-pressurize the system. If leakage continues, the imperfections within the pipe must be removed.

WARNING! NEVER STAND IN THE POSSIBLE PATH OF THE TEST PLUG

WARNING! NEVER EXCEED THE MAXIMUM TORQUE SPECIFIED IN TABLE 1 AS DAMAGE TO THE PLUG MAY OCCUR.

9. At the conclusion of the test, release **ALL** pressure, loosen the hex nut, remove and inspect plug. Worn or damaged plug components must be replaced before attempting further testing. Contact EST Customer Service for replacement part information.

10. Prior to storing, dry all parts of the plug and lubricate the shaft threads and hardened washers with antiseize. Store these instructions with the plug or replacement seals

SEAL REPLACEMENT

1. Remove jamnut and unthread bottom washer from shaft. Remove old seal(s) and replace with new seal. See chart on page (1) to cross reference standard and alternate seal applications.

2. Thread bottom washer onto shaft and firmly tighten jam nut against bottom washer.

QUESTIONS? Contact EST Customer Service at any of the following locations with questions.
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On the Internet: www.expansionseal.com

Expansion Seal Technologies is part of the EST Group of companies. **EST Group** provides a complete range of repair products, services and replacement parts covering the life cycle of tubular heat exchangers and condensers; additionally EST provides products and services to facilitate pressure testing pipe, piping systems, pressure vessels and their components. Visit EST Group on the internet at www.estgrp.com.

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TABLE 1. GripTight Installation Torque Specifications (Using alternate seal materials)

SALES PART NUMBER	PIPE SIZE (inches)	ID RANGE inches(mm)	NORMAL INSTALLATION TORQUE ft-lbs(kg-m)	MAXIMUM INSTALLATION TORQUE ft-lbs(kg-m)	MAXIMUM TEST PRESSURE[1] psi(bar)
GT1P80	1" sch 80	.93 - 1.00(23.6 - 25.4)	25 (3.4)	40 (5.5)	3000 (206.8)
GT1P40	1" sch 40	1.01 - 1.09(25.7 - 27.7)	25 (3.4)	40 (5.5)	3000 (206.8)
GT15PXXS	1-1/2" xxs	1.07 - 1.2(27.2 - 30.5)	25 (3.4)	40 (5.5)	3000 (206.8)
GT1P10	1" sch 10	1.07 - 1.2(27.2 - 30.5)	25 (3.4)	40 (5.5)	3000 (206.8)
GT125P160	1-1/4" sch 160	1.13 - 1.24(28.7 - 31.5)	25 (3.4)	50 (6.9)	2500 (172.4)
GT1P5	1" sch 5	1.13 - 1.24(28.7 - 31.5)	25 (3.4)	50 (6.9)	2500 (172.4)
GT125P80	1-1/4" sch 80	1.25 - 1.33(31.8 - 33.8)	25 (3.4)	50 (6.9)	2500 (172.4)
GT125P40	1-1/4" sch 40/std	1.31 - 1.43(33.3 - 36.3)	25 (3.4)	50 (6.9)	2500 (172.4)
GT15P160	1 1/2" sch 160	1.31 - 1.43(33.3 - 36.3)	25 (3.4)	50 (6.9)	2500 (172.4)
GT125P10	1 - 1/4" sch 10	1.41 - 1.49(35.8 - 37.8)	35 (4.8)	100 (13.8)	2000 (137.9)
GT125P5	1-1/4" sch 5	1.47 - 1.61(37.3 - 40.9)	35 (4.8)	100 (13.8)	2000 (137.9)
GT15P80	1-1/2" sch 80	1.47 - 1.61(37.3 - 40.9)	35 (4.8)	100 (13.8)	2000 (137.9)
GT2PXXS	2" xxs	1.47 - 1.61(37.3 - 40.9)	35 (4.8)	100 (13.8)	2000 (137.9)
GT15P40	1-1/2" sch 40/std	1.58 - 1.66(40.1 - 42.2)	35 (4.8)	100 (13.8)	2000 (137.9)
GT15P10	1-1/2" sch 10	1.66 - 1.77(42.2 - 45.0)	35 (4.8)	100 (13.8)	2000 (137.9)
GT2P160	2" sch 160	1.66 - 1.77(42.2 - 45.0)	35 (4.8)	100 (13.8)	2000 (137.9)
GT15P5	1-1/2" sch5	1.74 - 1.91(44.2 - 48.5)	35 (4.8)	100 (13.8)	2000 (137.9)
GT25PXXS	2-1/2" xxs	1.74 - 1.91(44.2 - 48.5)	35 (4.8)	100 (13.8)	2000 (137.9)
GT2P80	2" sch 80/xs	1.91 - 1.99(48.5 - 50.5)	35 (4.8)	100 (13.8)	2000 (137.9)
GT198T		1.98 - 2.06(50.3 - 52.3)	35 (4.8)	100 (13.8)	2000 (137.9)
GT2P40	2" sch 40/std	2.04 - 2.13(51.8 - 53.8)	35 (4.8)	100 (13.8)	2000 (137.9)
GT2P10	2" sch 10	2.10 - 2.22(53.3 - 56.4)	35 (4.8)	100 (13.8)	2000 (137.9)
GT25P160	2-1/2" sch 160	2.10 - 2.22(53.3 - 56.4)	35 (4.8)	100 (13.8)	2000 (137.9)
GT2P5	2" sch 5	2.22 - 2.30(56.4 - 58.4)	35 (4.8)	100 (13.8)	2000 (137.9)
GT25P80	2-1/2" sch 80/xs	2.27 - 2.45(57.7 - 62.2)	35 (4.8)	100 (13.8)	2000 (137.9)
GT3PXXS	3" xxs	2.27 - 2.45(57.7 - 62.2)	35 (4.8)	100 (13.8)	2000 (137.9)
GT25P40	2-1/2" sch 40/std	2.44 - 2.54(62.0 - 64.5)	50 (6.9)	150 (20.7)	2000 (137.9)
GT253T		2.53 - 2.63(64.3 - 66.8)	50 (6.9)	150 (20.7)	2000 (137.9)
GT25P10	2-1/2" sch 10	2.60 - 2.74(65.9 - 69.6)	50 (6.9)	150 (20.7)	2000 (137.9)
GT3P160	3" sch 160	2.60 - 2.74(65.9 - 69.6)	50 (6.9)	150 (20.7)	2000 (137.9)
GT25P5	2"-1/2" sch 5	2.68 - 2.78(68.1 - 70.6)	50 (6.9)	150 (20.7)	2000 (137.9)
GT35PXXS	3-1/2" xxs	2.70 - 2.89(68.6 - 73.4)	50 (6.9)	150 (20.7)	2000 (137.9)
GT3P80	3" sch 80/xs	2.87 - 2.98(72.9 - 75.7)	50 (6.9)	150 (20.7)	2000 (137.9)
GT296T		2.96 - 3.07(75.2 - 78.0)	50 (6.9)	150 (20.7)	2000 (137.9)
GT3P40	3" sch 40/std	3.04 - 3.14(77.2 - 79.8)	50 (6.9)	150 (20.7)	2000 (137.9)
GT4PXXS	4" xxs	3.12 - 3.32(79.2 - 84.3)	50 (6.9)	150 (20.7)	1750 (120.6)
GT3P10	3" sch 10	3.23 - 3.34(82.0 - 84.8)	50 (6.9)	150 (20.7)	1750 (120.6)
GT3P5	3" sch 5	3.30 - 3.41(83.8 - 86.6)	50 (6.9)	150 (20.7)	1750 (120.6)
GT35P80	3-1/2" sch 80/xs	3.33 - 3.44(84.6 - 87.4)	50 (6.9)	150 (20.7)	1750 (120.6)
GT4P160	4" sch 160	3.41 - 3.57(86.6 - 90.7)	50 (6.9)	150 (20.7)	1750 (120.6)
GT35P40	3-1/2" sch 40/std	3.52 - 3.63(89.4 - 92.2)	50 (6.9)	150 (20.7)	1750 (120.6)
GT4P120	4" sch 120	3.60 - 3.74(91.4 - 95.0)	50 (6.9)	150 (20.7)	1750 (120.6)
GT35P10	3-1/2" sch 10	3.73 - 3.84(94.7 - 97.5)	50 (6.9)	150 (20.7)	1750 (120.6)
GT35P5	3-1/2" sch 5	3.80 - 3.91(96.5 - 99.3)	50 (6.9)	150 (20.7)	1750 (120.6)
GT4P80	4" sch 80/xs	3.80 - 3.91(96.5 - 99.3)	50 (6.9)	150 (20.7)	1750 (120.6)
GT390T		3.90 - 4.01(99.1 - 101.9)	50 (6.9)	150 (20.7)	1750 (120.6)

Table continues on following page.

TABLE 1. GripTight Installation Torque Specifications Continued.
(Using alternate seal materials)

SALES PART NUMBER	PIPE SIZE (inches)	ID RANGE inches(mm)	NORMAL INSTALLATION TORQUE ft-lbs(kg-m)	MAXIMUM INSTALLATION TORQUE ft-lbs(kg-m)	MAXIMUM TEST PRESSURE[(1)] psi(bar)
GT4P40	4” sch 40/std	4.00 - 4.11(101.6 - 104.4)	50 (6.9)	150 (20.7)	1750 (120.6)
GT5PXXS	5” xxs	4.03 - 4.25(102.4 - 108.0)	50 (6.9)	150 (20.7)	1750 (120.6)
GT4P10	4” sch 10	4.23 - 4.34(107.4 - 110.2)	50 (6.9)	150 (20.7)	1750 (120.6)
GT4P5	4” sch 5	4.28 - 4.47(108.7 - 113.5)	200 (28)	380 (53)	1750 (120.6)
GT5P160	5” sch 160	4.28 - 4.47(108.7 - 113.5)	200 (28)	380 (53)	1750 (120.6)
GT442T		4.42 - 4.58(112.3 - 116.3)	200 (28)	380 (53)	1750 (120.6)
GT5P120	5” sch 120	4.53 - 4.69(115.1 - 119.1)	200 (28)	380 (53)	1250 (86.2)
GT466T		4.66 - 4.82(118.4 - 122.4)	200 (28)	380 (53)	1250 (86.2)
GT5P80	5” sch 80/xs	4.78 - 4.91(121.4 - 124.7)	200 (28)	380 (53)	1250 (86.2)
GT6PXXS	6” xxs	4.87 - 5.11(123.7 - 129.8)	200 (28)	380 (53)	1250 (86.2)
GT5P40	5” sch 40/std	5.02 - 5.14(127.5 - 130.6)	200 (28)	380 (53)	1250 (86.2)
GT514T		5.14 - 5.26(130.6 - 133.6)	200 (28)	380 (53)	1250 (86.2)
GT6P160	6” sch160	5.16 - 5.37(131.1 - 136.4)	200 (28)	380 (53)	1250 (86.2)
GT5P10	5” sch10	5.27 - 5.39(133.9 - 136.9)	200 (28)	380 (53)	1250 (86.2)
GT5P5	5” sch 5	5.32 - 5.44(135.1 - 138.2)	200 (28)	380 (53)	1250 (86.2)
GT534T		5.34 - 5.51(135.6 - 140.0)	200 (28)	380 (53)	1250 (86.2)
GT6P120	6” sch120	5.47 - 5.64(138.9 - 143.3)	200 (28)	380 (53)	1250 (86.2)
GT562T		5.62 - 5.76(142.7 - 146.3)	200 (28)	380 (53)	1250 (86.2)
GT6P80	6” sch 80/xs	5.73 - 5.87(145.5 - 149.1)	200 (28)	380 (53)	1250 (86.2)
GT588T		5.88 - 6.03(149.4 - 153.2)	200 (28)	380 (53)	1250 (86.2)
GT6P40	6” sch 40/std	6.04 - 6.17(153.4 - 156.7)	200 (28)	380 (53)	1250 (86.2)
GT618T		6.18 - 6.32(157.0 - 160.5)	200 (28)	380 (53)	1250 (86.2)
GT6P10	6” sch10	6.33 - 6.47(160.8 - 164.3)	200 (28)	380 (53)	1250 (86.2)
GT6P5	6” sch5	6.38 - 6.52(162.1 - 165.6)	200 (28)	380 (53)	1250 (86.2)
GT653T		6.53 - 6.67(165.9 - 169.4)	200 (28)	380 (53)	750 (51.7)
GT668T		6.68 - 6.82(169.7 - 173.2)	200 (28)	380 (53)	750 (51.7)

(1) NEVER use a test pressure greater than the weakest component in the system can safely handle. DO NOT use on coated pipe at any psi: Contact EST to determine use.

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High pressure pipe testing is safer than ever before, thanks to EST's GripTight™ High Pressure Test Plug. Unlike other plugs that can loosen and eject under high pressure - even becoming dangerous projectiles - the GripTight™ actually uses high pressure to seal more securely against the pipe's inner diameter. The result is safer installation, safer testing, and better sealing. Here's what EST's GripTight™ plugs have to offer:

Use to test open-end pipe and tube

Safe: Pressure on plug squeezes grippers tighter; plug can not be ejected under pressure when properly installed.

High Pressure Performance: Have been used for pipe burst tests in a manufacturing environment. Tests at higher pressure with greater safety, typically to 80% of yield.

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Retaining Spring: Ensures retraction of gripper segments. Superior to O-ring design.

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Super Stock: 1/2" to 12" in Sch 40 and 80 (DN25 to DN200) sizes are usually in stock for same or next day shipment.

Optional Seals: Viton®, Silicone, EPDM

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Use GripTight™ High Pressure Test Plug in these and other applications:

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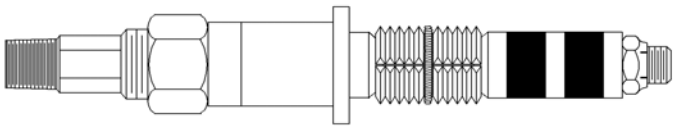
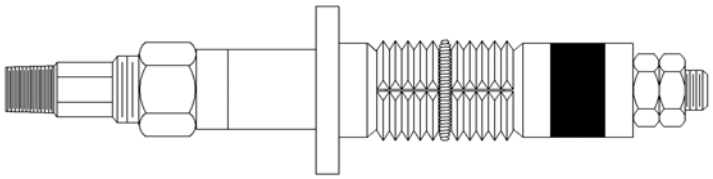
SPECIALISTS IN TUBE TESTING, SLEEVING AND PLUGGING TECHNOLOGY — AN ISO-9001 REGISTERED COMPANY

Technical Specifications: SQ2 Sizes 1/2” to 1”



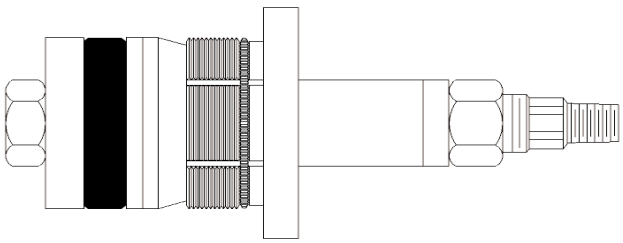
SQ2-0047 to SQ2-0060



SQ2-0062 to SQ2-0090

Part Nbr	I.D. Size Range	Max Test Pressure
SQ2-0047	.47-.50 in. (11.9-12.7 mm)	6500 psi (446 bar)
SQ2-0050	.50-.53 in. (12.7-13.5 mm)	6500 psi (446 bar)
SQ2-0053	.53-.56 in. (13.5-14.2 mm)	6500 psi (446 bar)
SQ2-0056	.56-.60 in. (14.2-15.2 mm)	6500 psi (446 bar)
SQ2-0060	.60-.62 in. (15.2-15.7 mm)	6500 psi (446 bar)
SQ2-0062	.62-.65 in. (15.7-16.5 mm)	6500 psi (446 bar)
SQ2-0065	.65-.68 in. (16.5-17.3 mm)	6500 psi (446 bar)
SQ2-0068	.68-.72 in. (17.3-18.3 mm)	6500 psi (446 bar)
SQ2-0072	.72-.75 in. (18.3-19.1 mm)	6500 psi (446 bar)
SQ2-0075	.75-.78 in. (19.1-19.8 mm)	6500 psi (446 bar)
SQ2-0078	.78-.81 in. (19.8-20.6 mm)	6500 psi (446 bar)
SQ2-0081	.81-.83 in. (20.6-21.1 mm)	6500 psi (446 bar)
SQ2-0083	.83-.87 in. (21.1-22.1 mm)	6500 psi (446 bar)
SQ2-0087	.87-.90 in. (22.1-22.9 mm)	6500 psi (446 bar)
SQ2-0090	.90-.93 in. (22.9-23.6 mm)	6500 psi (446 bar)

Technical Specifications: Standard Sizes 1” to 6”



Part Nbr	I.D. Size Range	Max. Test Pressure (1) (2)	Part Nbr	I.D. Size Range	Max. Test Pressure (1) (2)	Part Nbr	I.D. Size Range	Max. Test Pressure (1) (2)
GT-1P80	0.93-1.00 in. (23.6-25.4 mm)	8600 psi (590 bar)	GT-125P5	1.47-1.61 in. (37.3-40.9 mm)	2300 psi (160 bar)	GT-2P40	2.04-2.12 in. (51.8-54.1 mm)	3900 psi (270 bar)
GT-1P40	1.01-1.09 in. (25.7-27.7 mm)	6200 psi (430 bar)	GT-15P80	1.47-1.61 in. (37.3-40.9 mm)	6500 psi (450 bar)	GT-2P10	2.10-2.22 in. (53.3-56.4 mm)	2700 psi (190 bar)
GT-15PXXS	1.07-1.20 in. (27.2-30.5 mm)	13900 psi (960 bar)	GT-2PXXS	1.47-1.61 in. (37.3-40.9 mm)	12000 psi (830 bar)	GT-25P160	2.10-2.22 in. (53.3-56.4 mm)	8200 psi (570 bar)
GT-1P10	1.07-1.20 in. (27.2-30.5 mm)	5000 psi (350 bar)	GT-15P40	1.58-1.66 in. (40.1-42.2 mm)	4600 psi (320 bar)	GT-2P5	2.22-2.30 in. (56.4-58.4 mm)	1600 psi (110 bar)
GT-125P160	1.13-1.24 in. (28.7-31.5 mm)	9600 psi (660 bar)	GT-15P10	1.66-1.77 in. (42.2-45.0 mm)	3400 psi (240 bar)	GT-25P80	2.27-2.45 in. (57.6-62.2 mm)	5900 psi (410 bar)
GT-1P5	1.13-1.24 in. (28.7-31.5 mm)	2900 psi (200 bar)	GT-2P160	1.66-1.77 in. (42.2-45.0 mm)	9200 psi (640 bar)	GT-3PXXS	2.27-2.45 in. (57.6-62.2 mm)	11100 psi (770 bar)
GT-125P80	1.25.133- in. (31.8-33.8 mm)	7200 psi (500 bar)	GT-15P5	1.74-1.91 in. (44.2-48.5 mm)	2000 psi (140 bar)	GT-25P40	2.44-2.54 in. (62.0-64.5 mm)	4200 psi (290 bar)
GT-125P40	1.31-1.43 in. (33.3-36.3 mm)	5100 psi (350 bar)	GT-25PXXS	1.74-1.91 in. (44.2-48.5 mm)	12600 psi (870 bar)	GT-253T	2.53-2.63 in. (64.3-66.8 mm)	(1) (2) (1) (2)
GT-15P160	1.31-1.43 in. (33.3-36.3 mm)	9400 psi (650 bar)	GT-2P80	1.91-1.99 in. (48.5-50.5 mm)	5600 psi (390 bar)	GT-25P10	2.60-2.74 in. (66.0-69.6 mm)	2400 psi (170 bar)
GT-125P10	1.41-1.49 in. (35.8-37.8 mm)	3900 psi (270 bar)	GT-198T	1.98-2.06 in. (50.3-52.3 mm)	(1) (2) (1) (2)	GT-3P160	2.60-2.74 in. (66.0-69.6 mm)	7800 psi (540 bar)

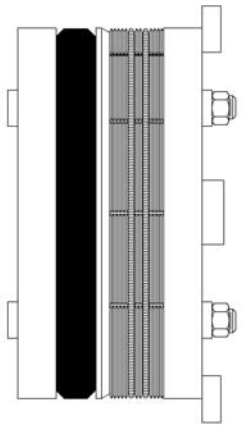
Part Nbr	I.D. Size Range	Max. Test Pressure (1) (2)
GT-25P5	2.68-2.78 in. (68.1-70.6 mm)	1600 psi (110 bar)
GT-35PXXS	2.70-2.89 in. (68.6-73.4 mm)	10200 psi (700 bar)
GT-3P80	2.87-2.98 in. (72.9-75.7 mm)	5200 psi (360 bar)
GT-296T	2.96-3.07 in. (75.2-78.0 mm)	(1) (2) (1) (2)
GT-3P40	3.04-3.14 in. (77.2-79.8 mm)	3700 psi (260 bar)
GT-4PXXS	3.12-3.32 in. (79.2-84.3 mm)	9500 psi (660 bar)
GT-3P10	3.23-3.34 in. (82.0-84.8 mm)	2000 psi (140 bar)
GT-3P5	3.30-3.41 in. (83.8-86.6 mm)	1400 psi (100 bar)
GT-35P80	3.33-3.44 in. (84.6-87.4 mm)	4800 psi (330 bar)
GT-4P160	3.41-3.57 in. (86.6-90.7 mm)	7400 psi (510 bar)
GT-35P40	3.52-3.63 in. (89.4-92.2 mm)	3300 psi (230 bar)
GT-4P120	3.60-3.74 in. (91.4-95.0 mm)	6000 psi (410 bar)
GT-35P10	3.73-3.84 in. (94.7-97.5 mm)	1700 psi (120 bar)
GT-35P5	3.80-3.91 in. (96.5-99.3 mm)	1400 psi (80 bar)
GT-4P80	3.80-3.91 in. (96.5-99.3 mm)	4500 psi (310 bar)
GT-390T	3.90-4.01 in. (99.1-101.9 mm)	(1) (2) (1) (2)
GT-4P40	4.00-4.11 in. (101.6-104.4 mm)	3100 psi (210 bar)
GT-5PXXS	4.03-4.25 in. (102.4-108.0 mm)	8500 psi (590 bar)
GT-4P10	4.23-4.34 in. (107.4-110.2 mm)	1500 psi (100 bar)
GT-4P5	4.28-4.47 in. (108.7-113.5 mm)	1100 psi (80 bar)
GT-5P160	4.28-4.47 in. (108.7-113.5 mm)	7000 psi (480 bar)
GT-442T	4.42-4.85 in. (112.3-116.3 mm)	(1) (2) (1) (2)
GT-5P120	4.53-4.69 in. (115.1-119.1 mm)	5500 psi (380 bar)
GT-466T	4.66-4.82 in. (118.4-122.4 mm)	(1) (2) (1) (2)
GT-5P80	4.78-4.91 in. (121.4-124.7 mm)	4000 psi (280 bar)
GT-6PXXS	4.87-5.11 in. (123.7-129.8 mm)	8200 psi (570 bar)
GT-5P40	5.02-5.14 in. (127.5-130.6 mm)	2700 psi (190 bar)
GT-514T	5.14-5.26 in. (130.6-133.6 mm)	(1) (2) (1) (2)
GT-6P160	5.16-5.37 in. (131.1-136.4 mm)	6700 psi (460 bar)
GT-5P10	5.27-5.39 in. (133.9-136.9 mm)	1400 psi (100 bar)
GT-5P5	5.32-5.44 in. (135.1-140.0 mm)	1100 psi (80 bar)
GT-534T	5.34-5.51 in. (135.6-140.0 mm)	(1) (2) (1) (2)
GT-6P120	5.47-5.64 in. (138.9-143.3 mm)	5100 psi (350 bar)
GT-562T	5.62-5.76 in. (142.7-146.3 mm)	(1) (2) (1) (2)
GT-6P80	5.73-5.87 in. (145.5-149.1 mm)	3900 psi (270 bar)
GT-588T	5.88-6.03 in. (149.4-153.2 mm)	(1) (2) (1) (2)
GT-6P40	6.04-6.17 in. (153.4-156.7 mm)	2500 psi (170 bar)
GT-618T	6.18-6.32 in. (157.0-160.5 mm)	(1) (2) (1) (2)
GT-6P10	6.33-6.47 in. (160.8-164.3 mm)	1200 psi (80 bar)
GT-6P5	6.38-6.52 in. (162.1-165.6 mm)	940 psi (70 bar)
GT-653T	6.53-6.67 in. (165.9-169.4 mm)	(1) (2) (1) (2)
GT-668T	6.68-6.82 in. (169.7-173.2 mm)	(1) (2) (1) (2)

Technical Specifications: 8" and Larger

Part Nbr	I.D. Size Range	Max. Test Pressure (1) (2)
GT-8P160	6.78-7.04 in. (172.2-178.8 mm)	6400 psi (440 bar)
GT-8PXXS	6.85-7.09 in. (174.0-180.1 mm)	6200 psi (430 bar)
GT-8P140	6.97-7.20 in. (177.0-182.9 mm)	5700 psi (390 bar)
GT-8P120	7.16-7.37 in. (181.9-187.2 mm)	5100 psi (350 bar)
GT-730T	7.30-7.48 in. (185.4-190.0 mm)	(1) (2) (1) (2)
GT-8P100	7.41-7.59 in. (188.2-192.8 mm)	4100 psi (280 bar)
GT-8P80	7.60-7.75 in. (193.0-196.9 mm)	3400 psi (240 bar)
GT-769T	7.69-7.84 in. (195.3-199.1 mm)	(1) (2) (1) (2)
GT-8P60	7.78-7.93 in. (197.6-201.4 mm)	2800 psi (190 bar)
GT-787T	7.87-8.02 in. (199.9-203.7 mm)	(1) (2) (1) (2)
GT-8P40	7.95-8.10 in. (201.9-205.7 mm)	2200 psi (150 bar)
GT-8P30	8.04-8.19 in. (204.2-208.0 mm)	1900 psi (130 bar)
GT-8P20	8.10-8.25 in. (205.7-209.6 mm)	1700 psi (120 bar)
GT-820T	8.20-8.35 in. (208.3-212.2 mm)	(1) (2) (1) (2)
GT-8P10	8.30-8.45 in. (210.8-214.6 mm)	980 psi (70 bar)
GT-8P5	8.38-8.53 in. (212.9-216.7 mm)	720 psi (50 bar)

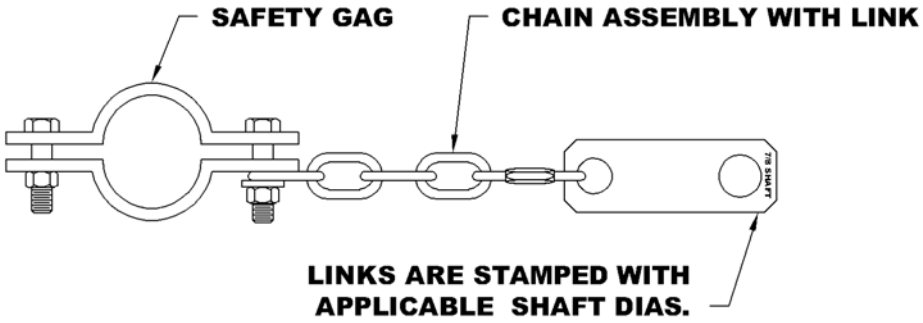
Consult factory for additional information

Sizes to 42" available; consult factory for prices & ratings.



Notes:
(1) NEVER use a test pressure greater than the weakest component in the system can handle. Test Pressure specified in table is equivalent to 80% of the pressure that will yield ASTM A106 Grade B pipe. The test pressure for higher and lower strength pipes will differ proportionally. The maximum Test Pressure for Higher Strength Pipe must never exceed the highest test pressure listed for that pipe O.D.
(2) Sizes that do not have a test pressure listed differ from standard pipe sizes. These plug sizes are normally used to test tubing. For use of these GripTight™ sizes in tubing with a minimum yield strength of 35ksi, the maximum test pressure is estimated by the test pressure listed for the equivalent or next larger pipe O.D. with the equivalent or next thinner wall thickness. The test pressure for higher and lower strength tubes will differ proportionally. The maximum test pressure for higher strength tubes must never exceed the highest test pressure listed for the equivalent or next larger pipe size. NEVER use a test pressure greater than the weakest component in the system can safely handle.
(3) Specifications subject to change without notice.

INSTALLATION INSTRUCTIONS FOR SAFETY GAGS & PIPE RESTRAINTS



SAFETY GAG INSTALLATION PROCEDURE:

REFER TO APPROPRIATE OPERATING PROCEDURES FOR THE TEST PLUG BEING UTILIZED, SEE TABLE 1 BELOW.

1. Install Safety Gag pipe clamp onto pipe being tested.
2. Tighten bolts to insure slippage will not occur.
3. Insert test plug into tube/pipe. Follow appropriate operating procedures for the plugs being utilized, and install plugs per recommended torque values using a calibrated torque wrench.
4. Prior to pressurizing the system, slip the link over the shaft end. 8” and larger are equipped with two chain and Link assemblies. The Links are stamped with the shaft sizes they can accommodate. Each link can do at least (2) sizes of shafts. Insure you have the appropriate Link set-up. Unscrew the chain connector and switch the Link around if necessary.
5. Continue with appropriate operating procedures.

Table 1. Operating Procedures for Various Plug Types

PLUG TYPE	OPERATING PROCEDURES
SQUATLINE II	DC2509
GRIPTIGHT TEST PLUGS	DC2510
GRIPTIGHT TEST PLUGS 10" AND LARGER	DC2520

QUESTIONS? Contact EST Customer Service at any of the following locations with questions.
In USA and Canada: tel: 800-355-7044, fax: 215-721-1101, e-mail: info@expansionseal.com
In Europe: tel: +31-172-418841, fax: +31-172-418849; e-mail: info@estgrp.nl
In Asia: tel: +65-6745-8560, fax: +65-6742-8700, e-mail: estasia@singnet.com.sg
On the Internet: www.expansionseal.com

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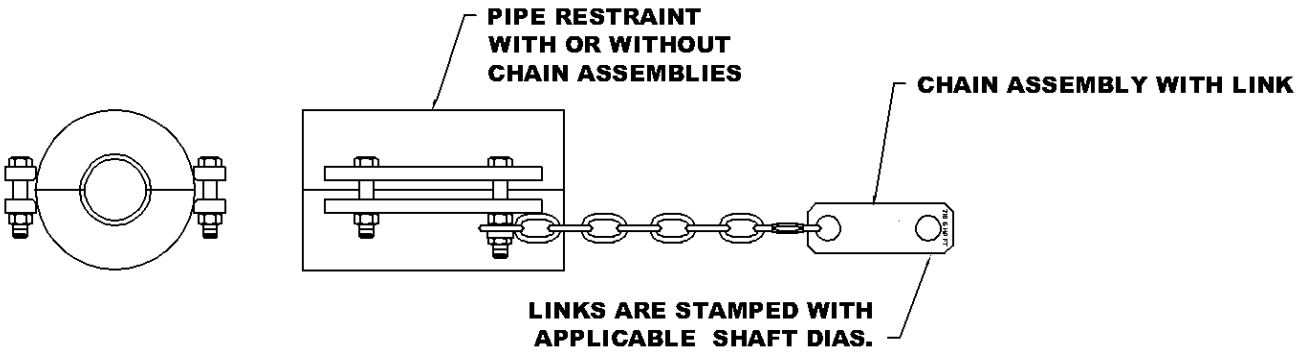

PIPE RESTRAINT INSTALLATION PROCEDURE:

REFER TO APPROPRIATE OPERATING PROCEDURES FOR THE TEST PLUG BEING UTILIZED, SEE TABLE 1.

1. Install Pipe restraint onto pipe being tested The Pipe restraint should be installed over the seal and gripper area of the plug to prevent pipe/tube expansion. Measure the distance on your plug and transfer to the outside of the pipe to insure correct placement.

2. Tighten bolts if present, to insure slippage will not occur.

3. Insert test plug into tube/pipe. Follow appropriate operating procedures for the plugs being utilized, and install plugs per recommended torque values using a calibrated torque wrench.

4. Prior to pressurizing the system, if chain and link assemblies are present, slip the link over the shaft end. 8” and larger are equipped with two chain and Link assemblies. The Links are stamped with the shaft sizes they can accommodate. Each link can do at least (2) sizes of shafts. Insure you have the appropriate Link set-up. Unscrew the chain connector and switch the Link around if necessary.

5. Continue with appropriate operating procedures.

Note: Slip on collar type pipe restraints do not have bolts or chain assemblies. After step 1, proceed to step 5.

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In Europe: tel: +31-30-600-6180, fax: +31-30-600-6188; e-mail: info@estgrp.nl
In Asia: tel: +65-6745-8560, fax: +65-6742-8700, e-mail: estasia@singnet.com.sg
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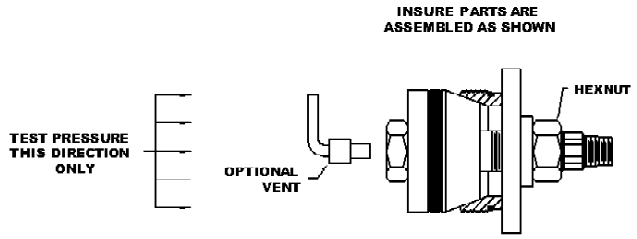
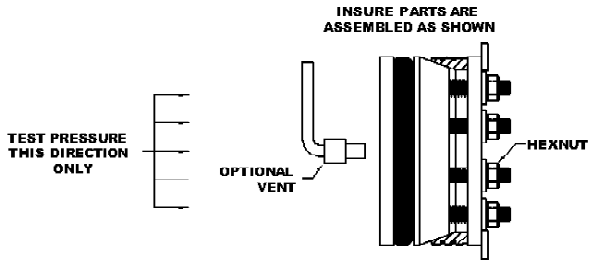
OPERATING PROCEDURES FOR GRIPTIGHT™ HIGH PRESSURE TEST PLUGS



1" THROUGH 6" GRIPTIGHTS



8" GRIPTIGHTS

WARNING! FOR PROPER OPERATION, GRIPTIGHT PLUGS MUST BE ASSEMBLED AS SHOWN.

- ***PRESSURE TESTING IS INHERENTLY DANGEROUS. STRICT ADHERENCE TO THESE OPERATION INSTRUCTIONS AND INDUSTRY SAFETY PRACTICES COULD PREVENT INJURY TO PERSONNEL***
- ***ALL PERSONNEL MUST BE CLEAR OF TEST PLUG WHEN PRESSURE TESTING***
- ***FOR SAFETY, AN INCOMPRESSIBLE LIQUID SUCH AS WATER SHOULD BE USED AS THE TEST MEDIUM. RESIDUAL AIR OR GAS IS TO BE EVACUATED FROM THE PIPE PRIOR TO TESTING. IN NON-VERTICAL APPLICATIONS THE OPTIONAL VENT, SHOWN ABOVE, WILL ALLOW FOR VENTING MOST AIR OR GAS. VENT IS AVAILABLE FOR MOST GRIPTIGHTS.***
- ***GRIPTIGHT TEST PLUGS ARE DESIGNED TO WITHSTAND PRESSURE IN THE DIRECTION SHOWN IN THE ABOVE DRAWINGS. DO NOT USE THESE PLUGS FOR REVERSE PRESSURE APPLICATIONS.***
- ***PLUG SIZES AND OPERATING PRESSURES DO NOT APPLY TO COATED PIPE. CONTACT EST PRIOR TO USE OF GRIP TIGHT PLUG ON ANY TYPE OF COATED PIPE / TUBE.***

1. PRIOR TO USE, replace damaged or worn grippers and seal. The surface between the cone and grippers must be free of friction producing dirt or corrosion. Verify proper operation of the test plug by hand tightening (plugs with multiple shafts will require use of a wrench) the hex nut(s) so that the grippers move freely to the end of the tapered cone surface. Fully loosen the hex nut(s). Should the grippers not fully retract, apply a light lubricant to the tapered surface of the cone and wipe away any excess. Threads should be kept well lubricated with antiseize. Inspect threads and apply antiseize if necessary before testing. If the nut cannot be easily advanced to allow full gripper expansion, **DO NOT USE THIS PLUG FOR TESTING** and contact EST Customer Service for assistance.

2. **The pipe ID to be tested must be within the limits specified on the plug.** Schedule 5 wall thickness pipe, or tubes with a wall thickness thinner than equivalent schedule 10 pipe, must have an OD restraint. Contact EST Customer Service for information. Position the test plug in clean, lubricant free pipe end so that all of the gripper is within the pipe.

3. Center the plug within the pipe while hand tightening the hex nut(s). On multi-shaft plugs used horizontally, tightening the bottom hex nuts first will aid in centering the plug. Tighten hex nut(s) until the test plug has gripped the pipe ID. The hex nuts on plugs with multiple shafts must be tightened in star pattern. Slight wiggling of the hand tightened plug may allow further hand tightening of the hex nuts.

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4. Tighten the hex nut(s) to the installation torque specified in Table 1. Use of a calibrated torque wrench is recommended.

WARNING! FAILURE TO APPLY THE INSTALLATION TORQUE SPECIFIED IN TABLE 1 COULD RESULT IN UNSAFE OPERATION OR LEAKAGE.

5. Install the pressure source or vent to the plug, leak tight. For plugs not being used to pressurize or vent the system, install a pipe cap or pipe plug that is rated at or above the GripTight test plug working pressure. Tighten so that it is leak tight.

6. Fill the pipe with test medium while evacuating any residual air or gas. Slowly introduce the test pressure. The test pressure must never exceed the strength of the weakest component within the system being tested. Maximum test pressure based on ASTM A106 Grade B pipe is shown in Table 1.

7. As pressure increases, movement of the shaft as large as 0.10”(2.54mm) may be detected. This movement indicates additional squeeze of the seal and expansion of the grippers and is normal for this plug design. Should movement of the shaft or plug exceed 0.10”(2.54mm), release **ALL** pressure immediately, remove plug, examine, reinstall and begin testing in accordance with this operating procedure. Should movement of the shaft or plug during the test still exceed 0.10”(2.54), contact EST Customer Service for technical assistance.

8. Imperfections within the pipe being tested may cause small plug leaks as the test pressure is being increased. Should small leaks develop, additional tightening of the plug may be required. Prior to additional tightening remove pressurization from the system. Tighten the hex nut(s) further and re-pressurize the system. If leakage continues, the imperfections within the pipe must be removed.

WARNING! NEVER STAND IN THE POSSIBLE PATH OF THE TEST PLUG

WARNING! NEVER EXCEED THE MAXIMUM TORQUE SPECIFIED IN TABLE 1 AS DAMAGE TO THE PLUG MAY OCCUR.

9. At the conclusion of the test, release **ALL** pressure, loosen the hex nut(s), remove and inspect plug. Worn or damaged plug components must be replaced before attempting further testing. Contact EST Customer Service for replacement part information.

10. Prior to storing, dry all parts of the plug and lubricate the shaft threads and hardened steel washers with antiseize.

11. Store these instructions with the plug.

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In Europe: tel: +31-172-418841, fax: +31-172-418849; e-mail: info@estgrp.nl
In Asia: tel: +65-6745-8560, fax: +65-6742-8700, e-mail: estasia@singnet.com.sg
On the Internet: www.expansionseal.com

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TABLE 1. GripTight Installation Torque Specifications

SALES PART NUMBER	PIPE SIZE (inches)	ID RANGE inches(mm)	NORMAL INSTALLATION TORQUE ft-lbs(N-m)	MAXIMUM INSTALLATION TORQUE ft-lbs(N-m)	MAXIMUM TEST PRESSURE[1] psi(bar)
GT1P80	1" sch 80	.93 - 1.00(23.6 - 25.4)	50 (67.8)	60 (81.3)	8600 (590)
GT1P40	1" sch 40	1.01 - 1.09(25.7 - 27.7)	50 (67.8)	60 (81.3)	6200 (430)
GT15PXXS	1-1/2" xxs	1.07 - 1.2(27.2 - 30.5)	50 (67.8)	60 (81.3)	13900 (960)
GT1P10	1" sch 10	1.07 - 1.2(27.2 - 30.5)	50 (67.8)	60 (81.3)	5000 (350)
GT125P160	1-1/4" sch 160	1.13 - 1.24(28.7 - 31.5)	50 (67.8)	75 (101.7)	9600 (660)
GT1P5	1" sch 5	1.13 - 1.24(28.7 - 31.5)	50 (67.8)	75 (101.7)	2900 (200)
GT125P80	1-1/4" sch 80	1.25 - 1.33(31.8 - 33.8)	50 (67.8)	75 (101.7)	7200 (500)
GT125P40	1-1/4" sch 40/std	1.31 - 1.43(33.3 - 36.3)	50 (67.8)	75 (101.7)	5100 (350)
GT15P160	1 1/2" sch 160	1.31 - 1.43(33.3 - 36.3)	50 (67.8)	75 (101.7)	9400 (650)
GT125P10	1 - 1/4" sch 10	1.41 - 1.49(35.8 - 37.8)	75 (101.7)	150 (204.4)	3900 (270)
GT125P5	1-1/4" sch 5	1.47 - 1.61(37.3 - 40.9)	75 (101.7)	150 (204.4)	2300 (160)
GT15P80	1-1/2" sch 80	1.47 - 1.61(37.3 - 40.9)	75 (101.7)	150 (204.4)	6500 (450)
GT2PXXS	2" xxs	1.47 - 1.61(37.3 - 40.9)	75 (101.7)	150 (204.4)	12000 (830)
GT15P40	1-1/2" sch 40/std	1.58 - 1.66(40.1 - 42.2)	75 (101.7)	150 (204.4)	4600 (320)
GT15P10	1-1/2" sch 10	1.66 - 1.77(42.2 - 45.0)	75 (101.7)	150 (204.4)	3400 (240)
GT2P160	2" sch 160	1.66 - 1.77(42.2 - 45.0)	75 (101.7)	150 (204.4)	9200 (640)
GT15P5	1-1/2" sch5	1.74 - 1.91(44.2 - 48.5)	75 (101.7)	150 (204.4)	2000 (140)
GT25PXXS	2-1/2" xxs	1.74 - 1.91(44.2 - 48.5)	75 (101.7)	150 (204.4)	12600 (870)
GT2P80	2" sch 80/xs	1.91 - 1.99(48.5 - 50.5)	75 (101.7)	150 (204.4)	5600 (390)
GT198T		1.98 - 2.06(50.3 - 52.3)	75 (101.7)	150 (204.4)	see note 2
GT2P40	2" sch 40/std	2.04 - 2.13(51.8 - 53.8)	75 (101.7)	150 (204.4)	3900 (270)
GT2P10	2" sch 10	2.10 - 2.22(53.3 - 56.4)	75 (101.7)	150 (204.4)	2700 (190)
GT25P160	2-1/2" sch 160	2.10 - 2.22(53.3 - 56.4)	75 (101.7)	150 (204.4)	8200 (570)
GT2P5	2" sch 5	2.22 - 2.30(56.4 - 58.4)	75 (101.7)	150 (204.4)	1600 (110)
GT25P80	2-1/2" sch 80/xs	2.27 - 2.45(57.7 - 62.2)	75 (101.7)	150 (204.4)	5900 (410)
GT3PXXS	3" xxs	2.27 - 2.45(57.7 - 62.2)	75 (101.7)	150 (204.4)	11100 (770)
GT25P40	2-1/2" sch 40/std	2.44 - 2.54(62.0 - 64.5)	150 (204.4)	300 (406.7)	4200 (290)
GT253T		2.53 - 2.63(64.3 - 66.8)	150 (204.4)	300 (406.7)	see note 2
GT25P10	2-1/2" sch 10	2.60 - 2.74(65.9 - 69.6)	150 (204.4)	300 (406.7)	2400 (170)
GT3P160	3" sch 160	2.60 - 2.74(65.9 - 69.6)	150 (204.4)	300 (406.7)	7800 (540)
GT25P5	2"-1/2" sch 5	2.68 - 2.78(68.1 - 70.6)	150 (204.4)	300 (406.7)	1600 (110)
GT35PXXS	3-1/2" xxs	2.70 - 2.89(68.6 - 73.4)	150 (204.4)	300 (406.7)	10200 (700)
GT3P80	3" sch 80/xs	2.87 - 2.98(72.9 - 75.7)	150 (204.4)	300 (406.7)	5200 (360)
GT296T		2.96 - 3.07(75.2 - 78.0)	150 (204.4)	300 (406.7)	see note 2
GT3P40	3" sch 40/std	3.04 - 3.14(77.2 - 79.8)	150 (204.4)	300 (406.7)	3700 (260)
GT4PXXS	4" xxs	3.12 - 3.32(79.2 - 84.3)	150 (204.4)	300 (406.7)	9500 (660)
GT3P10	3" sch 10	3.23 - 3.34(82.0 - 84.8)	150 (204.4)	300 (406.7)	2000 (140)
GT3P5	3" sch 5	3.30 - 3.41(83.8 - 86.6)	150 (204.4)	300 (406.7)	1400 (100)
GT35P80	3-1/2" sch 80/xs	3.33 - 3.44(84.6 - 87.4)	150 (204.4)	300 (406.7)	4800 (330)
GT4P160	4" sch 160	3.41 - 3.57(86.6 - 90.7)	150 (204.4)	300 (406.7)	7400 (510)
GT35P40	3-1/2" sch 40/std	3.52 - 3.63(89.4 - 92.2)	150 (204.4)	300 (406.7)	3300 (230)
GT4P120	4" sch 120	3.60 - 3.74(91.4 - 95.0)	150 (204.4)	300 (406.7)	6000 (410)
GT35P10	3-1/2" sch 10	3.73 - 3.84(94.7 - 97.5)	150 (204.4)	300 (406.7)	1700 (120)
GT35P5	3-1/2" sch 5	3.80 - 3.91(96.5 - 99.3)	150 (204.4)	300 (406.7)	1200 (80)
GT4P80	4" sch 80/xs	3.80 - 3.91(96.5 - 99.3)	150 (204.4)	300 (406.7)	4500 (310)
GT390T		3.90 - 4.01(99.1 - 101.9)	150 (204.4)	300 (406.7)	see note 2

Table continues on following page.

TABLE 1. GripTight Installation Torque Specifications, Continued.

SALES PART NUMBER	PIPE SIZE (inches)	ID RANGE inches(mm)	NORMAL INSTALLATION TORQUE ft-lbs(N-m)	MAXIMUM INSTALLATION TORQUE ft-lbs(N-m)	MAXIMUM TEST PRESSURE[1] psi(bar)
GT4P40	4" sch 40/std	4.00 - 4.11(101.6 - 104.4)	150 (204.4)	300 (406.7)	3100(210)
GT5PXXS	5" xxs	4.03 - 4.25(102.4 - 108.0)	150 (204.4)	300 (406.7)	8500 (590)
GT4P10	4" sch 10	4.23 - 4.34(107.4 - 110.2)	150 (204.4)	300 (406.7)	1500 (100)
GT4P5	4" sch 5	4.28 - 4.47(108.7 - 113.5)	200 (271.2)	380 (515.2)	1100 (80)
GT5P160	5" sch 160	4.28 - 4.47(108.7 - 113.5)	200 (271.2)	380 (515.2)	7000 (480)
GT442T		4.42 - 4.58(112.3 - 116.3)	200 (271.2)	380 (515.2)	see note 2
GT5P120	5" sch 120	4.53 - 4.69(115.1 - 119.1)	200 (271.2)	380 (515.2)	5500 (380)
GT466T		4.66 - 4.82(118.4 - 122.4)	200 (271.2)	380 (515.2)	see note 2
GT5P80	5" sch 80/xs	4.78 - 4.91(121.4 - 124.7)	200 (271.2)	380 (515.2)	4000 (280)
GT6PXXS	6" xxs	4.87 - 5.11(123.7 - 129.8)	200 (271.2)	380 (515.2)	8200 (570)
GT5P40	5" sch 40/std	5.02 - 5.14(127.5 - 130.6)	200 (271.2)	380 (515.2)	2700 (190)
GT514T		5.14 - 5.26(130.6 - 133.6)	200 (271.2)	380 (515.2)	see note 2
GT6P160	6" sch160	5.16 - 5.37(131.1 - 136.4)	200 (271.2)	380 (515.2)	6700 (460)
GT5P10	5" sch10	5.27 - 5.39(133.9 - 136.9)	200 (271.2)	380 (515.2)	1400 (100)
GT5P5	5" sch 5	5.32 - 5.44(135.1 - 138.2)	200 (271.2)	380 (515.2)	1100 (80)
GT534T		5.34 - 5.51(135.6 - 140.0)	200 (271.2)	380 (515.2)	see note 2
GT6P120	6" sch120	5.47 - 5.64(138.9 - 143.3)	200 (271.2)	380 (515.2)	5100 (350)
GT562T		5.62 - 5.76(142.7 - 146.3)	200 (271.2)	380 (515.2)	see note 2
GT6P80	6" sch 80/xs	5.73 - 5.87(145.5 - 149.1)	200 (271.2)	380 (515.2)	3900 (270)
GT588T		5.88 - 6.03(149.4 - 153.2)	200 (271.2)	380 (515.2)	see note 2
GT6P40	6" sch 40/std	6.04 - 6.17(153.4 - 156.7)	200 (271.2)	380 (515.2)	2500 (170)
GT618T		6.18 - 6.32(157.0 - 160.5)	200 (271.2)	380 (515.2)	see note 2
GT6P10	6" sch10	6.33 - 6.47(160.8 - 164.3)	200 (271.2)	380 (515.2)	1200 (80)
GT6P5	6" sch5	6.38 - 6.52(162.1 - 165.6)	200 (271.2)	380 (515.2)	940 (70)
GT653T		6.53 - 6.67(165.9 - 169.4)	200 (271.2)	380 (515.2)	see note 2
GT668T		6.68 - 6.82(169.7 - 173.2)	200 (271.2)	380 (515.2)	see note 2
GT8P160	8" sch160	6.78 - 7.04(172.2 - 178.8)	85 (115.2)	130 (176.3)	6400 (440)
GT8PXXS	8" xxs	6.85 - 7.09(174.0 - 180.1)	85 (115.2)	130 (176.3)	6200 (430)
GT8P140	8" sch 140	6.97 - 7.20(177.0 - 182.9)	85 (115.2)	130 (176.3)	5700 (390)
GT8P120	8" sch 120	7.16 - 7.37(181.9 - 187.2)	85 (115.2)	130 (176.3)	5100 (350)
GT730T		7.30 - 7.48(185.4 - 190.0)	85 (115.2)	130 (176.3)	see note 2
GT8P100	8" sch 100	7.41 - 7.59(188.2 - 192.8)	85 (115.2)	130 (176.3)	4100 (280)
GT8P80	8" sch 80/xs	7.60 - 7.75(193.0 - 196.9)	85 (115.2)	130 (176.3)	3400 (240)
GT769T		7.69 - 7.84(195.3 - 199.1)	85 (115.2)	130 (176.3)	see note 2
GT8P60	8" sch 60	7.78 - 7.93(197.6 - 201.4)	85 (115.2)	130 (176.3)	2800 (190)
GT787T		7.87 - 8.02(199.9 - 203.7)	85 (115.2)	130 (176.3)	see note 2
GT8P40	8" sch 40/std	7.95 - 8.10(201.9 - 205.7)	85 (115.2)	130 (176.3)	2200 (150)
GT8P30	8" sch 30	8.04 - 8.19(204.2 - 208.0)	85 (115.2)	130 (176.3)	1900 (130)
GT8P20	8" sch 20	8.10 - 8.25(205.7 - 209.6)	85 (115.2)	130 (176.3)	1700 (120)
GT820T		8.20 - 8.35(208.3 - 212.1)	85 (115.2)	130 (176.3)	see note 2
GT8P10	8" sch 10	8.30 - 8.45(210.8 - 214.6)	85 (115.2)	130 (176.3)	980 (70)
GT8P5	8" sch 5	8.38 - 8.53(212.9 - 216.7)	85 (115.2)	130 (176.3)	720 (50)

(1) NEVER use a test pressure greater than the weakest component in the system can safely handle. Test pressure specified in table is equivalent to 80% of pressure that will yield ASTM A106 Grade B pipe. The test pressure for higher and lower strength pipes will differ proportionally. The maximum test pressure for higher strength pipe must never exceed the highest test pressure listed for that pipe OD DO NOT use on coated pipe at any psi : Contact EST to determine use.
(2) Sizes which do not have a test pressure listed differ from standard pipe sizes. These plug sizes are normally used to test tubing. For use of these GripTight sizes in tubing with a minimum yield strength of 35ksi(240 MPa), the maximum test pressure is estimated by the test pressure listed for the equivalent or next larger pipe OD with the equivalent or next thinner wall thickness. The test pressure for higher and lower strength tubes will differ proportionally. The maximum test pressure for higher strength tubes must never exceed the highest test pressure listed for the equivalent or next larger pipe OD . NEVER use a test pressure greater than the weakest component in the system can safely handle.

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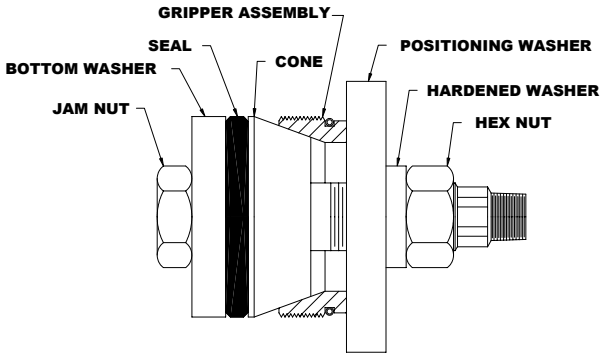
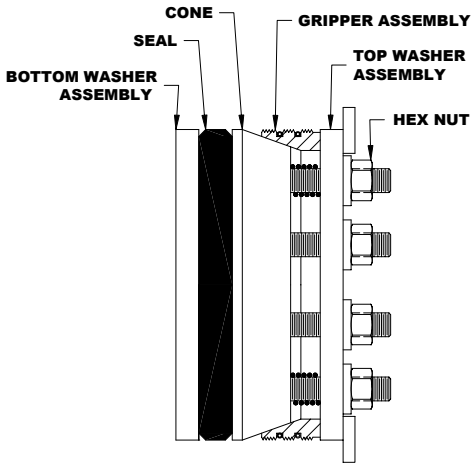
GRIPTIGHT™ SEAL AND GRIPPER REPLACEMENT PROCEDURES



SINGLE SHAFT PLUG
6" PIPE AND SMALLER
INSURE PARTS ARE ASSEMBLED AS SHOWN



MULTIPLE SHAFT PLUG
8" PIPE ONLY
INSURE PARTS ARE ASSEMBLED AS SHOWN

WARNING!
FOR PROPER OPERATION, GRIPTIGHT PLUGS MUST BE ASSEMBLED AS SHOWN. FAILURE TO PROPERLY REASSEMBLE GRIPTIGHT HIGH PRESSURE TEST PLUGS AS SHOWN MAY RESULT IN UNSAFE OPERATION OR PLUG FAILURE. TAPERED CONE AND GRIPPER SURFACES MUST BE CONFIGURED AS SHOWN WITH THICKER END OF GRIPPER SEATED AGAINST POSITIONING WASHER.

SEAL REPLACEMENT, SINGLE SHAFT PLUGS

1. Remove jam nut and unthread bottom washer from shaft. Remove old seal(s) and replace with new seal(s). Sizes 4" sch 5 to 6.82" use (2) ½" thick seals. For these sizes install the harder, red colored seal, marked 80, with chamfered OD towards cone. Next install the softer, black colored seal, marked 70, so that the unchamfered side is against harder red seal. Thread bottom washer onto shaft and firmly tighten jam nut against bottom washer.

GRIPPER REPLACEMENT, SINGLE SHAFT PLUGS

NOTE: To prevent removal of the hex nut, threads on the shaft have been deformed. The hex nut cannot be removed without stripping the nut.

1. Fully back-off hex nut by hand. Remove gripper segments by prying them out of the spring. Remove spring. If additional slack in the shaft is needed for gripper removal or re-assembly, the jam nut, bottom washer and seal can be removed.

2. Install new spring over the plug so it is positioned around the tapered surface of the cone. Position gripper segments, one at a time on the cone surface and slide the spring into the groove on grippers. Repeat for each gripper segment. A screwdriver or similar tool may aid in the installation of the grippers and spring.

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WARNING! DO NOT MAR OR SCRATCH THE TAPERED CONE OR TAPERED GRIPPER SURFACE.

3. If removed, reinstall seal, bottom washer and jam nut. Hand tighten the hex nut to remove all slack from the plug assembly.

SEAL AND GRIPPER REPLACEMENT, MULTIPLE SHAFT PLUGS

1. Remove hex nuts, and positioning washer.

2. Carefully remove gripper assembly, cone and seal. If care is taken the gripper assembly can be handled in its assembled configuration.

3. Install new seal and cone so that the large end of the cone is against the seal.

4. If gripper assembly has collapsed or if new a new gripper assembly is being installed it may be reassembled by placing the thick end of each gripper segment on a flat surface. Form a circle with all but (2) gripper segments, Install the garter spring around the gripper segments and into the groove on each gripper. Holding (2) adjacent segments stretch the spring and install an additional gripper section. Repeat for the remaining section. Carefully handle gripper assembly and install onto the plug so that tapered gripper surface mates with tapered cone surface.

5. Install positioning washer. Lubricate shafts with antisieze, if necessary. Install hex nuts.

STORAGE

1. Clean and dry plugs prior to storage. All worn or damaged parts should be replaced prior to further testing.

QUESTIONS? Contact EST Customer Service at any of the following locations with questions.
In USA and Canada: tel: 800-355-7044, fax: 215-721-1101, e-mail: info@expansionseal.com
In Europe: tel: +31-172-418841, fax: +31-172-418849; e-mail: info@estgrp.nl
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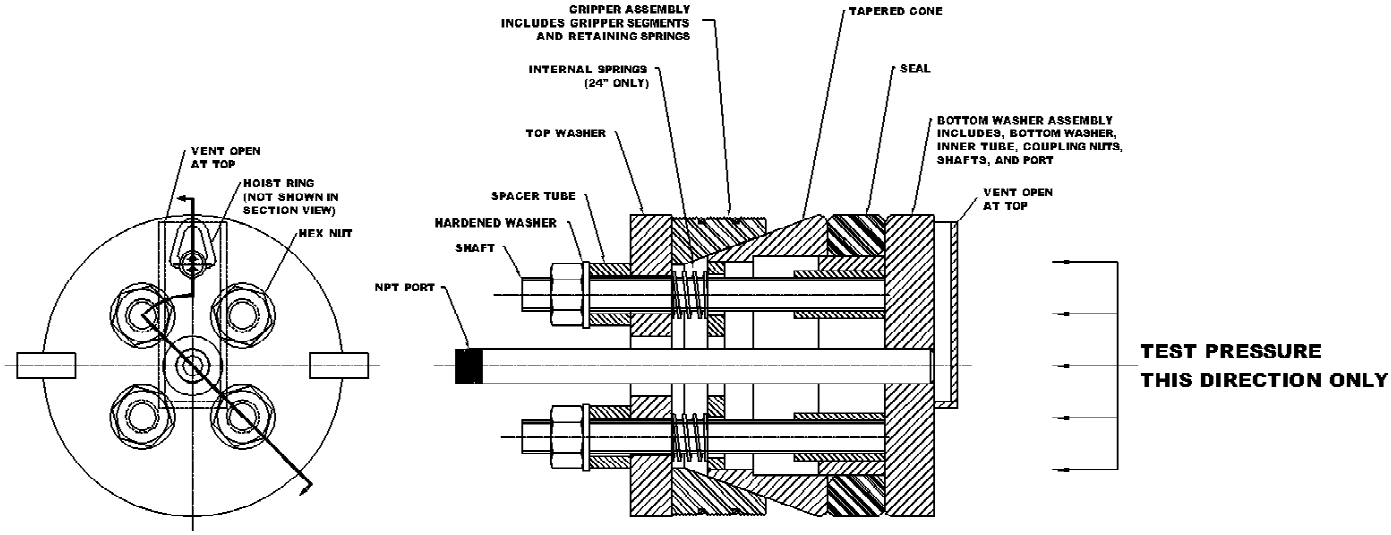
OPERATING PROCEDURES FOR 10”- 24” GRIPTIGHT™ HIGH PRESSURE TEST PLUGS

(FOR SMALLER GRIPTIGHT PLUG SIZES REFER TO DC2510)



WARNING! FOR PROPER OPERATION, GRIPTIGHT™ PLUGS MUST BE ASSEMBLED AS SHOWN.

- ***PRESSURE TESTING IS INHERENTLY DANGEROUS. STRICT ADHERENCE TO THESE OPERATION INSTRUCTIONS AND INDUSTRY SAFETY PRACTICES COULD PREVENT INJURY TO PERSONNEL.***
- ***ALL PERSONNEL MUST BE CLEAR OF TEST PLUG WHEN PRESSURE TESTING.***
- ***FOR SAFETY, AN INCOMPRESSIBLE LIQUID SUCH AS WATER SHOULD BE USED AS THE TEST MEDIUM. RESIDUAL AIR OR GAS IS TO BE EVACUATED FROM THE PIPE PRIOR TO TESTING. IN NON-VERTICAL APPLICATIONS THE VENT, SHOWN ABOVE, WILL ALLOW FOR VENTING MOST AIR OR GAS.***
- ***GRIPTIGHT TEST PLUGS ARE DESIGNED TO WITHSTAND PRESSURE IN THE DIRECTION SHOWN IN THE ABOVE DRAWING. DO NOT USE THESE PLUGS FOR REVERSE PRESSURE APPLICATIONS.***
- ***REMOVE METAL SHIPPING BAND SECURING GRIPPER ASSEMBLY PRIOR TO PRESSURE TESTING.***
- ***VERIFY THE PIPE ID RANGE AND PRESSURE RATING LOCATED ON THE TAG PROVIDED ON THE TEST PLUG.***
- ***DO NOT USE GRIPTIGHT PLUGS IN PIPES WITH ID COATINGS. CONTACT EST CUSTOMER SERVICE PRIOR TO USE OF GRIP TIGHT PLUG ON ANY TYPE OF COATED PIPE / TUBE.***

INSTALLATION PROCEDURES

1. **PRIOR TO USE**, replace damaged or worn grippers and seal. The surface between the cone and grippers must be free of friction producing dirt or corrosion. Verify proper operation of the test plug by tightening with a wrench the hex nuts so that the grippers move freely to the end of the tapered cone surface. Fully loosen the hex nuts. Prior to testing, insure the hex nuts have been advanced down so that the gripper OD is approximately the same as the top washer OD. Should the grippers not fully retract, apply a light lubricant to the tapered surface of the cone and wipe away any excess. Threads should be kept well lubricated with antisieze. Inspect threads and apply antisieze if necessary before testing. If the nut cannot be easily advanced to allow full gripper expansion, **DO NOT USE THIS PLUG FOR TESTING** and contact EST Customer Service.

2. The pipe ID to be tested must be within the limits specified on the plug. Schedule 5 wall thickness pipe, or tubes with a wall thickness thinner than equivalent schedule 10 pipe, must have an OD restraint. For welded pipes, if the weld seam protrudes into the pipe ID, it is to be ground flush with the pipe ID to prevent interference with the grippers. The pipe ID is to be clean, dry and free of scale, dirt or debris.

WARNING! ACCEPTED INDUSTRY SAFETY PRACTICES MUST BE FOLLOWING WHEN LIFTING AND MOVING GT TEST PLUGS AND DURING ALL STEPS RELATED TO INSTALLATION OR REMOVAL OF THE TEST PLUGS.

3. A hoist ring and a handle (not shown) have been provided for ease of installation and lifting the plug. Insure that the hoist ring is positioned as shown in relation to the vent for horizontal installation. The hoist ring and vent must be located as shown to insure that most air or gas is properly vented when used in a horizontal application. Position the test plug in a clean, lubricant free pipe end so that all the gripper teeth are within the pipe. The plug is to be centered within the pipe end regardless of the cut on the end of the pipe. Orient the plug so that the open end of the vent is at the highest point.

   For Horizontal Installations use of a lever bar will aid horizontal installation of the plug. An approximate 6 ft.-8ft long lever bar is recommended. For plug sizes 10"-16" GT a lever bar with an ID close to 1-1/4" (31.8mm) can be fully engaged **over** the center port of the plug. (typical levers = 1-5/8" x 3/16" wall tubing or 1-1/4" SCH 80 pipe) For plug sizes 18"-24" a lever bar with an OD close to 1-1/2" can be fully engaged **into** the center port of the plug. (typical levers = 1-1/2" x 3/8" or greater wall tubing or 1-1/2" solid bar) Position the plug so it is lying on its OD. Fully engage the lever bar over or into the plugs center port. Securely wrap a lifting strap around the lever bar at the center port location. During lifting and installation of the plug, personnel must counter balance the weight of the plug using the lever bar.

4. Incrementally tighten the hex nuts in standard cross or star pattern to the normal installation torque of **180 Ft-Lbs (24.9 kg-m).** Torque increments of 25%, 50%, 75% and 100% of the final installation torque are recommended. On plugs used horizontally, tightening the bottom hex nuts first will aid in centering the plug. There may exist cases (pipe defects, out-of-roundness, pipe seams, etc.) where a higher installation torque is necessary to seal the pipe. If a higher installation torque is necessary it is recommended that the installation torque be increased in increments only enough to seal the pipe. The maximum installation torque limit is **325 Ft-Lbs (44.9 kg-m).** Do not exceed the maximum installation torque of **325 Ft-Lbs (44.9 kg-m).** Use of a calibrated torque wrench is recommended.

WARNING! FAILURE TO APPLY THE INSTALLATION TORQUE SPECIFIED COULD RESULT IN UNSAFE OPERATION OR LEAKAGE.

5. Install the pressure source or vent to the plug, leak tight. For plugs not being used to pressurize or vent the system, install a pipe cap rated at or above the Grip Tight Test Plug test pressure, leak tight.

6. Fill the pipe with test medium while evacuating any residual air or gas. Slowly introduce the test pressure. The test pressure must never exceed the maximum pressure listed in Tables 1 and 2.

7. As pressure increases, movement of the shaft as large as .60" (15.24mm) may be detected. This movement indicates additional squeeze of the seal and expansion of the grippers and is normal for this plug design. Should movement of the shaft or plug exceed 0.60" (15.24mm), release **ALL** pressure immediately, remove plug, examine, reinstall and begin testing in accordance with this operating procedure. Should movement of the shaft or plug during the test still exceed 0.60" (15.24mm), contact EST Customer Service for technical assistance.

8. Imperfections within the pipe being tested may cause small plug leaks as the test pressure is being increased. Should small leaks develop, additional tightening of the plug may be required. Prior to any plug adjustments release all pressure from the system. Make necessary adjustments and re-tighten hex nuts and re-pressurize the system. If leakage continues, the imperfections within the pipe must be removed.

WARNING! NEVER STAND IN THE POSSIBLE PATH OF THE TEST PLUG.

WARNING! NEVER EXCEED THE MAXIMUM TORQUE SPECIFIED IN TABLES 1 AND 2. DAMAGE TO THE PLUG MAY OCCUR.

9. At the conclusion of the test, release ALL pressure, loosen the hex nuts, remove and inspect plug. Any plug component, which is worn or damaged, must be replaced before attempting further testing. Contact factory for replacement part information.

10. Prior to storing, dry all parts of the plug and lubricate the shaft threads and hardened washers with anti-seize. Store these instructions with the plug.

SEAL AND GRIPPER REPLACEMENT

1. Remove hex nuts and the hardened washers. Remove the spacer tubes if present.

2. Remove top washer.

3. Carefully remove gripper assembly, tapered cone and seal. If care is taken the gripper assembly can be handled in its assembled configuration.

4. Install new seal. Install tapered cone so that the large end of the cone is against the seal. For 24" plug sizes only, install the internal springs, (1) every other shaft.

5. If gripper assembly has collapsed or if new a new gripper assembly is being installed it may be reassembled by placing the thick end of each gripper segment on a flat surface. Form a circle with all but (2) gripper segments, Install the garter spring around the gripper segments and into the groove on each gripper. Holding (2) adjacent segments stretch the spring and install an additional gripper section. Repeat for the remaining section. Carefully handle gripper assembly and install onto the plug so that tapered gripper surface mates with tapered cone surface.

6. Install top washer.

7. Lubricate shafts with anti-seize, if necessary. Install spacer tubes if present, hardened washers and hex nuts.

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TABLE 1. Technical Data And Installation Torque For GripTight Plugs In 10" Through 16" Pipe Sizes.

* NEVER use a test pressure greater than the weakest component in the system that can safely handle. The test pressure specified is equivalent to 80% of pressure that will yield ASTM A106 Grade B Pipe. The test pressure for higher and lower strength pipes will differ proportionally. The maximum test pressure for higher strength pipe must never exceed the highest test pressure listed for that pipe size. Do not use in coated pipe at any pressure. Contact EST Customer Service to determine use.

Sales Number	Pipe Size	Pipe Schedule	Minimum Pipe I.D. Inches	Maximum Pipe I.D. Inches	Minimum Pipe I.D. mm	Maximum Pipe I.D. mm	* Maximum Pressure PSI	* Maximum Pressure Bar	Normal Installation Torque Ft-Lbs	Maximum Installation Torque Ft-Lbs	Normal Installation Torque Kg-m	Maximum Installation Torque Kg-m
GT-10P100	10	sch 100	9.28	9.59	235.7	243.6	3993	275.4	180	325	24.9	44.9
GT-10P80	10	sch 80	9.53	9.80	242.1	248.9	3264	225.1	180	325	24.9	44.9
GT-10PXS	10	xs	9.72	9.97	246.9	253.2	2725	187.9	180	325	24.9	44.9
GT-10P40	10	sch 40	9.99	10.21	253.7	259.3	1966	135.6	180	325	24.9	44.9
GT-10P30	10	sch 30	10.10	10.31	256.5	261.9	1645	113.4	180	325	24.9	44.9
GT-10P20	10	sch 20	10.22	10.41	259.6	264.4	1333	91.9	180	325	24.9	44.9
GT-10P10	10	sch 10s	10.39	10.56	263.9	268.2	873	60.2	180	325	24.9	44.9
GT-10P5	10	sch 5	10.45	10.61	265.4	269.5	707	48.8	180	325	24.9	44.9
GT-12P80	12	sch 80	11.34	11.64	288.0	295.7	3184	219.6	180	325	24.9	44.9
GT-12P60	12	sch 60	11.59	11.86	294.4	301.2	2577	177.7	180	325	24.9	44.9
GT-12PXS	12	xs	11.72	11.97	297.7	304.0	2282	157.4	180	325	24.9	44.9
GT-12P40	12	std	11.91	12.19	302.5	309.6	1840	126.9	180	325	24.9	44.9
GT-12P30	12	sch 30	12.06	12.27	306.3	311.7	1487	102.6	180	325	24.9	44.9
GT-12P20	12	sch 20	12.22	12.41	310.4	315.2	1120	77.2	180	325	24.9	44.9
GT-12P10	12	sch 5	12.36	12.57	313.9	319.3	802	55.3	180	325	24.9	44.9
GT-14P140	14	sch 140	11.47	11.91	291.3	302.5	5438	375.0	180	325	24.9	44.9
GT-14P120	14	sch 120	11.78	12.18	299.2	309.4	4713	325.0	180	325	24.9	44.9
GT-14P100	14	sch 100	12.09	12.45	307.1	316.2	4001	275.9	180	325	24.9	44.9
GT-14P80	14	sch 80	12.47	12.78	316.7	324.6	3160	217.9	180	325	24.9	44.9
GT-14P60	14	sch 60	12.78	13.05	324.6	331.5	2476	170.8	180	325	24.9	44.9
GT-14PXS	14	xs	12.97	13.22	329.4	335.8	2071	142.8	180	325	24.9	44.9
GT-14P40	14	sch 40	13.09	13.33	332.5	338.6	1807	124.6	180	325	24.9	44.9
GT-14PSTD	14	std	13.22	13.44	335.8	341.4	1540	106.2	180	325	24.9	44.9
GT-14P20	14	sch 20	13.34	13.55	338.8	344.2	1276	88.0	180	325	24.9	44.9
GT-14P10	14	sch 5	13.47	13.82	342.1	351.0	1018	70.2	180	325	24.9	44.9
GT-16P120	16	sch 120	13.53	13.96	343.7	354.6	4587	316.3	180	325	24.9	44.9
GT-16P100	16	sch 100	13.91	14.29	353.3	363.0	3839	264.8	180	325	24.9	44.9
GT-16P80	16	sch 80	14.28	14.62	362.7	371.3	3109	214.4	180	325	24.9	44.9
GT-16P60	16	sch 60	14.66	14.95	372.4	379.7	2390	164.8	180	325	24.9	44.9
GT-16P40	16	sch 40	14.97	15.22	380.2	386.6	1805	124.5	180	325	24.9	44.9
GT-16PSTD	16	std	15.22	15.44	386.6	392.2	1343	92.6	180	325	24.9	44.9
GT-16P20	16	sch 20	15.34	15.55	389.6	395.0	1113	76.8	180	325	24.9	44.9
GT-16P10	16	sch 5	15.47	15.81	392.9	401.6	889	61.3	180	325	24.9	44.9

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TABLE 2. Technical Data And Installation Torque For GripTight Plugs In 18" Through 24" Pipe Sizes.

* NEVER use a test pressure greater than the weakest component in the system that can safely handle. The test pressure specified is equivalent to 80% of pressure that will yield ASTM A106 Grade B Pipe. The test pressure for higher and lower strength pipes will differ proportionally. The maximum test pressure for higher strength pipe must never exceed the highest test pressure listed for that pipe size. DO NOT use on coated pipe at any pressure. Contact EST Customer Service to determine use.

Sales Number	Pipe Size	Pipe Schedule	Minimum Pipe I.D. Inches	Maximum Pipe I.D. Inches	Minimum Pipe I.D. mm	Maximum Pipe I.D. mm	* Maximum Pressure PSI	* Maximum Pressure Bar	Normal Installation Torque Ft-Lbs	Maximum Installation Torque Ft-Lbs	Normal Installation Torque Kg-m	Maximum Installation Torque Kg-m
GT-18P120	18	sch 120	15.22	15.69	386.6	398.5	4600	317.2	180	325	24.9	44.9
GT-18P100	18	sch 100	15.66	16.07	397.8	408.2	3825	263.8	180	325	24.9	44.9
GT-18P80	18	sch 80	16.09	16.45	408.7	417.8	3069	211.7	180	325	24.9	44.9
GT-18P60	18	sch 60	16.47	16.78	418.3	426.2	2430	167.6	180	325	24.9	44.9
GT-18P40	18	sch 40	16.84	17.11	427.7	434.6	1803	124.3	180	325	24.9	44.9
GT-18PXS	18	xs	16.97	17.22	431.0	437.4	1599	110.3	180	325	24.9	44.9
GT-18P30	18	sch 30	17.09	17.33	434.1	440.2	1396	96.3	180	325	24.9	44.9
GT-18PSTD	18	std	17.22	17.44	437.4	443.0	1191	82.1	180	325	24.9	44.9
GT-18P20	18	sch 20	17.34	17.55	440.4	445.8	987	68.1	180	325	24.9	44.9
GT-18P10	18	sch 5	17.47	17.81	443.7	452.4	789	54.4	180	325	24.9	44.9
GT-20P100	20	sch 100	17.41	17.88	442.2	454.2	3814	263.0	180	325	24.9	44.9
GT-20P80	20	sch 80	17.91	18.32	454.9	465.3	3035	209.3	180	325	24.9	44.9
GT-20P60	20	sch 60	18.34	18.70	465.8	475.0	2366	163.2	180	325	24.9	44.9
GT-20P40	20	sch 40	18.78	19.09	477.0	484.9	1713	118.1	180	325	24.9	44.9
GT-20PXS	20	xs	18.97	19.25	481.8	489.0	1435	99.0	180	325	24.9	44.9
GT-20PSTD	20	std	19.22	19.47	488.2	494.5	1070	73.8	180	325	24.9	44.9
GT-20P10	20	sch 5	19.47	19.80	494.5	502.9	709	48.9	180	325	24.9	44.9
GT-22P100	22	sch 100	19.22	19.72	488.2	500.9	3717	256.3	180	325	24.9	44.9
GT-22P80	22	sch 80	19.72	20.16	500.9	512.1	3009	207.5	180	325	24.9	44.9
GT-22P60	22	sch 60	20.22	20.59	513.6	523.0	2316	159.7	180	325	24.9	44.9
GT-22PXS	22	xs	20.97	21.25	532.6	539.8	1302	89.8	180	325	24.9	44.9
GT-22PSTD	22	std	21.22	21.47	539.0	545.3	971	67.0	180	325	24.9	44.9
GT-22P10	22	sch 5	21.47	21.80	545.3	553.7	644	44.4	180	325	24.9	44.9
GT-24P120	24	sch 120	20.34	20.95	516.6	532.1	4543	313.3	180	325	24.9	44.9
GT-24P100	24	sch 100	20.91	21.45	531.1	544.8	3798	261.9	180	325	24.9	44.9
GT-24P80	24	sch 80	21.53	21.99	546.9	558.5	2985	205.9	180	325	24.9	44.9
GT-24P60	24	sch 60	22.03	22.43	559.6	569.7	2352	162.2	180	325	24.9	44.9
GT-24P40	24	sch 40	22.59	22.92	573.8	582.2	1651	113.9	180	325	24.9	44.9
GT-24P30	24	sch 30	22.84	23.14	580.1	587.8	1342	92.6	180	325	24.9	44.9
GT-24PXS	24	xs	22.97	23.25	583.4	590.6	1191	82.1	180	325	24.9	44.9
GT-24PSTD	24	std	23.22	23.47	589.8	596.1	889	61.3	180	325	24.9	44.9
GT-24P10	24	sch 5	23.47	23.74	596.1	603.0	589	40.6	180	325	24.9	44.9

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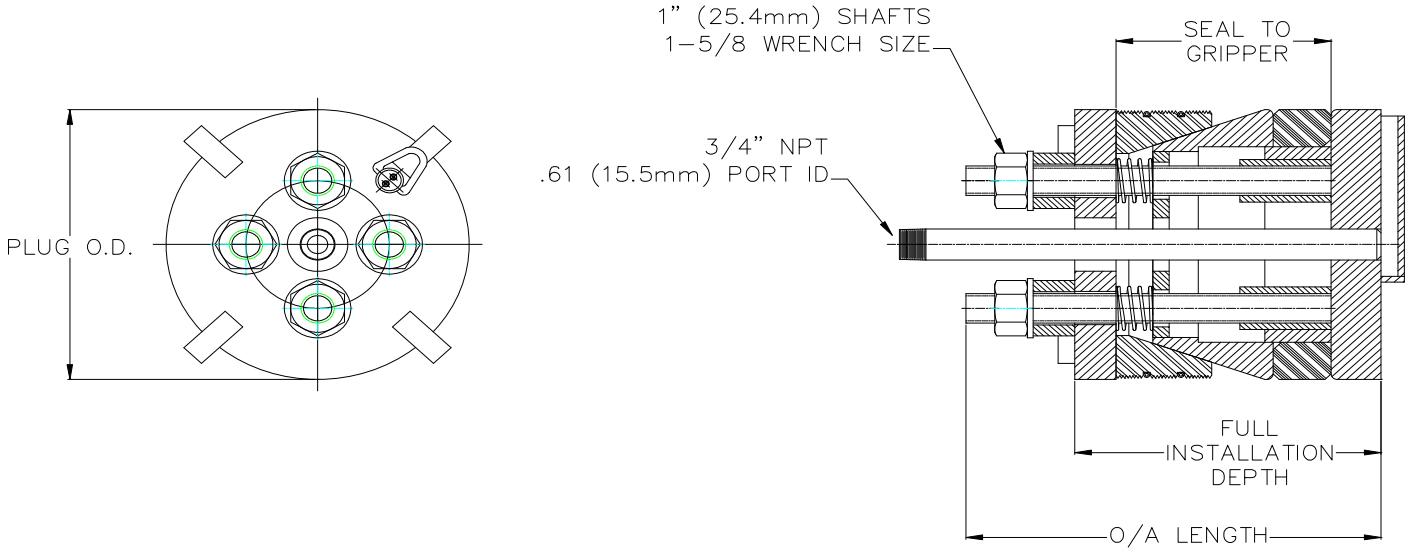
GRIPTIGHT TEST PLUG (10"-16") - TECHNICAL SPECIFICATIONS



PART NUMBER	GRIPTIGHT SIZE	PIPE SCHEDULE	I.D. SIZE RANGE		I.D. SIZE RANGE		PLUG OD		UNDERCUT FROM MINIMUM PIPE I.D.		MAXIMUM TEST PRESSURE (1)		SHAFT QTY	OVERALL LENGTH		SEAL TO GRIPPER		FULL INSTALLATION DEPTH		APRROXIMATE WEIGHT	
			(in)	(in)	(mm)	(mm)	(in)	(mm)	(in)	(mm)	(psi)	(Bar)		(in)	(mm)	(in)	(mm)	(in)	(mm)	(lbs)	(kg)
GT-10P100	10"	sch 100	9.28	9.59	235.7	243.6	9.13	231.9	.15	3.8	3993	274.1	4	12	304.8	5.96	151.4	8.71	221.2	150	68.0
GT-10P80		sch 80	9.53	9.80	242.1	248.9	9.38	238.3	.15	3.8	3264	224.0		12	304.8	5.95	151.1	8.70	221.0		
GT-10PXS		sch 60/xs	9.72	9.97	246.9	253.2	9.57	243.1	.15	3.8	2725	187.0		11 3/4	298.5	5.94	150.9	8.44	214.4		
GT-10P40		sch 40/std	9.99	10.21	253.7	259.3	9.84	249.9	.15	3.8	1966	134.9		11 3/4	298.5	5.92	150.4	8.42	213.9		
GT-10P30		sch 30	10.10	10.31	256.5	261.9	9.96	253.0	.14	3.6	1645	112.9		11 3/4	298.5	5.91	150.1	8.41	213.6		
GT-10P20		sch 20	10.22	10.41	259.6	264.4	10.07	255.8	.15	3.8	1333	91.5		11 3/4	298.5	5.90	149.9	8.65	219.7		
GT-10P10		sch 10s	10.39	10.56	263.9	268.2	10.24	260.1	.15	3.8	873	59.9		11 3/4	298.5	5.90	149.9	8.65	219.7		
GT-10P5		sch 5	10.45	10.61	265.4	269.5	10.30	261.6	.15	3.8	707	48.5		11 3/4	298.5	5.89	149.6	8.64	219.5		
GT-12P80	12"	sch 80	11.34	11.64	288.0	295.7	11.19	284.2	.15	3.8	3184	218.5	4	12 1/4	311.2	6.45	163.8	9.45	240.0	200	90.6
GT-12P60		sch 60	11.59	11.86	294.4	301.2	11.45	290.8	.14	3.6	2577	176.9		12 1/4	311.2	6.44	163.6	9.44	239.8		
GT-12PXS		xs	11.72	11.97	297.7	304.0	11.57	293.9	.15	3.8	2282	156.6		12 1/4	311.2	6.43	163.3	9.43	239.5		
GT-12P40		sch40/std	11.91	12.19	302.5	309.6	11.82	300.2	.09	2.3	1840	126.3		12	304.8	6.42	163.1	9.42	239.3		
GT-12P30		sch 30	12.06	12.27	306.3	311.7	11.91	302.5	.15	3.8	1487	102.1		12	304.8	6.41	162.8	9.41	239.0		
GT-12P20		sch 20	12.22	12.41	310.4	315.2	12.07	306.6	.15	3.8	1120	76.9		12	304.8	6.40	162.6	9.40	238.8		
GT-12P10		sch 10s/5	12.36	12.57	313.9	319.3	12.21	310.1	.15	3.8	802	55.0		12	304.8	6.40	162.6	9.39	238.5		
GT-14P140	14"	sch 140	11.47	11.91	291.3	302.5	11.32	287.5	.15	3.8	5438	373.2	6	12 3/4	323.9	7.09	180.1	10.59	269.0	275	**124.6**
GT-14P120		sch 120	11.78	12.18	299.2	309.4	11.63	295.4	.15	3.8	4713	323.5		12 3/4	323.9	7.06	179.3	10.56	268.2		
GT-14P100		sch 100	12.09	12.45	307.1	316.2	11.94	303.3	.15	3.8	4001	274.6		12 1/2	317.5	7.04	178.8	10.29	261.4		
GT-14P80		sch 80	12.47	12.78	316.7	324.6	12.32	312.9	.15	3.8	3160	216.9		12 1/4	311.2	7.02	178.3	10.27	260.9		
GT-14P60		sch 60	12.78	13.05	324.6	331.5	12.63	320.8	.15	3.8	2476	169.9		12 1/4	311.2	7.00	177.8	10.50	266.7		
GT-14Pxs		xs	12.97	13.22	329.4	335.8	12.82	325.6	.15	3.8	2071	142.1		12 1/4	311.2	6.99	177.5	10.49	266.4		
GT-14P40		sch 40	13.09	13.33	332.5	338.6	12.94	328.7	.15	3.8	1807	124.0		12 1/4	311.2	6.98	177.3	10.48	266.2		
GT-14PSTD		sch 30/std	13.22	13.44	335.8	341.4	13.07	332.0	.15	3.8	1540	105.7		12 1/4	311.2	6.98	177.3	10.48	266.2		
GT-14P20		sch 20	13.34	13.55	338.8	344.2	13.20	335.3	.14	3.6	1276	87.6		12	304.8	6.97	177.0	10.22	259.6		
GT-14P10		sch 10/10s/5	13.47	13.82	342.1	351.0	13.44	341.4	.03	0.8	1018	69.9		12	304.8	6.96	176.8	10.46	265.7		
GT-16P120	16"	sch 120	13.53	13.96	343.7	354.6	13.38	339.9	.15	3.8	4587	314.8	8	13 1/4	336.6	7.50	190.5	11.55	293.4	350	158.6
GT-16P100		sch 100	13.91	14.29	353.3	363.0	13.76	349.5	.15	3.8	3839	263.5		13	330.2	7.52	191.0	11.27	286.3		
GT-16P80		sch 80	14.28	14.62	362.7	371.3	14.13	358.9	.15	3.8	3109	213.4		12 3/4	323.9	7.50	190.5	11.25	285.8		
GT-16P60		sch 60	14.66	14.95	372.4	379.7	14.51	368.6	.15	3.8	2390	164.0		12 1/2	317.5	7.48	190.0	11.23	285.2		
GT-16P40		sch 40/xs	14.97	15.22	380.2	386.6	14.82	376.4	.15	3.8	1805	123.9		12 1/4	311.2	7.46	189.5	10.96	278.4		
GT-16PSTD		sch 30/std	15.22	15.44	386.6	392.2	15.07	382.8	.15	3.8	1343	92.2		12 1/4	311.2	7.45	189.2	10.95	278.1		
GT-16P20		sch 20	15.34	15.55	389.6	395.0	15.20	386.1	.14	3.6	1113	76.4		13 3/4	349.3	7.44	189.0	11.19	284.2		
GT-16P10		sch 10/10s/5	15.47	15.81	392.9	401.6	15.32	389.1	.15	3.8	889	61.0		13 3/4	349.3	7.44	189.0	11.19	284.2		

Notes:
(1) NEVER use a test pressure greater than the weakest component in the system can handle. Test Pressure specified in table is equivalent to 80% of the pressure that will yield ASTM A106 Grade B pipe.
The test pressure for higher and lower strength pipes will differ proportionally. The maximum test pressure for higher strength pipe must never exceed the highest test pressure listed for that pipe O.D.
For plug sizes used to test tubing, use of these GripTight sizes in tubing with a minimum yield strength of 35ksi, the maximum test pressure is estimated by the test pressure listed for the equivalent or next larger pipe O.D.
with the equivalent or next thinner wall thickness. The test pressure for higher and lower strength tubes will differ proportionally. The maximum test pressure for higher strength tubes must never exceed the highest test pressure listed for the equivalent or next larger pipe size. NEVER use a test pressure greater than the weakest component in the system can safely handle.

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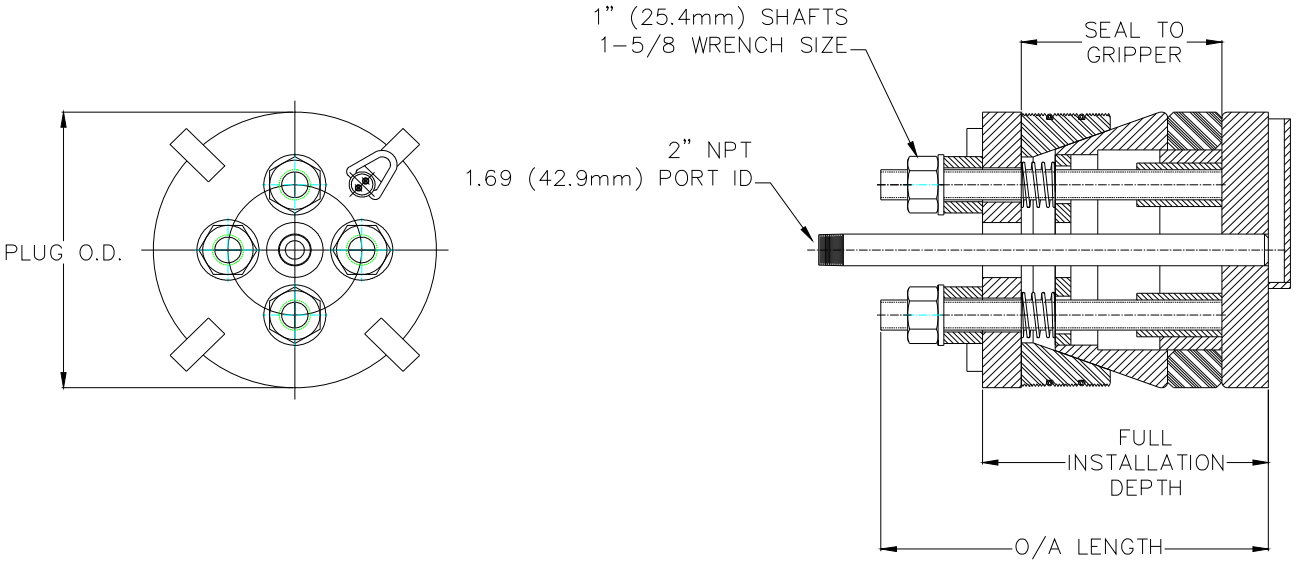
GRIPTIGHT TEST PLUG (18"-24") - TECHNICAL SPECIFICATIONS



PART NUMBER	NOM PIPE SIZE	PIPE SCHEDULE	I.D. SIZE RANGE		I.D. SIZE RANGE		PLUG OD		UNDERCUT FROM MINIMUM PIPE I.D.		MAXIMUM TEST PRESSURE (1)		SHAFT QTY	OVERALL LENGTH		SEAL TO GRIPPER		FULL INSTALLATION DEPTH		APPROXIMATE WEIGHT	
			(in)	(in)	(mm)	(mm)	(in)	(mm)	(in)	(mm)	(psi)	(Bar)		(in)	(mm)	(in)	(mm)	(in)	(mm)	(lbs)	(kg)
GT-18P120	18"	sch 120	15.22	15.69	386.6	398.5	15.07	382.8	.15	3.8	4600	315.7	8	15	381.0	8.12	206.2	12.62	320.5	500	226.6
GT-18P100		sch 100	15.66	16.07	397.8	408.2	15.51	394.0	.15	3.8	3825	262.5		14 3/4	374.7	8.09	205.5	12.34	313.4		
GT-18P80		sch 80	16.09	16.45	408.7	417.8	15.94	404.9	.15	3.8	3069	210.6		14 1/2	368.3	8.06	204.7	12.31	312.7		
GT-18P60		sch 60	16.47	16.78	418.3	426.2	16.32	414.5	.15	3.8	2430	166.8		14 1/4	362.0	8.04	204.2	12.29	312.2		
GT-18P40		sch 40	16.84	17.11	427.7	434.6	16.70	424.2	.14	3.6	1803	123.7		14	355.6	8.02	203.7	12.02	305.3		
GT-18PXS		xs	16.97	17.22	431.0	437.4	16.82	427.2	.15	3.8	1599	109.7		14	355.6	8.01	203.5	12.01	305.1		
GT-18P30		sch 30	17.09	17.33	434.1	440.2	16.94	430.3	.15	3.8	1396	95.8		13 3/4	349.3	8.01	203.5	12.01	305.1		
GT-18PSTD		std	17.22	17.44	437.4	443.0	17.07	433.6	.15	3.8	1191	81.7		13 3/4	349.3	8.00	203.2	12.00	304.8		
GT-18P20		sch 20	17.34	17.55	440.4	445.8	17.20	436.9	.14	3.6	987	67.7		13 3/4	349.3	7.99	202.9	11.99	304.5		
GT-18P10		sch 10/10s/5	17.47	17.81	443.7	452.4	17.32	439.9	.15	3.8	789	54.2		13 3/4	349.3	7.99	202.9	11.99	304.5		
GT-20P100	20"	sch 100	17.41	17.88	442.2	454.2	17.26	438.4	.15	3.8	3814	261.8	10	15 1/4	387.4	8.60	218.4	13.35	339.1	625	283.2
GT-20P80		sch 80	17.91	18.32	454.9	465.3	17.76	451.1	.15	3.8	3035	208.3		14 3/4	374.7	8.57	217.7	13.07	332.0		
GT-20P60		sch 60	18.34	18.70	465.8	475.0	18.20	462.3	.14	3.6	2366	162.4		14 1/2	368.3	8.55	217.2	12.80	325.1		
GT-20P40		sch 40	18.78	19.09	477.0	484.9	18.63	473.2	.15	3.8	1713	117.6		14 1/4	362.0	8.52	216.4	12.77	324.4		
GT-20PXS		sch 30/xs	18.97	19.25	481.8	489.0	18.82	478.0	.15	3.8	1435	98.5		14	355.6	8.51	216.2	12.51	317.8		
GT-20PSTD		sch 20/std	19.22	19.47	488.2	494.5	19.07	484.4	.15	3.8	1070	73.4		14	355.6	8.50	215.9	12.75	323.9		
GT-20P10		sch 10/10s/5	19.47	19.80	494.5	502.9	19.32	490.7	.15	3.8	709	48.7		14	355.6	8.49	215.6	12.74	323.6		
GT-22P100	22"	sch 100	19.22	19.72	488.2	500.9	19.00	482.6	.22	5.6	3717	255.1	10	17 3/4	450.9	9.38	238.3	14.13	358.9	850	385.1
GT-22P80		sch 80	19.72	20.16	500.9	512.1	19.50	495.3	.22	5.6	3009	206.5		17 1/2	444.5	9.35	237.5	14.10	358.1		
GT-22P60		sch 60	20.22	20.59	513.6	523.0	20.00	508.0	.22	5.6	2316	159.0		17	431.8	9.32	236.7	13.82	351.0		
GT-22PXS		sch 30/xs	20.97	21.25	532.6	539.8	20.75	527.1	.22	5.6	1302	89.4		16 1/2	419.1	9.28	235.7	13.53	343.7		
GT-22PSTD		sch 20/std	21.22	21.47	539.0	545.3	21.00	533.4	.22	5.6	971	66.6		16 1/4	412.8	9.27	235.5	13.52	343.4		
GT-22P10		sch 10/10s/5	21.47	21.80	545.3	553.7	21.25	539.8	.22	5.6	644	44.2		16 1/4	412.8	9.26	235.2	13.51	343.2		
GT-24P120	24"	sch 120	20.34	20.95	516.6	532.1	20.13	511.3	.21	5.3	4543	311.8	12	18 1/4	463.6	9.98	253.5	15.73	399.5	1073	486.2
GT-24P100		sch 100	20.91	21.45	531.1	544.8	20.69	525.5	.22	5.6	3798	260.7		18	457.2	9.94	252.5	15.69	398.5		
GT-24P80		sch 80	21.53	21.99	546.9	558.5	21.31	541.3	.22	5.6	2985	204.9		17 1/2	444.5	9.99	253.7	15.49	393.4		
GT-24P60		sch 60	22.03	22.43	559.6	569.7	21.81	554.0	.22	5.6	2352	161.4		16 3/4	425.5	9.97	253.2	15.22	386.6		
GT-24P40		sch 40	22.59	22.92	573.8	582.2	22.37	568.2	.22	5.6	1651	113.3		16 3/4	425.5	9.94	252.5	15.19	385.8		
GT-24P30		sch 30	22.84	23.14	580.1	587.8	22.63	574.8	.21	5.3	1342	92.1		16 3/4	425.5	9.92	252.0	15.42	391.7		
GT-24PXS		xs	22.97	23.25	583.4	590.6	22.75	577.9	.22	5.6	1191	81.7		16 3/4	425.5	9.92	252.0	15.17	385.3		
GT-24PSTD		sch 20/std	23.22	23.47	589.8	596.1	23.00	584.2	.22	5.6	889	61.0		16 3/4	425.5	9.90	251.5	15.40	391.2		
GT-24P10		sch 10/5	23.47	23.74	596.1	603.0	23.25	590.6	.22	5.6	589	40.4		16 3/4	425.5	9.89	251.2	15.39	390.9		

Notes:
(1) NEVER use a test pressure greater than the weakest component in the system can handle. Test Pressure specified in table is equivalent to 80% of the pressure that will yield ASTM A106 Grade B pipe.
The test pressure for higher and lower strength pipes will differ proportionally. The maximum test pressure for higher strength pipe must never exceed the highest test pressure listed for that pipe O.D.
For plug sizes used to test tubing, use of these GripTight sizes in tubing with a minimum yield strength of 35ksi, the maximum test pressure is estimated by the test pressure listed for the equivalent or next larger pipe O.D. with the equivalent or next thinner wall thickness. The test pressure for higher and lower strength tubes will differ proportionally. The maximum test pressure for higher strength tubes must never exceed the highest test pressure listed for the equivalent or next larger pipe size. NEVER use a test pressure greater than the weakest component in the system can safely handle.

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September 29, 1998

GripTight™ Test Plugs Design Basis

High pressure GripTight™ Test Plugs are manufactured by Expansion Seal Technologies (EST) of Harleysville, PA, USA. EST developed the GripTight test plug design based on evaluation of industry requirements for a safe method to perform high pressure testing of pipe, tube and fabricated components.

The GripTight test plug uses a unique self-gripping feature, developed by EST, which increases the plug's grip on the pipe as the test pressure within the pipe increases. This self-gripping feature is what makes the GripTight the safest high-pressure test plug on the market. GripTight test plugs have a pressure rating equivalent to 80% of the test pressure that will deform a pipe with a yield strength of 35ksi (240MPa). Having the plugs rated to 80% of the pipe yield pressure was an original development goal that was established by our sales personnel after evaluation of market needs.

Evaluation of the fundamental GripTight design showed that proper operation of the plug was dependent on friction in two locations: between the gripper and the pipe; and between the gripper and the cone. During development of the GripTight we determined the necessary friction coefficients through performance tests of prototype units. Using the experimentally determined friction coefficients we established a method of calculating the gripper dimensions so that the gripper would not cause yielding of the pipe when pressurized. The seal used on the GripTight was designed based on existing seal designs but modified largely through evaluation of experimental data. The operation of our gripper and seal design has been verified by performance testing. Our performance tests included but are not limited to the following:

1. Hydrostatic Pressure Testing: Installed plugs were pressurized to 1.5x the rated pressure. Many of these tests were conducted in thick walled vessels that were designed to withstand the test pressure. Carbon, stainless and alloy steel pipes and vessels were tested.

2. Pressure Shock Testing: Installed plugs were subjected to rapid pressurization from zero to approximately 4000psi (275 Bar), with pressure transient lasting a few tenths of a second.

3. Pipe Burst Testing: Installed plugs were pressurized and the pressure gradually increased until the pipe failure.

4. Life Cycle Testing: Repeated plug installation, pressurization and removal to determine usable plug life and plug component wear characteristics.

Each of the remaining plug components, shaft, washers, hex & jam nuts, were sized or designed to safely withstand the stresses resulting from hydrostatic testing. The safe operation of these components was also verified during the above performance tests.

Since being introduced to industry, the GripTight test plug has been widely accepted as a safe, reliable and economic means to facilitate pressure testing of pipe, tube and fabricated components. For assistance with specific applications, for additional information on GripTight plugs or EST's complete range of pressure testing plugs and equipment please contact EST Customer Service.

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SQ2 and GripTight™ Test Plug Alternate Seal Materials and Pressure Ratings

This document is for in-house distribution only.

ID RANGE in (mm)	SHAFT DIA in (mm)	STANDARD SEAL MATERIAL qty, in (mm)	ALTERNATE SEAL MATERIAL qty, in (mm)	MAXIMUM TEST PRESSURE WITH ALTERNATE SEAL MATERIALS psi (bar)
.47 - .62 (11.9 - 15.7)	1/2 - 1/4 (12.7 - 6.4) STEPPED	URETHANE BLUE - (2) 1/4" (6.4)	NEOPRENE BLACK, EPDM BLACK, SILICONE AND FLUOROELASTOMER; VITON OR EQUIVALENT - (2) 1/4" (6.4)	3250 (224.1)
.62 - .72 (15.7 - 18.3)	1/2 - 1/4 (12.7 - 6.4) STEPPED	URETHANE BLUE - (1) 1/2" (12.7)	NEOPRENE BLACK, EPDM BLACK, SILICONE AND FLUOROELASTOMER; VITON OR EQUIVALENT - (1) 1/2" (12.7)	3250 (224.1)
.72 - .93 (18.3 - 23.60)	1/2 - 3/8 (12.7 - 9.5) STEPPED			3000 (206.8)
.93 - 1.20 (23.6 - 30.5)	1/2 (12.7)			3000 (206.8)
1.13 - 1.43 (28.7 - 36.30)	5/8 (15.9)			2500 (172.4)
1.41 - 2.45 (35.8 - 62.20)	7/8 (22.2)			2000 (137.9)
2.44 - 2.54 (62.0 - 3.14)	1-1/4 (31.8)	URETHANE RED - (1) 1/2" (12.7)		2000 (137.9)
3.12 - 4.34 (79.2 - 110.2)				1750 (120.6)
4.28 - 4.58 (108.7 - 116.3)	1-1/2 (38.1)	URETHANE RED - (1) 1/2" (12.7) AND NEOPRENE BLACK - (1) 1/2" (12.7)	NEOPRENE BLACK, EPDM BLACK, SILICONE AND FLUOROELASTOMER; VITON OR EQUIVALENT - (1) 1" (25.4)	1750 (120.6)
4.53 - 6.52 (115.1 - 165.6)				1250 (86.2)
6.53 - 6.82 (165.9 - 173.2)				750 (51.7)
6.78 - 8.53 (172.2 - 216.7)	5/8 (15.9) MULTI-SHAFT	URETHANE YELLOW - (1) 1" (25.4)		750 (51.7)
9.28 - 10.61 (235.7 - 269.5)	1" (25.4) MULTI-SHAFT	URETHANE RED - (1) 1-3/4" (44.5)	NEOPRENE BLACK, EPDM BLACK, SILICONE AND FLUOROELASTOMER; VITON OR EQUIVALENT - (1) 1-3/4" (44.5)	500 (34.5)
11.34 - 16.78 (288.0 - 426.2)				300 (20.7)
16.84 - 20.59 (427.7 - 523.0)				250 (17.2)
20.97 - 23.74 (532.6 - 603.0)				150 (10.3)

SQ2 and GripTight Test Plugs are available with the alternate seal materials/maximum test pressures shown in table.

If a GripTight plug with an alternate seal is needed, the seal material designator should be added to the standard part number:
E - Epdm
N - Neoprene
S - Silicone
V - Fluoroelastomer, Viton® or Equivalent

Example:
SQ2-0062-E designates a SQ2 for .62-.649 id with all EPDM seals
GT-1P80-V designates a 1" sch 80 GripTight Test Plug with all Fluoroelastomer, Viton® or equivalent seals
GT-3P10-S designates a 3" sch 10 GripTight Test Plug with all Silicone seals
GT-5P40-AN designates a 5" sch 40 GripTight Test Plug with all Neoprene seals

If a replacement alternate seal is needed, the same seal material designator is used in the part number with (1) exception. GripTight plugs that utilize a 1-1/2" shaft are equipped with both a Urethane Seal and a Neoprene Seal. The standard designator for this plug is -N and the seal set is -NRS. If all Neoprene is required suffix should be for the plug -AN and for the seal set -ANRS, see 5" sch 40 example below.

Example:
SQ2-0062-E designates a replacement all EDPM seal for a SQ2 .62-.649 id
GT-1P80-VRS designates a replacement all Fluoroelastomer, Viton® or equivalent seal for a 1" sch 80 GripTight Test Plug
GT-3P10-SRS designates a replacement all Silicone seal for a 3" sch 10 GripTight Test Plug
GT-5P40-ANRS designates a replacement all Neoprene seal for a 5" sch 40 GripTight Test Plug

Prices and delivery for replacement seals and/or plugs equipped with alternate seals, will vary and should be quoted per quantity and material requested. Not all alternate seal materials are stocked and readily available. Standard pricing and delivery are not applicable. **This document is for in-house distribution only.**

Viton® is a registered trademark of DuPont Dow Elastomers.

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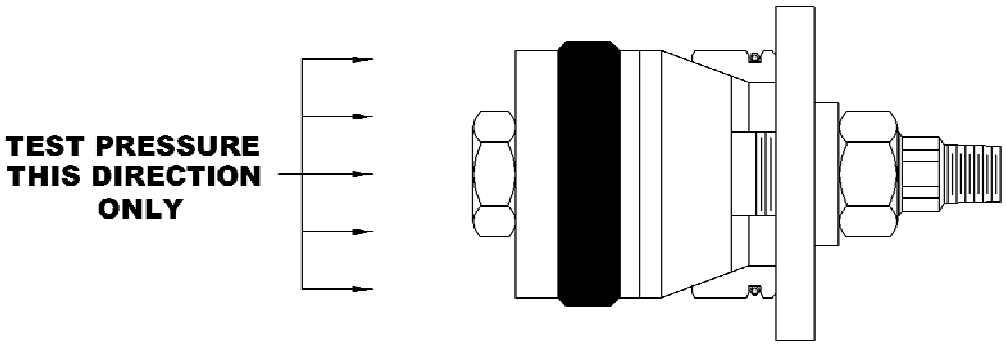
OPERATING PROCEDURES FOR NG TEST PLUGS (NON-METALLIC GRIPPERS)



WARNING! FOR PROPER OPERATION, NG PLUGS MUST BE ASSEMBLED AS SHOWN.

- ***PRESSURE TESTING IS INHERENTLY DANGEROUS. STRICT ADHERENCE TO THESE OPERATION INSTRUCTIONS AND INDUSTRY SAFETY PRACTICES COULD PREVENT INJURY TO PERSONNEL***
- ***ALL PERSONNEL MUST BE CLEAR OF TEST PLUG WHEN PRESSURE TESTING***
- ***FOR SAFETY, AN INCOMPRESSIBLE LIQUID SUCH AS WATER SHOULD BE USED AS THE TEST MEDIUM. RESIDUAL AIR OR GAS IS TO BE EVACUATED FROM THE PIPE PRIOR TO TESTING. IN NON-VERTICAL APPLICATIONS THE OPTIONAL VENT, SHOWN ABOVE, WILL ALLOW FOR VENTING MOST AIR OR GAS. VENT IS AVAILABLE FOR MOST NG TEST PLUGS.***
- ***NG TEST PLUGS ARE DESIGNED TO WITHSTAND PRESSURE IN THE DIRECTION SHOWN IN THE ABOVE DRAWINGS. DO NOT USE THESE PLUGS FOR REVERSE PRESSURE APPLICATIONS.***
- ***PLUG SIZES AND OPERATING PRESSURES DO NOT APPLY TO COATED PIPE. CONTACT EST PRIOR TO USE OF GRIP TIGHT PLUG ON ANY TYPE OF COATED PIPE / TUBE.***

1. PRIOR TO USE, replace damaged or worn grippers and seal. The surface between the cone and grippers must be free of friction producing dirt or corrosion. Verify proper operation of the test plug by hand tightening hexnut so that the grippers move freely to the end of the tapered cone surface. Fully loosen the hex nut. Should the grippers not fully retract, apply a light lubricant to the tapered surface of the cone and wipe away any excess. Threads should be kept well lubricated with antiseize. Inspect threads and apply antiseize if necessary before testing. If the nut cannot be easily advanced to allow full gripper expansion, **DO NOT USE THIS PLUG FOR TESTING** and contact EST Customer Service for assistance.

2. **The pipe ID to be tested must be within the limits specified on the plug.** Schedule 5 wall thickness pipe, or tubes with a wall thickness thinner than equivalent schedule 10 pipe, must have an OD restraint. Contact EST Customer Service for information. Position the test plug in clean, lubricant free pipe end so that all of the gripper is within the pipe.

3. Center the plug within the pipe while hand tightening the hex nut. Tighten hex nut until the test plug has gripped the pipe ID. Slight wiggling of the hand-tightened plug may allow further hand tightening of the hex nuts.

4. Tighten the hex nut to the installation torque specified in Table 1. Use of a calibrated torque wrench is recommended.

WARNING! FAILURE TO APPLY THE INSTALLATION TORQUE SPECIFIED IN TABLE 1 COULD RESULT IN UNSAFE OPERATION OR LEAKAGE.

5. Install the pressure source or vent to the plug, leak tight. For plugs not being used to pressurize or vent the system, install a pipe cap or pipe plug that is rated at or above the NG test plug working pressure. Tighten so that it is leak tight.

6. Fill the pipe with test medium while evacuating any residual air or gas. Slowly introduce the test pressure. The test pressure must never exceed the strength of the weakest component within the system being tested. Maximum test pressure based on ASTM A106 Grade B pipe is shown in Table 1.

7. As pressure increases, movement of the shaft as large as 0.10”(2.54mm) may be detected. This movement indicates additional squeeze of the seal and expansion of the grippers and is normal for this plug design. Should movement of the shaft or plug exceed 0.10”(2.54mm), release **ALL** pressure immediately, remove plug, examine, reinstall and begin testing in accordance with this operating procedure. Should movement of the shaft or plug during the test still exceed 0.10”(2.54), contact EST Customer Service for technical assistance.

8. Imperfections within the pipe being tested may cause small plug leaks as the test pressure is being increased. Should small leaks develop, additional tightening of the plug may be required. Prior to additional tightening remove pressurization from the system. Tighten the hex nut further and re-pressurize the system. If leakage continues, the imperfections within the pipe must be removed.

WARNING! NEVER STAND IN THE POSSIBLE PATH OF THE TEST PLUG

WARNING! NEVER EXCEED THE MAXIMUM TORQUE SPECIFIED IN TABLE 1 AS DAMAGE TO THE PLUG MAY OCCUR.

9. At the conclusion of the test, release **ALL** pressure, loosen the hex nut, remove and inspect plug. Worn or damaged plug components must be replaced before attempting further testing. Contact EST Customer Service for replacement part information.

10. Prior to storing, dry all parts of the plug and lubricate the shaft threads and hardened steel washers with antiseize.

11. Store these instructions with the plug.

QUESTIONS? Contact EST Customer Service at any of the following locations with questions.
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On the Internet: www.expansionseal.com

Expansion Seal Technologies is part of the EST Group of companies. **EST Group** provides a complete range of repair products, services and replacement parts covering the life cycle of tubular heat exchangers and condensers; additionally EST provides products and services to facilitate pressure testing pipe, piping systems, pressure vessels and their components. Visit EST Group on the internet at www.estgrp.com.

TABLE 1. NG Test Plug Installation Torque/Pressure Specifications

SALES PART NUMBER	PIPE SIZE (inches)	ID RANGE inches(mm)	NORMAL INSTALLATION TORQUE ft-lbs(kg-m)	MAXIMUM INSTALLATION TORQUE ft-lbs(kg-m)	MAXIMUM TEST PRESSURE[1] psi(bar)
GTNG1P80	1" sch 80	.93 - 1.00(23.6 - 25.4)	50 (7)	60 (8)	200 (13.7)
GTNG1P40	1" sch 40	1.01 - 1.09(25.7 - 27.7)	50 (7)	60 (8)	200 (13.7)
GTNG15PXXS	1-1/2" xxs	1.07 - 1.2(27.2 - 30.5)	50 (7)	60 (8)	200 (13.7)
GTNG1P10	1" sch 10	1.07 - 1.2(27.2 - 30.5)	50 (7)	60 (8)	200 (13.7)
GTNG125P160	1-1/4" sch 160	1.13 - 1.24(28.7 - 31.5)	50 (7)	75 (10)	200 (13.7)
GTNG1P5	1" sch 5	1.13 - 1.24(28.7 - 31.5)	50 (7)	75 (10)	200 (13.7)
GTNG125P80	1-1/4" sch 80	1.25 - 1.33(31.8 - 33.8)	50 (7)	75 (10)	200 (13.7)
GTNG125P40	1-1/4" sch 40/std	1.31 - 1.43(33.3 - 36.3)	50 (7)	75 (10)	200 (13.7)
GTNG15P160	1 1/2" sch 160	1.31 - 1.43(33.3 - 36.3)	50 (7)	75 (10)	200 (13.7)
GTNG125P10	1 - 1/4" sch 10	1.41 - 1.49(35.8 - 37.8)	75 (10)	150 (21)	200 (13.7)
GTNG125P5	1-1/4" sch 5	1.47 - 1.61(37.3 - 40.9)	75 (10)	150 (21)	200 (13.7)
GTNG15P80	1-1/2" sch 80	1.47 - 1.61(37.3 - 40.9)	75 (10)	150 (21)	200 (13.7)
GTNG2PXXS	2" xxs	1.47 - 1.61(37.3 - 40.9)	75 (10)	150 (21)	200 (13.7)
GTNG15P40	1-1/2" sch 40/std	1.58 - 1.66(40.1 - 42.2)	75 (10)	150 (21)	200 (13.7)
GTNG15P10	1-1/2" sch 10	1.66 - 1.77(42.2 - 45.0)	75 (10)	150 (21)	200 (13.7)
GTNG2P160	2" sch 160	1.66 - 1.77(42.2 - 45.0)	75 (10)	150 (21)	200 (13.7)
GTNG15P5	1-1/2" sch5	1.74 - 1.91(44.2 - 48.5)	75 (10)	150 (21)	200 (13.7)
GTNG25PXXS	2-1/2" xxs	1.74 - 1.91(44.2 - 48.5)	75 (10)	150 (21)	200 (13.7)
GTNG2P80	2" sch 80/xs	1.91 - 1.99(48.5 - 50.5)	75 (10)	150 (21)	200 (13.7)
GTNG198T		1.98 - 2.06(50.3 - 52.3)	75 (10)	150 (21)	200 (13.7)
GTNG2P40	2" sch 40/std	2.04 - 2.13(51.8 - 53.8)	75 (10)	150 (21)	200 (13.7)
GTNG2P10	2" sch 10	2.10 - 2.22(53.3 - 56.4)	75 (10)	150 (21)	200 (13.7)
GTNG25P160	2-1/2" sch 160	2.10 - 2.22(53.3 - 56.4)	75 (10)	150 (21)	200 (13.7)
GTNG2P5	2" sch 5	2.22 - 2.30(56.4 - 58.4)	75 (10)	150 (21)	200 (13.7)
GTNG25P80	2-1/2" sch 80/xs	2.27 - 2.45(57.7 - 62.2)	75 (10)	150 (21)	200 (13.7)
GTNG3PXXS	3" xxs	2.27 - 2.45(57.7 - 62.2)	75 (10)	150 (21)	200 (13.7)
GTNG25P40	2-1/2" sch 40/std	2.44 - 2.54(62.0 - 64.5)	150 (21)	300 (42)	200 (13.7)
GTNG253T		2.53 - 2.63(64.3 - 66.8)	150 (21)	300 (42)	200 (13.7)
GTNG25P10	2-1/2" sch 10	2.60 - 2.74(65.9 - 69.6)	150 (21)	300 (42)	200 (13.7)
GTNG3P160	3" sch 160	2.60 - 2.74(65.9 - 69.6)	150 (21)	300 (42)	200 (13.7)
GTNG25P5	2"-1/2" sch 5	2.68 - 2.78(68.1 - 70.6)	150 (21)	300 (42)	200 (13.7)
GTNG35PXXS	3-1/2" xxs	2.70 - 2.89(68.6 - 73.4)	150 (21)	300 (42)	200 (13.7)
GTNG3P80	3" sch 80/xs	2.87 - 2.98(72.9 - 75.7)	150 (21)	300 (42)	200 (13.7)
GTNG296T		2.96 - 3.07(75.2 - 78.0)	150 (21)	300 (42)	200 (13.7)
GTNG3P40	3" sch 40/std	3.04 - 3.14(77.2 - 79.8)	150 (21)	300 (42)	200 (13.7)
GTNG4PXXS	4" xxs	3.12 - 3.32(79.2 - 84.3)	150 (21)	300 (42)	200 (13.7)
GTNG3P10	3" sch 10	3.23 - 3.34(82.0 - 84.8)	150 (21)	300 (42)	200 (13.7)
GTNG3P5	3" sch 5	3.30 - 3.41(83.8 - 86.6)	150 (21)	300 (42)	200 (13.7)
GTNG35P80	3-1/2" sch 80/xs	3.33 - 3.44(84.6 - 87.4)	150 (21)	300 (42)	200 (13.7)
GTNG4P160	4" sch 160	3.41 - 3.57(86.6 - 90.7)	150 (21)	300 (42)	200 (13.7)
GTNG35P40	3-1/2" sch 40/std	3.52 - 3.63(89.4 - 92.2)	150 (21)	300 (42)	200 (13.7)
GTNG4P120	4" sch 120	3.60 - 3.74(91.4 - 95.0)	150 (21)	300 (42)	200 (13.7)
GTNG35P10	3-1/2" sch 10	3.73 - 3.84(94.7 - 97.5)	150 (21)	300 (42)	200 (13.7)
GTNG35P5	3-1/2" sch 5	3.80 - 3.91(96.5 - 99.3)	150 (21)	300 (42)	200 (13.7)
GTNG4P80	4" sch 80/xs	3.80 - 3.91(96.5 - 99.3)	150 (21)	300 (42)	200 (13.7)
GTNG390T		3.90 - 4.01(99.1 - 101.9)	150 (21)	300 (42)	200 (13.7)

(1) NEVER use a test pressure greater than the weakest component in the system can safely handle. DO NOT use on coated pipe at any psi: Contact EST to determine use.

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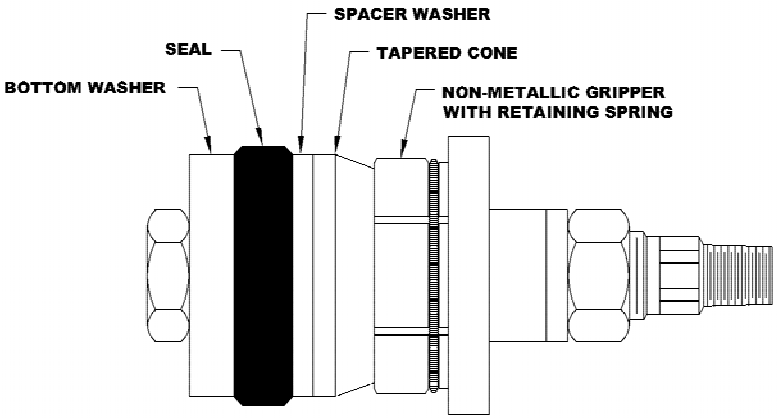
SEAL REPLACEMENT

1. Remove jam nut and unthread bottom washer from shaft.
2. Remove old seal and replace with new seal.
3. Thread bottom washer onto shaft and firmly tighten jam nut against bottom washer.

GRIPPER REPLACEMENT

1. Remove hex nut, hardened washer, compression tube if present and positioning washer.
2. Install the gripper assembly so that the tapered surface of the gripper mates with the tapered surface of the cone. If handled carefully the gripper assembly installed in its assembled configuration.
3. If gripper assembly has collapsed, install new spring over the plug so it is positioned around the tapered surface of the cone. Position grippers segments, one at a time on the cone surface and slide the spring into the groove on grippers. Repeat for each gripper segment. A screwdriver or similar tool may aid in the installation of the grippers and spring.



INSURE PARTS ARE ASSEMBLED AS SHOWN

WARNING! DO NOT MAR OR SCRATCH THE TAPERED CONE OR TAPERED GRIPPER SURFACE.

4. Install positioning washer. Lubricate shaft and hardened steel washer with antisieze, if necessary. Install the compression tubes if present, hardened steel washer and hex nut. Insure Griptight is assembled per drawing above.

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Expansion Seal Technologies is part of the EST Group of companies. **EST Group** provides a complete range of repair products, services and replacement parts covering the life cycle of tubular heat exchangers and condensers; additionally EST provides products and services to facilitate pressure testing pipe, piping systems, pressure vessels and their components. Visit EST Group on the internet at www.estgrp.com.

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OPERATING PROCEDURES FOR AUTO-GRIPTIGHT™ HIGH PRESSURE TEST PLUGS

WARNING! FOR PROPER OPERATION, GRIPTIGHT PLUGS MUST BE ASSEMBLED AS SHOWN.

- ***PRESSURE TESTING IS INHERENTLY DANGEROUS. STRICT ADHERENCE TO THESE OPERATION INSTRUCTIONS AND INDUSTRY SAFETY PRACTICES COULD PREVENT INJURY TO PERSONNEL***
- ***ALL PERSONNEL MUST BE CLEAR OF TEST PLUG WHEN PRESSURE TESTING***
- ***FOR SAFETY, AN INCOMPRESSIBLE LIQUID SUCH AS WATER SHOULD BE USED AS THE TEST MEDIUM. RESIDUAL AIR OR GAS IS TO BE EVACUATED FROM THE PIPE PRIOR TO TESTING. IN NON-VERTICAL APPLICATIONS THE OPTIONAL VENT, SHOWN ABOVE, WILL ALLOW FOR VENTING MOST AIR OR GAS. VENT IS AVAILABLE FOR MOST GRIPTIGHTS.***
- ***GRIPTIGHT TEST PLUGS ARE DESIGNED TO WITHSTAND PRESSURE IN THE DIRECTION SHOWN IN THE BELOW DRAWING. DO NOT USE THESE PLUGS FOR REVERSE PRESSURE APPLICATIONS.***
- ***PLUG SIZES AND OPERATING PRESSURES DO NOT APPLY TO COATED PIPE. CONTACT EST PRIOR TO USE OF GRIP TIGHT PLUG ON ANY TYPE OF COATED PIPE / TUBE.***

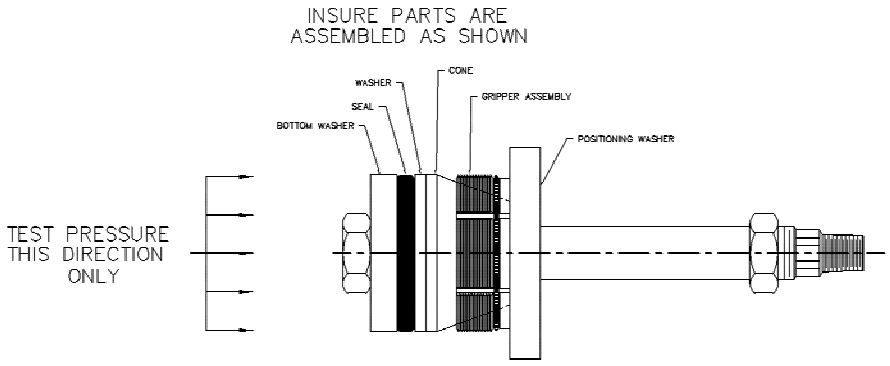

FIGURE 1

PRIOR TO USE

1. PRIOR TO USE, replace damaged or worn grippers and seal. Insure parts are assembled as shown in figure 1. The surface between the cone and grippers must be free of friction producing dirt or corrosion. Verify proper operation by hand advancing the grippers by pushing on positioning washer so that they move freely to the end of the tapered cone surface. Should the grippers not fully retract, apply a light lubricant to the tapered surface of the cone and wipe away any excess.

CYLINDER/AUTO-GRIPTIGHT™ ASSEMBLY

1. For sizes that have a 1/2" diameter shaft, the use of the shaft adapter that was supplied with the cylinder assembly is required. Remove jamnut from plug at NPT end and set aside. Replace damaged or worn grippers and seal. Insure the surface between the cone and grippers must be free of friction production dirt or corrosion. Apply hydraulic thread sealant to the pipe threads on the end of the shaft. Insure the compression tube around the cylinder piston is in place. the shaft assembly into the front of the Auto-GripTight™ Cylinder as shown in figure 2 & 4. The shaft assembly will engage the threads in the piston ID. Keep threading until enough of the shaft is extending to allow assembly with the shaft adapter. Tighten down to leak tight. Adjust the shaft adapter to allow proper operation of Auto-GripTight™. The grippers should be in the relaxed position, roughly the same diameter as the cones and seals. If excess space exists between parts, the shaft adapter should be turned counter-clockwise to remove the slack. With adjustments complete, hand tighten the jamnut on the shaft adapter against the cylinder piston.

2. For sizes that have a 5/8" diameter shaft, the use of the shaft positioner that was supplied with the cylinder assembly is required. Fully thread the shaft positioner into the cylinder piston. Remove the jamnut from the NPT end of the plug. Holding the wrench flats on the shaft positioner, insert the shaft assembly into the rear of the Auto-GripTight™ Cylinder as shown in figure 2 & 4. The shaft assembly will engage the threads in shaft positioner ID. Keep threading the plug into the cylinder. To allow proper operation of Auto-GripTight™, the grippers should be in the relaxed position, roughly the same diameter as the cones and seals. If excess space exists between parts, the shaft assembly should be threaded into cylinder an additional amount to remove the slack. With adjustments complete, hand-tighten the jamnut on the shaft assembly against the cylinder piston.

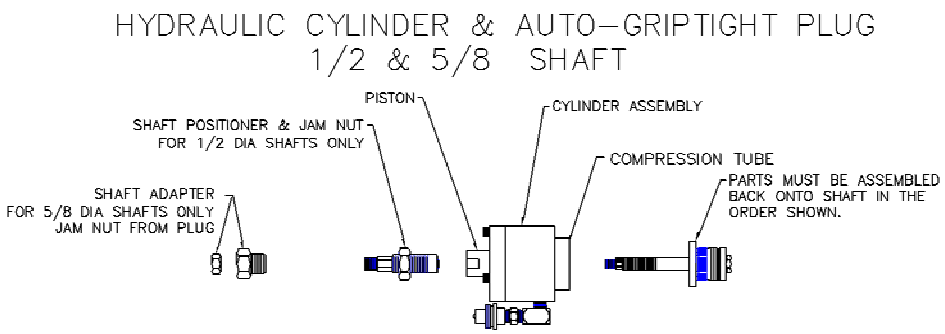

FIGURE 2

3. For sizes that have a 7/8 diameter shaft and larger, remove the jamnut from the NPT end of the plug. Holding the wrench flats on the cylinder, insert the shaft assembly into the rear of the Auto-GripTight™ Cylinder as shown in figure 3 & 4. The shaft assembly will engage the threads in cylinder ID. Keep threading the plug into the cylinder. To allow proper operation of Auto-GripTight™, the grippers should be in the relaxed position, roughly the same diameter as the cones and seals. If excess space exists between parts, the shaft assembly should be threaded into cylinder an additional amount to remove the slack. With adjustments complete, hand-tighten the jamnut on the shaft assembly against the cylinder piston.

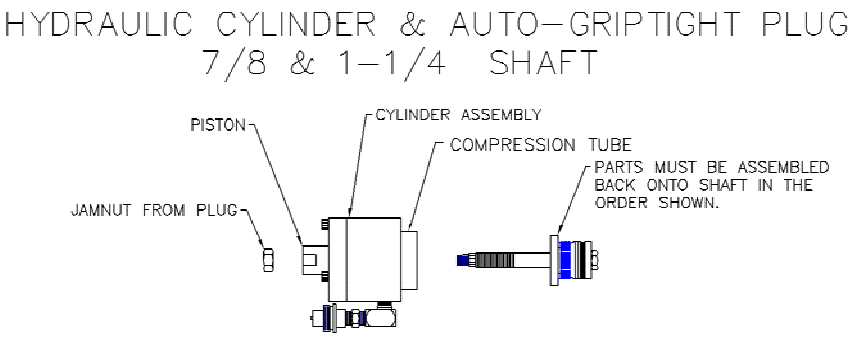

FIGURE 3

HYDRAULIC PUMP ADJUSTMENT

1. Depress the “release” pedal on the hydraulic pump.
2. Connect the clean dry air supply (40-125 psi or 3-9 bar) to the pump.
3. Disconnect any hydraulic hoses that are attached to the pump.
4. Depress the “pump” pedal on the pump and adjust the pressure regulator on the pump to meet the cylinder pressure shown in table 1.

SYSTEM SET-UP

1. Connect a hydrostatic test supply hose to one Auto-GripTight™, leak tight. Connect the bleed valve to the other Auto-GripTight™, leak tight.
2. Depress the "release" pedal on the hydraulic pump.
3. Connect hydraulic hose between the pump and each Auto-GripTight™ cylinder.

HYDRAULIC CYLINDER & AUTO–GRIPTIGHT PLUG
SHOWN ASSEMBLED

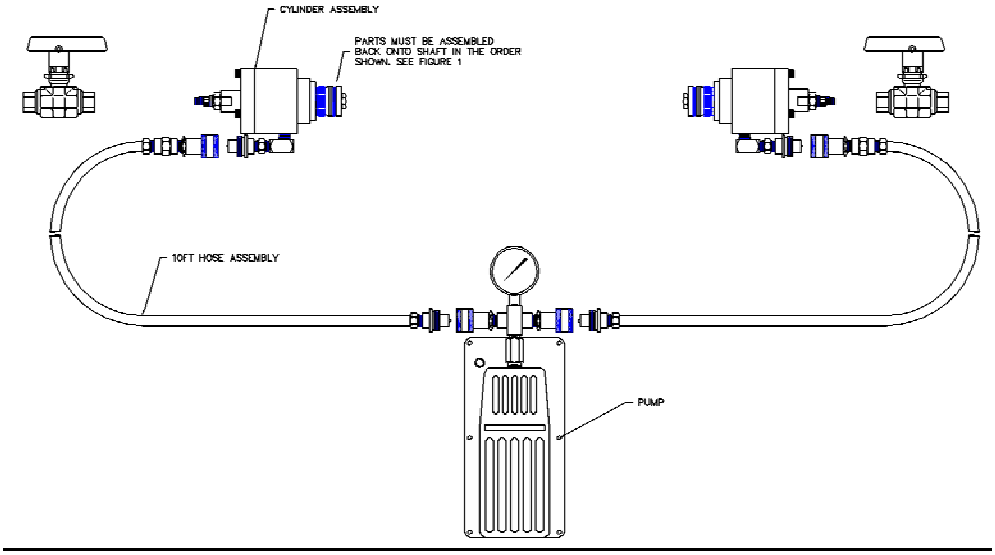

FIGURE 4

INSTALLATION PROCEDURES

1. The pipe I.D. to be tested must be within the limits specified on the plug. Prepare the pipe end. Auto-GripTight™ plugs are to be installed in a clean, lubricant free pipe end.

2. Position the Auto-GripTight™ assemblies in the pipe ends being tested.

3. While holding both cylinder assemblies in place, depress the “pump” pedal until the cylinder pressure listed in Table is achieved.

4. Open the bleed valve on the Auto-GripTight™.

5. Fill the pipe with water, while evacuating any residual air or gas. When a constant stream of water flows from the bleed valve, the valve must be closed.

6. Slowly introduce the test pressure. The test pressure must never exceed pressure listed in Table.

7. As pressure increases, movement of the shaft as large as 0.10” (2.54mm) may be detected. This movement indicates additional squeeze of the seal and expansion of the grippers and is normal for this plug design. Should movement of the shaft or plug exceed 0.10” (2.54mm), release ALL pressure immediately, remove plug, examine, reinstall and begin testing in accordance with this operating procedure. Should movement of the shaft or plug during the test still exceed 0.10” (2.54mm), contact the factory for technical assistance.

8. Slowly bring the pipe up to the desired test pressure.

9. At the conclusion of the test, release ALL pressure by slowly opening the bleed valve.

10. Depress the ”release” pedal on the pump to release the cylinder pressure. Repeat for all pipes being tested.

11. Withdraw the plug from the pipe and inspect. Any component that is worn or damaged must be replaced before attempting further testing. Contact the factory for replacement part information. Store these instructions with the plug.

Table 1. AUTO-GRIPTIGHT™ CYLINDER PRESSURES & TEST PRESSURES

SALES PART NUMBER	PIPE SIZE (inches)	ID RANGE inches(mm)	CYLINDER PRESSURES psi(bar)	MAXIMUM TEST PRESSURE[1] psi(bar)
GT1P80	1" sch 80	0.93 - 1.00(23.6 - 25.4)	3600 (248)	8600 (590)
GT1P40	1" sch 40	1.01 - 1.09(25.7 - 27.7)	3600 (248)	6200 (430)
GT15PXXS	1-1/2" xxs	1.07 - 1.2(27.2 - 30.5)	3600 (248)	13900 (960)
GT1P10	1" sch 10	1.07 - 1.2(27.2 - 30.5)	3200 (221)	5000 (350)
GT125P160	1-1/4" sch 160	1.13 - 1.24(28.7 - 31.5)	3200 (221)	9600 (660)
GT1P5	1" sch 5	1.13 - 1.24(28.7 - 31.5)	3200 (221)	2900 (200)
GT125P80	1-1/4" sch 80	1.25 - 1.33(31.8 - 33.8)	3200 (221)	7200 (500)
GT125P40	1-1/4" sch 40/std	1.31 - 1.43(33.3 - 36.3)	3200 (221)	5100 (350)
GT15P160	1 1/2" sch 160	1.31 - 1.43(33.3 - 36.3)	3200 (221)	9400 (650)
GT125P10	1 - 1/4" sch 10	1.41 - 1.49(35.8 - 37.8)	3200 (221)	3900 (270)
GT125P5	1-1/4" sch 5	1.47 - 1.61(37.3 - 40.9)	3200 (221)	2300 (160)
GT15P80	1-1/2" sch 80	1.47 - 1.61(37.3 - 40.9)	3200 (221)	6500 (450)
GT2PXXS	2" xxs	1.47 - 1.61(37.3 - 40.9)	3200 (221)	12000 (830)
GT15P40	1-1/2" sch 40/std	1.58 - 1.66(40.1 - 42.2)	3200 (221)	4600 (320)
GT15P10	1-1/2" sch 10	1.66 - 1.77(42.2 - 45.0)	3200 (221)	3400 (240)
GT2P160	2" sch 160	1.66 - 1.77(42.2 - 45.0)	3200 (221)	9200 (640)
GT15P5	1-1/2" sch5	1.74 - 1.91(44.2 - 48.5)	3200 (221)	2000 (140)
GT25PXXS	2-1/2" xxs	1.74 - 1.91(44.2 - 48.5)	3200 (221)	12600 (870)
GT2P80	2" sch 80/xs	1.91 - 1.99(48.5 - 50.5)	3200 (221)	5600 (390)
GT198T		1.98 - 2.06(50.3 - 52.3)	3200 (221)	see note 2
GT2P40	2" sch 40/std	2.04 - 2.13(51.8 - 53.8)	3200 (221)	3900 (270)
GT2P10	2" sch 10	2.10 - 2.22(53.3 - 56.4)	3200 (221)	2700 (190)
GT25P160	2-1/2" sch 160	2.10 - 2.22(53.3 - 56.4)	3200 (221)	8200 (570)
GT2P5	2" sch 5	2.22 - 2.30(56.4 - 58.4)	3200 (221)	1600 (110)
GT25P80	2-1/2" sch 80/xs	2.27 - 2.45(57.7 - 62.2)	3200 (221)	5900 (410)
GT3PXXS	3" xxs	2.27 - 2.45(57.7 - 62.2)	3200 (221)	11100 (770)
GT25P40	2-1/2" sch 40/std	2.44 - 2.54(62.0 - 64.5)	4400 (303)	4200 (290)
GT253T		2.53 - 2.63(64.3 - 66.8)	4400 (303)	see note 2
GT25P10	2-1/2" sch 10	2.60 - 2.74(65.9 - 69.6)	4400 (303)	2400 (170)
GT3P160	3" sch 160	2.60 - 2.74(65.9 - 69.6)	4400 (303)	7800 (540)
GT25P5	2"-1/2" sch 5	2.68 - 2.78(68.1 - 70.6)	4400 (303)	1600 (110)
GT35PXXS	3-1/2" xxs	2.70 - 2.89(68.6 - 73.4)	4400 (303)	10200 (700)
GT3P80	3" sch 80/xs	2.87 - 2.98(72.9 - 75.7)	4400 (303)	5200 (360)
GT296T		2.96 - 3.07(75.2 - 78.0)	4400 (303)	see note 2
GT3P40	3" sch 40/std	3.04 - 3.14(77.2 - 79.8)	4400 (303)	3700 (260)
GT4PXXS	4" xxs	3.12 - 3.32(79.2 - 84.3)	5000 (345)	9500 (660)
GT3P10	3" sch 10	3.23 - 3.34(82.0 - 84.8)	5000 (345)	2000 (140)
GT3P5	3" sch 5	3.30 - 3.41(83.8 - 86.6)	5000 (345)	1400 (100)
GT35P80	3-1/2" sch 80/xs	3.33 - 3.44(84.6 - 87.4)	5000 (345)	4800 (330)
GT4P160	4" sch 160	3.41 - 3.57(86.6 - 90.7)	5000 (345)	7400 (510)
GT35P40	3-1/2" sch 40/std	3.52 - 3.63(89.4 - 92.2)	5000 (345)	3300 (230)
GT4P120	4" sch 120	3.60 - 3.74(91.4 - 95.0)	5000 (345)	6000 (410)
GT35P10	3-1/2" sch 10	3.73 - 3.84(94.7 - 97.5)	5000 (345)	1700 (120)
GT35P5	3-1/2" sch 5	3.80 - 3.91(96.5 - 99.3)	5000 (345)	1200 (80)
GT4P80	4" sch 80/xs	3.80 - 3.91(96.5 - 99.3)	5000 (345)	4500 (310)
GT390T		3.90 - 4.01(99.1 - 101.9)	5000 (345)	see note 2
GT4P40	4" sch 40/std	4.00 - 4.11(101.6 - 104.4)	5000 (345)	3100(210)
GT5PXXS	5" xxs	4.03 - 4.25(102.4 - 108.0)	5000 (345)	8500 (590)
GT4P10	4" sch 10	4.23 - 4.34(107.4 - 110.2)	5000 (345)	1500 (100)

(1) NEVER use a test pressure greater than the weakest component in the system can safely handle. Test pressure specified in table is equivalent to 80% of pressure that will yield ASTM A106 Grade B pipe. The test pressure for higher and lower strength pipes will differ proportionally. The maximum test pressure for higher strength pipe must never exceed the highest test pressure listed for that pipe OD DO NOT use on coated pipe at any psi: Contact EST to determine use.
(2) Sizes which do not have a test pressure listed differ from standard pipe sizes. These plug sizes are normally used to test tubing. For use of these GripTight sizes in tubing with a minimum yield strength of 35ksi (240 MPa), the maximum test pressure is estimated by the test pressure listed for the equivalent or next larger pipe OD with the equivalent or next thinner wall thickness. The test pressure for higher and lower strength tubes will differ proportionally. The maximum test pressure for higher strength tubes must never exceed the highest test pressure listed for the equivalent or next larger pipe OD. NEVER use a test pressure greater than the weakest component in the system can safely handle.

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NG Test Plugs For Sanitary Pipe Testing

- ***NG Test Plugs***
- *GripTight™ Test Plugs*
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Simple, Safe & Reliable Testing of High Purity Pipe and Tube, without wall damage!

TÜV MANAGEMENT SERVICE ISO 9001

Testing of Stainless Steel Piping systems in sanitary applications is now easily accomplished with the new NG Test Plug from EST. Based on the proven GripTight™ High Pressure Test Plug design, the NG Test Plug uses the test pressure to seal more securely against the ID of the pipe or tube to be tested. The non-metallic gripper design of the NG Plug will not harm the ID of the pipe, and there is no metal to metal contact between the plug and the pipe ID. To operate, simply install into the open pipe end, torque the compression nut to engage the non-metallic gripper and seal, and begin testing.

The NG Test Plug offers the following features:

- Heavy Duty Construction: Plated steel with non-metallic grippers
- Versatile: Available for ID's from 0.470" (11.9mm) through 6.270" (159.3mm). (Consult factory for larger applications)
- Long wearing urethane, full disk seal design. Extends seal life.
- Easy to Maintain: Replacement seals and grippers readily available
- Optional Construction: 300 series Stainless Steel, and alternate seal materials available.
- Plugs are rated up to 200 psi (13.7 bar) depending on size.

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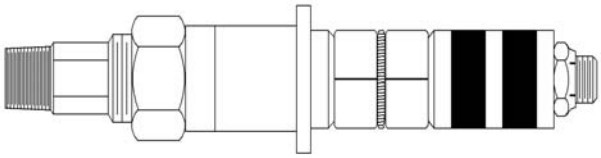
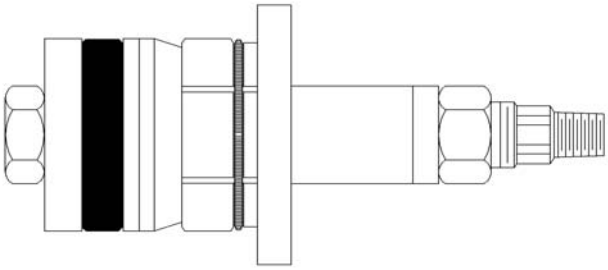
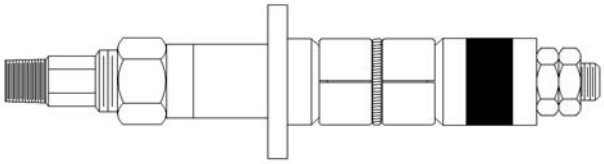
Technical Specifications -



GTNG-0047 to GTNG-0060



GTNG-1P80 to GTNG-6P40

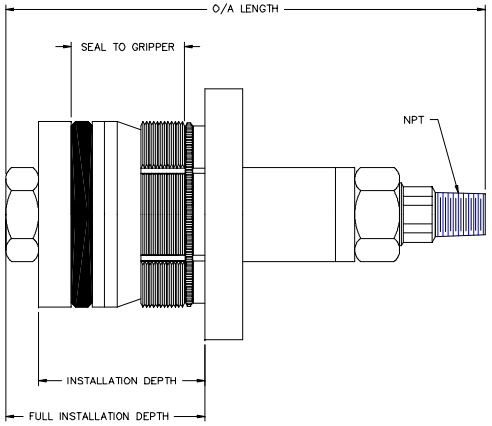


GTNG-0062 to GTNG-0090

Part Nbr	I.D. Size Range	Part Nbr	I.D. Size Range	Part Nbr	I.D. Size Range	Part Nbr	I.D. Size Range
GTNG-0047	.470-.499 in (11.94-12.67 mm)	GTNG-125P80	1.25-1.33 in (31.75-33.78 mm)	GTNG-253T	2.53-2.63 in (64.26-66.80 mm)	GTNG-4P10	4.23-4.34 in (107.44-110.24 mm)
GTNG-0050	.500-.529 in (12.70-13.44 mm)	GTNG-125P40	1.31-1.43 in (33.27-36.32 mm)	GTNG-25P10	2.60-2.74 in (66.04-69.60 mm)	GTNG-4P5	4.28-4.47 in (108.71-113.54 mm)
GTNG-0053	.530-.559 in (13.46-14.20 mm)	GTNG-15P160	1.31-1.43 in (33.27-36.32 mm)	GTNG-3P160	2.60-2.74 in (66.04-69.60 mm)	GTNG-5P160	4.28-4.47 in (108.71-113.54 mm)
GTNG-0056	.560-.599 in (14.22-15.21 mm)	GTNG-125P10	1.41-1.49 in (35.81-37.85 mm)	GTNG-25P5	2.68-2.78 in (68.07-70.61 mm)	GTNG-442T	4.42-4.58 in (112.27-116.33 mm)
GTNG-0060	.600-.619 in (15.24-15.72 mm)	GTNG-125P5	1.47-1.61 in (37.34-40.89 mm)	GTNG-35PXXS	2.70-2.89 in (68.58-78.41 mm)	GTNG-5P120	4.53-4.69 in (115.06-119.13 mm)
GTNG-0062	.620-.649 in (15.75-16.48 mm)	GTNG-15P80	1.47-1.61 in (37.34-40.89 mm)	GTNG-3P80	2.87-2.98 in (72.90-75.69 mm)	GTNG-466T	4.66-4.82 in (118.36-122.43 mm)
GTNG-0065	.650-.679 in (16.51-17.25 mm)	GTNG-2PXXS	1.47-1.61 in (37.34-40.89 mm)	GTNG-296T	2.96-3.07 in (75.18-77.98 mm)	GTNG-5P80	4.78-4.91 in (121.41-124.74 mm)
GTNG-0068	.680-.719 in (17.27-18.26 mm)	GTNG-15P40	1.58-1.66 in (40.13-42.16 mm)	GTNG-3P40	3.04-3.14 in (77.22-79.76 mm)	GTNG-6PXXS	4.87-5.11 in (123.70-129.79 mm)
GTNG-0072	.720-.749 in (18.29-19.02 mm)	GTNG-15P10	1.66-1.77 in (42.16-44.96 mm)	GTNG-4PXXS	3.12-3.32 in (79.25-84.33 mm)	GTNG-5P40	5.02-5.14 in (127.51-130.56 mm)
GTNG-0075	.750-.779 in (19.05-19.79 mm)	GTNG-2P160	1.66-1.77 in (42.16-44.96 mm)	GTNG-3P10	3.23-3.34 in (82.04-84.84 mm)	GTNG-514T	5.14-5.26 in (130.56-133.60 mm)
GTNG-0078	.780-.809 in (19.81-20.55 mm)	GTNG-15P5	1.74-1.91 in (44.20-48.51 mm)	GTNG-3P5	3.30-3.41 in (83.82-86.61 mm)	GTNG-6P160	5.16-5.37 in (131.06-136.40 mm)
GTNG-0081	.810-.829 in (20.57-21.06 mm)	GTNG-25PXXS	1.74-1.91 in (44.20-48.51 mm)	GTNG-35P80	3.33-3.44 in (84.58-87.38 mm)	GTNG-5P10	5.27-5.39 in (133.86-136.91 mm)
GTNG-0083	.830-.869 in (21.08-22.07 mm)	GTNG-2P80	1.91-1.99 in (48.51-50.55 mm)	GTNG-4P160	3.41-3.57 in (86.61-90.68 mm)	GTNG-5P5	5.32-5.44 in (135.13-138.18 mm)
GTNG-0087	.870-.899 in (22.10-22.83 mm)	GTNG-198T	1.98-2.06 in (50.29-52.32 mm)	GTNG-35P40	3.52-3.63 in (89.41-92.20 mm)	GTNG-534T	5.34-5.51 in (135.64-139.95 mm)
GTNG-0090	.900-.939 in (22.86-23.85 mm)	GTNG-2P40	2.04-2.12 in (51.82-53.85 mm)	GTNG-4P120	3.60-3.74 in (91.44-95.00 mm)	GTNG-6P120	5.47-5.64 in (138.94-143.26 mm)
GTNG-1P80	.930-1.00 in (23.62-25.40 mm)	GTNG-2P10	2.10-2.22 in (53.34-56.39 mm)	GTNG-35P10	3.73-3.84 in (94.74-97.54 mm)	GTNG-562T	5.62-5.76 in (142.75-146.30 mm)
GTNG-1P40	1.01-1.09 in (25.65-27.69 mm)	GTNG-25P160	2.10-2.22 in (53.34-56.39 mm)	GTNG-35P5	3.80-3.91 in (96.52-99.31 mm)	GTNG-6P80	5.73-5.87 in (145.54-149.10 mm)
GTNG-15PXXS	1.07-1.20 in (27.18-30.48 mm)	GTNG-2P5	2.22-2.60 in (56.39-66.04 mm)	GTNG-4P80	3.80-3.91 in (96.52-99.31 mm)	GTNG-588T	5.88-6.03 in (149.35-153.16 mm)
GTNG-1P10	1.07-1.20 in (27.18-30.48 mm)	GTNG-25P80	2.27-2.45 in (57.66-62.23 mm)	GTNG-390T	3.90-4.01 in (99.06-101.85 mm)	GTNG-6P40	6.04-6.17 in (153.42-156.72 mm)
GTNG-125P160	1.13-1.24 in (28.70-31.50 mm)	GTNG-3PXXS	2.27-2.45 in (57.66-62.23 mm)	GTNG-4P40	4.00-4.11 in (101.60-104.39 mm)		
GTNG-1P5	1.13-1.24 in (28.70-31.50 mm)	GTNG-25P40	2.44-2.54 in (61.98-64.52 mm)	GTNG-5PXXS	4.03-4.25 in (102.36-107.95 mm)		

Larger sizes available. Contact EST Customer Service. Specifications subject to change without notice.

GripTight High Pressure Test Plug (0.93" to 2.30" ID Sizes) - Technical Specifications



Part Number	Nom. Pipe Size	Nom. Pipe Sch	I.D. Size Range				Plug O.D.		Undercut From Minimum I.D.		Std Seal Mat'l (1)	Number of Shafts	Shaft O.D.		Shaft I.D.		NPT(2) Size	O/A Length		Seal to Gripper		Instl'n Depth		Full Instl'n Depth		Max. Test Pressure (3) (4)		Shaft Hex Wrench Size	Hex Nut Wrench Size	Approx. Shipping Weight	
			Min.	Max.	Min.	Max.																								
			(in)	(in)	(mm)	(mm)	(in)	(mm)	(in)	(mm)			(in)	(mm)	(in)	(mm)		(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(psi)	(Bar)	(in)	(in)	(lbs)	(kgs)
GT-1P80	1	80 / XS	0.93	1.00	23.6	25.4	0.89	22.6	0.04	1.0	U	1	1/2	12.7	1/8	3.2	1/8M	6	152.4	2 1/16	52.4	2 11/16	68.3	3 1/8	79.4	8,600	590	3/8	3/4	3/4	0.34
GT-1P40	1	40 / STD	1.01	1.09	25.7	27.7	0.97	24.6	0.04	1.0	U	1	1/2	12.7	1/8	3.2	1/8M	6	152.4	1 15/16	49.2	2 5/8	66.7	3	76.2	6,200	430	3/8	3/4	3/4	0.34
GT-15PXXS	1 1/2	XXS	1.07	1.20	27.2	30.5	1.03	26.2	0.04	1.0	U	1	1/2	12.7	1/8	3.2	1/8M	6	152.4	2 1/16	52.4	2 11/16	68.3	3 1/8	79.4	13,900	960	3/8	3/4	3/4	0.34
GT-1P10	1	10	1.07	1.20	27.2	30.5	1.03	26.2	0.04	1.0	U	1	1/2	12.7	1/8	3.2	1/8M	6	152.4	2 1/16	52.4	2 11/16	68.3	3 1/8	79.4	5,000	350	3/8	3/4		
GT-125P160	1 1/4	160	1.13	1.24	28.7	31.5	1.07	27.2	0.06	1.5	U	1	5/8	16.0	5/16	7.9	1/4M	6 5/8	168.3	2 1/16	52.4	2 3/4	69.9	3 3/16	81.0	9,600	660	1/2	15/16	1	0.45
GT-1P5	1	5	1.13	1.24	28.7	31.5	1.07	27.2	0.06	1.5	U	1	5/8	16.0	5/16	7.9	1/4M	6 5/8	168.3	2 1/16	52.4	2 3/4	69.9	3 3/16	81.0	2,900	200	1/2	15/16		
GT-125P80	1 1/4	80 / XS	1.25	1.33	31.8	33.8	1.19	30.2	0.06	1.5	U	1	5/8	15.9	5/16	7.9	1/4M	6 5/8	168.3	2	50.8	2 5/8	66.7	3 1/8	79.4	7,200	500	1/2	15/16	1 1/4	0.57
GT-125P40	1 1/4	40 / STD	1.31	1.43	33.3	36.3	1.25	31.8	0.06	1.5	U	1	5/8	15.9	5/16	7.9	1/4M	6 5/8	168.3	2	50.8	2 5/8	66.7	3 1/8	79.4	5,100	350	1/2	15/16	1 1/4	0.57
GT-15P160	1 1/2	160	1.31	1.43	33.3	36.3	1.25	31.8	0.06	1.5	U	1	5/8	15.9	5/16	7.9	1/4M	6 5/8	168.3	2	50.8	2 5/8	66.7	3 1/8	79.4	9,400	650	1/2	15/16		
GT-125P10	1 1/4	10	1.41	1.49	35.8	37.8	1.35	34.3	0.06	1.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 1/4	57.2	2 15/16	74.6	3 9/16	90.5	3,900	270	11/16	1 5/16	2 1/4	1.02
GT-125P5	1 1/4	5	1.47	1.61	37.3	40.9	1.41	35.8	0.06	1.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 1/4	57.2	2 15/16	74.6	3 9/16	90.5	2,300	160	11/16	1 5/16	2 1/4	1.02
GT-15P80	1 1/2	80	1.47	1.61	37.3	40.9	1.41	35.8	0.06	1.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 1/4	57.2	2 15/16	74.6	3 9/16	90.5	6,500	450	11/16	1 5/16		
GT-2PXXS	2	XXS	1.47	1.61	37.3	40.9	1.41	35.8	0.06	1.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 1/4	57.2	2 15/16	74.6	3 9/16	90.5	12,000	830	11/16	1 5/16		
GT-15P40	1 1/2	40 / STD	1.58	1.66	40.1	42.2	1.52	38.6	0.06	1.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 1/8	54.0	2 13/16	71.4	3 7/16	87.3	4,600	320	11/16	1 5/16	2 1/4	1.02
GT-15P10	1 1/2	10	1.66	1.77	42.2	45.0	1.60	40.6	0.06	1.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 3/16	55.6	2 13/16	71.4	3 7/16	87.3	3,400	240	11/16	1 5/16	2 1/2	1.13
GT-2P160	2	160	1.66	1.77	42.2	45.0	1.60	40.6	0.06	1.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 3/16	55.6	2 13/16	71.4	3 7/16	87.3	9,200	640	11/16	1 5/16		
GT-15P5	1 1/2	5	1.74	1.91	44.2	48.5	1.68	42.7	0.06	1.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 1/4	57.2	2 7/8	73.0	3 1/2	88.9	2,000	140	11/16	1 5/16	2 1/2	1.13
GT-25PXXS	2 1/2	XXS	1.74	1.91	44.2	48.5	1.68	42.7	0.06	1.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 1/4	57.2	2 7/8	73.0	3 1/2	88.9	12,600	870	11/16	1 5/16		
GT-2P80	2	80 / XS	1.91	1.99	48.5	50.5	1.81	46.0	0.10	2.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 1/8	54.0	2 13/16	71.4	3 7/16	87.3	5,600	390	11/16	1 5/16	2 1/2	1.13
GT-198T			1.98	2.06	50.3	52.3	1.88	47.8	0.10	2.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 1/8	54.0	2 13/16	71.4	3 7/16	87.3	(3) (4)	(3) (4)	11/16	1 5/16	3	1.36
GT-2P40	2	40 / STD	2.04	2.13	51.8	54.1	1.94	49.3	0.10	2.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 1/8	54.0	2 13/16	71.4	3 7/16	87.3	3,900	270	11/16	1 5/16	2 3/4	1.25
GT-2P10	2	10	2.10	2.22	53.3	56.4	2.00	50.8	0.10	2.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 5/16	58.7	2 7/8	73.0	3 1/2	88.9	2,700	190	11/16	1 5/16	3 1/2	1.59
GT-25P160	2 1/2	160	2.10	2.22	53.3	56.4	2.00	50.8	0.10	2.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 5/16	58.7	2 7/8	73.0	3 1/2	88.9	8,200	570	11/16	1 5/16		
GT-2P5	2	5	2.22	2.30	56.4	58.4	2.12	53.8	0.10	2.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 1/8	54.0	2 13/16	71.4	3 7/16	87.3	1,600	110	11/16	1 5/16	3 1/2	1.59

Notes:

(1) Standard Seal Material: U = urethane, N = neoprene

(2) M = Male NPT, F = Female NPT

(3) NEVER use a test pressure greater than the weakest component in the system can handle. Test Pressure specified in table is equivalent to 80% of the pressure that will yield ASTM A106 Grade B pipe. The test pressure for higher and lower strength pipes will differ proportionally. The maximum test pressure for higher strength pipe must never exceed the highest test pressure listed for that pipe O.D.

(4) Sizes that do not have a test pressure listed differ from standard pipe sizes. These plug sizes are normally used to test tubing. For use of these GripTight sizes in tubing with a minimum yield strength of 35ksi, the maximum test pressure is estimated by the test pressure listed for the equivalent or next larger pipe O.D. with the equivalent or next thinner wall thickness. The test pressure for higher and lower strength tubes will differ proportinally. The maximum test pressure for higher strength tubes must never exceed the highest test pressure listed for the equivalent or next larger pipe size. NEVER use a test pressure greater than the weakest component in the system can safely handle.

(5) Specifications subject to change without notice.

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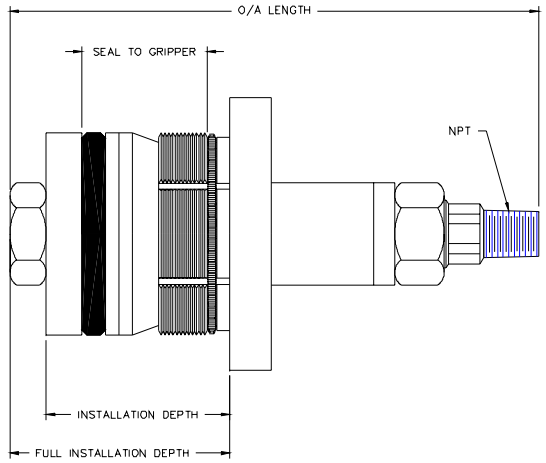
GripTight High Pressure Test Plug (2.27" to 4.25" ID Sizes) - Technical Specifications



Part Number	Nom. Pipe Size	Nom. Pipe Sch	I.D. Size Range				Plug O.D.		Undercut From Minimum I.D.		Std Seal Mat'l (1)	Number of Shafts	Shaft O.D.		Shaft I.D.		NPT(2) Size	O/A Length		Seal to Gripper		Instl'n Depth		Full Instl'n Depth		Max. Test Pressure (3) (4)		Shaft Hex Wrench Size	Hex Nut Wrench Size	Approx. Shipping Weight	
			Min. (in)	Max. (in)	Min. (mm)	Max. (mm)	(in)	(mm)	(in)	(mm)			(in)	(mm)	(in)	(mm)		(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(psi)	(Bar)	(in)	(in)	(lbs)	(kgs)
GT-25P80	2 1/2	80 / XS	2.27	2.45	57.7	62.2	2.17	55.1	0.10	2.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 5/16	58.7	2 7/8	73.0	3 1/2	88.9	5,900	410	11/16	1 5/16	3 1/2	1.59
GT-3PXXS	3	XXS	2.27	2.45	57.7	62.2	2.17	55.1	0.10	2.5	U	1	7/8	22.4	7/16	11.1	3/8M	7	177.8	2 5/16	58.7	2 7/8	73.0	3 1/2	88.9	11,100	770	11/16	1 5/16		
GT-25P40	2 1/2	40 / STD	2.44	2.54	62.0	64.5	2.34	59.4	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2	50.8	3	76.2	3 7/8	98.4	4,200	290	1	1 7/8	6	2.72
GT-253T			2.53	2.63	64.3	66.8	2.43	61.7	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 1/16	52.4	3	76.2	3 7/8	98.4	(3) (4)	(3) (4)	1	1 7/8	6	2.72
GT-25P10	2 1/2	10	2.60	2.74	66.0	69.6	2.50	63.5	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 1/4	57.2	3 5/16	84.1	4 3/16	106.4	2,400	170	1	1 7/8	6 3/4	3.06
GT-3P160	3	160	2.60	2.74	66.0	69.6	2.50	63.5	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 1/4	57.2	3 5/16	84.1	4 3/16	106.4	7,800	540	1	1 7/8		
GT-25P5	2 1/2	5	2.68	2.78	68.1	70.6	2.58	65.5	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2	50.8	3	76.2	3 7/8	98.4	1,600	110	1	1 7/8	7	3.17
GT-35PXXS	3 1/2	XXS	2.70	2.89	68.6	73.4	2.60	66.0	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 3/8	60.3	3 1/2	88.9	4 3/8	111.1	10,200	700	1	1 7/8	7 1/2	3.40
GT-3P80	3	80 / XS	2.87	2.98	72.9	75.7	2.77	70.4	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 1/8	54.0	3 3/16	81.0	4 1/16	103.2	5,200	360	1	1 7/8	7 1/2	3.40
GT-296T			2.96	3.07	75.2	78.0	2.86	72.6	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 3/16	55.6	3 3/16	81.0	4 1/16	103.2	(3) (4)	(3) (4)	1	1 7/8	7 1/2	3.40
GT-3P40	3	40 / STD	3.04	3.14	77.2	79.8	2.94	74.7	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 1/8	54.0	3 3/16	81.0	4 1/16	103.2	3,700	260	1	1 7/8	8	3.62
GT-4PXXS	4	XXS	3.12	3.32	79.2	84.3	3.02	76.7	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 5/8	66.7	3 13/16	96.8	4 11/16	119.1	9,500	660	1	1 7/8	8 3/4	3.96
GT-3P10	3	10	3.23	3.34	82.0	84.8	3.13	79.5	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 3/16	55.6	3 3/16	81.0	4 1/16	103.2	2,000	140	1	1 7/8	8 1/4	3.74
GT-3P5	3	5	3.30	3.41	83.8	86.6	3.20	81.3	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 3/16	55.6	3 3/16	81.0	4 1/16	103.2	1,400	100	1	1 7/8	8 1/2	3.85
GT-35P80	3 1/2	80 / XS	3.33	3.44	84.6	87.4	3.23	82.0	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 5/16	58.7	3 5/16	84.1	4 1/4	108.0	4,800	330	1	1 7/8	8 3/4	3.96
GT-4P160	4	160	3.41	3.57	86.6	90.7	3.31	84.1	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 9/16	65.1	3 11/16	93.7	4 9/16	115.9	7,400	510	1	1 7/8	9 1/2	4.30
GT-35P40	3 1/2	40 / STD	3.52	3.63	89.4	92.2	3.42	86.9	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 5/16	58.7	3 5/16	84.1	4 3/16	106.4	3,300	230	1	1 7/8	9 1/2	4.30
GT-4P120	4	120	3.60	3.74	91.4	95.0	3.50	88.9	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 1/2	63.5	3 5/8	92.1	4 1/2	114.3	6,000	410	1	1 7/8	10 1/4	4.64
GT-35P10	3 1/2	10	3.73	3.84	94.7	97.5	3.63	92.2	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 5/16	58.7	3 5/16	84.1	4 3/16	106.4	1,700	120	1	1 7/8	10 1/2	4.76
GT-35P5	3 1/2	5	3.80	3.91	96.5	99.3	3.70	94.0	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 9/16	65.1	3 9/16	90.5	4 7/16	112.7	1,200	80	1	1 7/8	11 1/4	5.10
GT-4P80	4	80 / XXS	3.80	3.91	96.5	99.3	3.70	94.0	0.10	2.5	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 9/16	65.1	3 9/16	90.5	4 7/16	112.7	4,500	310	1	1 7/8		
GT-390T			3.90	4.01	99.1	101.9	3.79	96.3	0.11	2.8	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 5/8	66.7	3 5/8	92.1	4 1/2	114.3	(3) (4)	(3) (4)	1	1 7/8	11 1/2	5.21
GT-4P40	4	40 / STD	4.00	4.11	101.6	104.4	3.89	98.8	0.11	2.8	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 5/8	66.7	3 5/8	92.1	4 1/2	114.3	3,100	210	1	1 7/8	12	5.44
GT-5PXXS	5	XXS	4.03	4.25	102.4	108.0	3.92	99.6	0.11	2.8	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	3 3/16	81.0	4 5/16	109.5	5 1/4	133.4	8,500	590	1	1 7/8	14	6.34

Notes:

(1) Standard Seal Material: U = urethane, N = neoprene

(2) M = Male NPT, F = Female NPT

(3) NEVER use a test pressure greater than the weakest component in the system can handle. Test Pressure specified in table is equivalent to 80% of the pressure that will yield ASTM A106 Grade B pipe. The test pressure for higher and lower strength pipes will differ proportionally. The maximum test pressure for higher strength pipe must never exceed the highest test pressure listed for that pipe O.D.

(4) Sizes that do not have a test pressure listed differ from standard pipe sizes. These plug sizes are normally used to test tubing. For use of these GripTight sizes in tubing with a minimum yield strength of 35ksi, the maximum test pressure is estimated by the test pressure listed for the equivalent or next larger pipe O.D. with the equivalent or next thinner wall thickness. The test pressure for higher and lower strength tubes will differ proportinally. The maximum test pressure for higher strength tubes must never exceed the highest test pressure listed for the equivalent or next larger pipe size. NEVER use a test pressure greater than the weakest component in the system can safely handle.

(5) Specifications subject to change without notice.

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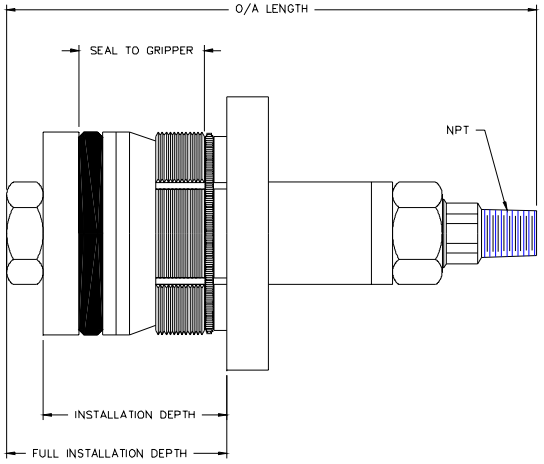
GripTight High Pressure Test Plug (4.23" to 6.82" ID Sizes) - Technical Specifications



Part Number	Nom. Pipe Size	Nom. Pipe Sch	I.D. Size Range				Plug O.D.		Undercut From Minimum I.D.		Std Seal Mat'l (1)	Number of Shafts	Shaft O.D.		Shaft I.D.		NPT (2) Size	O/A Length		Seal to Gripper		Instl'n Depth		Full Instl'n Depth		Max. Test Pressure (3) (4)		Shaft Hex Wrench Size	Hex Nut Wrench Size	Approximate Shipping Weight	
			Min. (in)	Max. (in)	Min. (mm)	Max. (mm)	(in)	(mm)	(in)	(mm)			(in)	(mm)	(in)	(mm)		(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(psi)	(Bar)	(in)	(in)	(lbs)	(kgs)
GT-4P10	4	10	4.23	4.34	107.4	110.2	4.12	104.6	0.11	2.8	U	1	1 1/4	31.8	9/16	14.3	1/2M	9	227.0	2 5/8	66.7	3 5/8	92.1	4 3/4	120.7	1,500	100	1	1 7/8	13 1/4	6.00
GT-4P5	4	5	4.28	4.47	108.7	113.5	4.17	105.9	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 3/4	95.3	4 15/16	125.4	5 15/16	150.8	1,100	80	1 1/4	2 1/4	18	8.16
GT-5P160	5	160	4.28	4.47	108.7	113.5	4.17	105.9	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 3/4	95.3	4 15/16	125.4	5 15/16	150.8	7,000	480	1 1/4	2 1/4		
GT-442T			4.42	4.58	112.3	116.3	4.31	109.5	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 13/16	96.8	4 13/16	122.2	5 7/8	149.2	(3) (4)	(3) (4)	1 1/4	2 1/4	18 1/2	8.38
GT-5P120	5	120	4.53	4.69	115.1	119.1	4.42	112.3	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 3/4	95.3	4 13/16	122.2	5 7/8	149.2	5,500	380	1 1/4	2 1/4	19 1/4	8.72
GT-466T			4.66	4.82	118.4	122.4	4.55	115.6	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 3/4	95.3	4 13/16	122.2	5 7/8	149.2	(3) (4)	(3) (4)	1 1/4	2 1/4	20	9.06
GT-5P80	5	80 / XS	4.78	4.91	121.4	124.7	4.67	118.6	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 11/16	93.7	4 11/16	119.1	5 3/4	146.1	4,000	280	1 1/4	2 1/4	20 1/2	9.29
GT-6PXXS	6	XXS	4.87	5.11	123.7	129.8	4.76	120.9	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	4 1/16	103.2	5 5/16	134.9	6 3/8	161.9	8,200	570	1 1/4	2 1/4	21	9.52
GT-5P40	5	40 / STD	5.02	5.14	127.5	130.6	4.91	124.7	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 11/16	93.7	4 11/16	119.1	5 3/4	146.1	2,700	190	1 1/4	2 1/4	21 3/4	9.85
GT-514T			5.14	5.26	130.6	133.6	5.03	127.8	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 11/16	93.7	4 11/16	119.1	5 3/4	146.1	(3) (4)	(3) (4)	1 1/4	2 1/4	22 3/4	10.31
GT-6P160	6	160	5.16	5.37	131.1	136.4	5.05	128.3	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	4	101.6	5 1/4	133.4	6 1/4	158.8	6,700	460	1 1/4	2 1/4	25 1/4	11.44
GT-5P10	5	10	5.27	5.39	133.9	136.9	5.16	131.1	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 11/16	93.7	4 11/16	119.1	5 3/4	146.1	1,400	100	1 1/4	2 1/4	23 3/4	10.76
GT-5P5	5	5	5.32	5.44	135.1	138.2	5.21	132.3	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 11/16	93.7	4 11/16	119.1	5 3/4	146.1	1,100	80	1 1/4	2 1/4	23 3/4	10.76
GT-534T			5.34	5.51	135.6	140.0	5.23	132.8	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	4	101.6	5 1/8	130.2	6 1/8	155.6	(3) (4)	(3) (4)	1 1/4	2 1/4	26 1/2	12.01
GT-6P120	6	120	5.47	5.64	138.9	143.3	5.36	136.1	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	4	101.6	5 1/8	130.2	6 1/8	155.6	5,100	350	1 1/4	2 1/4	27 1/2	12.46
GT-562T			5.62	5.76	142.7	146.3	5.51	140.0	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 15/16	100.0	5 1/16	128.6	6 1/16	154.0	(3) (4)	(3) (4)	1 1/4	2 1/4	28 1/2	12.91
GT-6P80	6	80 / XS	5.73	5.87	145.5	149.1	5.62	142.7	0.11	2.8	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 15/16	100.0	5 1/16	128.6	6 1/16	154.0	3,900	270	1 1/4	2 1/4	29	13.14
GT-588T			5.88	6.03	149.4	153.2	5.76	146.3	0.12	3.0	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 15/16	100.0	5 1/8	130.2	6 1/8	155.6	(3) (4)	(3) (4)	1 1/4	2 1/4	30 3/4	13.93
GT-6P40	6	40 / STD	6.04	6.17	153.4	156.7	5.92	150.4	0.12	3.0	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 15/16	100.0	5 1/16	128.6	6 1/16	154.0	2,500	170	1 1/4	2 1/4	32 3/4	14.84
GT-618T			6.18	6.32	157.0	160.5	6.06	153.9	0.12	3.0	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 15/16	100.0	5 1/16	128.6	6 1/8	155.6	(3) (4)	(3) (4)	1 1/4	2 1/4	33 1/4	15.07
GT-6P10	6	10	6.33	6.47	160.8	164.3	6.21	157.7	0.12	3.0	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 15/16	100.0	5 1/16	128.6	6 1/16	154.0	1,200	80	1 1/4	2 1/4	34	15.41
GT-6P5	6	5	6.38	6.52	162.1	165.6	6.26	159.0	0.12	3.0	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 15/16	100.0	5 1/16	128.6	6 1/16	154.0	940	70	1 1/4	2 1/4	35 1/4	15.97
GT-653T			6.53	6.67	165.9	169.4	6.41	162.8	0.12	3.0	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 15/16	100.0	5 1/16	128.6	6 1/8	155.6	(3) (4)	(3) (4)	1 1/4	2 1/4	37 1/4	16.88
GT-668T			6.68	6.82	169.7	173.2	6.56	166.6	0.12	3.0	U/N	1	1 1/2	38.1	3/4	19.1	3/4M	10 1/8	257.2	3 15/16	100.0	5 1/16	128.6	6 1/8	155.6	(3) (4)	(3) (4)	1 1/4	2 1/4	38 1/2	17.44

Notes:

(1) Standard Seal Material: U = urethane, N = neoprene

(2) M = Male NPT, F = Female NPT

(3) NEVER use a test pressure greater than the weakest component in the system can handle. Test Pressure specified in table is equivalent to 80% of the pressure that will yield ASTM A106 Grade B pipe. The test pressure for higher and lower strength pipes will differ proportionally. The maximum test pressure for higher strength pipe must never exceed the highest test pressure listed for that pipe O.D.

(4) Sizes that do not have a test pressure listed differ from standard pipe sizes. These plug sizes are normally used to test tubing. For use of these GripTight sizes in tubing with a minimum yield strength of 35ksi, the maximum test pressure is estimated by the test pressure listed for the equivalent or next larger pipe O.D. with the equivalent or next thinner wall thickness. The test pressure for higher and lower strength tubes will differ proportionally. The maximum test pressure for higher strength tubes must never exceed the highest test pressure listed for the equivalent or next larger pipe size. NEVER use a test pressure greater than the weakest component in the system can safely handle.

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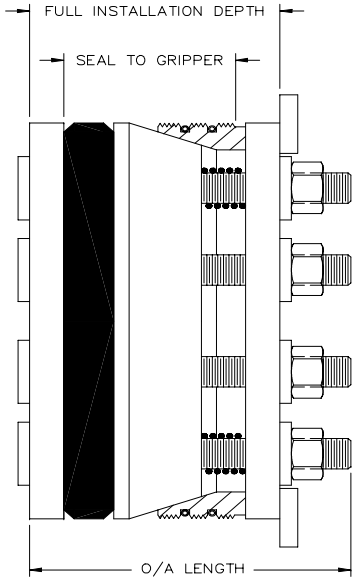
GripTight High Pressure Test Plug (6.78" to 8.53" ID Sizes) - Technical Specifications



Part Number	Nom. Pipe Size	Nom. Pipe Sch	I.D. Size Range				Plug O.D.		Undercut From Minimum I.D.		Std Seal Mat'l (1)	Number of Shafts	Shaft Diameter		Port I.D.		NPT (2) Size	O/A Length		Seal to Gripper		Full Instl'n Depth		Max. Test Pressure (3)(4)		Hex Nut Wrench Size	Approximate Shipping Weight	
			Min. (in)	Max. (in)	Min. (mm)	Max. (mm)	(in)	(mm)	(in)	(mm)			(in)	(mm)	(in)	(mm)		(in)	(mm)	(in)	(mm)	(in)	(mm)	(psi)	(Bar)	(in)	(lbs)	(kgs)
GT-8P160	8	160	6.78	7.04	172.2	178.8	6.66	169.2	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 1/4	108.0	6 9/16	166.7	6,400	440	1 1/16	42 1/2	19.3
GT-8PXXS	8	XXS	6.85	7.09	174.0	180.1	6.73	170.9	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 1/4	108.0	6 9/16	166.7	6,200	430	1 1/16	43 1/2	19.7
GT-8P140	8	140	6.97	7.20	177.0	182.9	6.85	174.0	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 1/4	108.0	6 1/2	165.1	5,700	390	1 1/16	45	20.4
GT-8P120	8	120	7.16	7.37	181.9	187.2	7.04	178.8	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 3/16	106.4	6 9/16	166.7	5,100	350	1 1/16	46 3/4	21.2
GT-730T	8		7.30	7.48	185.4	190.0	7.18	182.4	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 3/16	106.4	6 3/8	161.9	(3) (4)	(3) (4)	1 1/16	48 1/2	22.0
GT-8P100	8	100	7.41	7.59	188.2	192.8	7.29	185.2	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 1/8	104.8	6 3/8	161.9	4,100	280	1 1/16	48 1/2	22.0
GT-8P80	8	80 / XS	7.60	7.75	193.0	196.9	7.48	190.0	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 1/8	104.8	6 1/4	158.8	3,400	240	1 1/16	48 1/2	22.0
GT-769T			7.69	7.84	195.3	199.1	7.57	192.3	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 1/8	104.8	6 1/4	158.8	(3) (4)	(3) (4)	1 1/16	50	22.7
GT-8P60	8	60	7.78	7.93	197.6	201.4	7.66	194.6	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 1/8	104.8	6 1/4	158.8	2,800	190	1 1/16	51 1/4	23.2
GT-787T			7.87	8.02	199.9	203.7	7.75	196.9	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 1/8	104.8	6 1/4	158.8	(3) (4)	(3) (4)	1 1/16	52 3/4	23.9
GT-8P40	8	40 / STD	7.95	8.10	201.9	205.7	7.83	198.9	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 1/8	104.8	6 1/4	158.8	2,200	150	1 1/16	54	24.5
GT-8P30	8	30	8.04	8.19	204.2	208.0	7.92	201.2	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 1/8	104.8	6 1/4	158.8	1,900	130	1 1/16	55 1/2	25.1
GT-8P20	8	20	8.10	8.25	205.7	209.6	7.98	202.7	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 1/8	104.8	6 1/4	158.8	1,700	120	1 1/16	57	25.8
GT-820T			8.20	8.35	208.3	212.1	8.08	205.2	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 1/8	104.8	6 1/4	158.8	(3) (4)	(3) (4)	1 1/16	58 1/2	26.5
GT-8P10	8	10	8.30	8.45	210.8	214.6	8.18	207.8	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 1/8	104.8	6 1/4	158.8	980	70	1 1/16	60	27.2
GT-8P5	8	5	8.38	8.53	212.9	216.7	8.26	209.8	0.12	3.0	U	4	5/8	15.9	3/4	19.1	3/4 F	7 3/16	182.6	4 1/8	104.8	6 1/4	158.8	720	50	1 1/16	61 1/2	27.9

Notes:

(1) Standard Seal Material: U = urethane, N = neoprene

(2) M = Male NPT, F = Female NPT

(3) NEVER use a test pressure greater than the weakest component in the system can handle. Test Pressure specified in table is equivalent to 80% of the pressure that will yield ASTM A106 Grade B pipe. The test pressure for higher and lower strength pipes will differ proportionally. The maximum test pressure for higher strength pipe must never exceed the highest test pressure listed for that pipe O.D.

(4) Sizes that do not have a test pressure listed differ from standard pipe sizes. These plug sizes are normally used to test tubing. For use of these GripTight sizes in tubing with a minimum yield strength of 35ksi, the maximum test pressure is estimated by the test pressure listed for the equivalent or next larger pipe O.D. with the equivalent or next thinner wall thickness. The test pressure for higher and lower strength tubes will differ proportinally. The maximum test pressure for higher strength tubes must never exceed the highest test pressure listed for the equivalent or next larger pipe size. NEVER use a test pressure greater than the weakest component in the system can safely handle.

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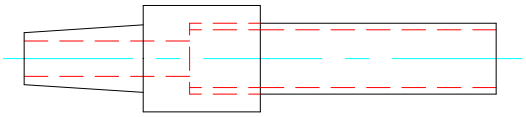
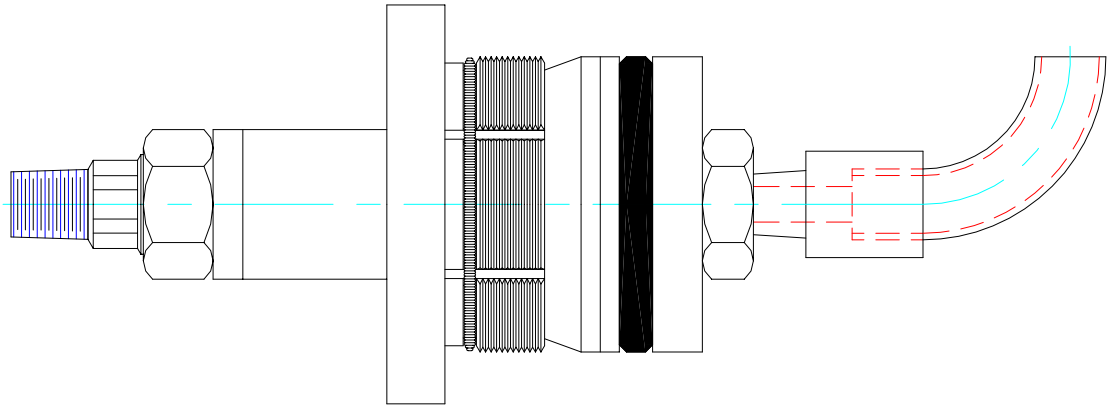
GRIPTIGHT™ TEST PLUG VENT INSTALLATION PROCEDURES



BEFORE BENDING



SHAFT OD SIZE	PART NUMBER
5/8	GT-VENT-0063
7/8	GT-VENT-0088
1-1/4	GT-VENT-0125
1-1/2	GT-VENT-0150
¾ (MULTI-SHAFT 8")	GT-VENT-0075

INSTALLATION PROCEDURES:

1. Lightly tap the vent into the port that runs through the plug.

2. Carefully bend the copper tube so that the open end is approximately even with the plug OD. The tube should not extend beyond the plug OD.

3. When installing the GripTight plug, orient the plug so that the open end of the vent is at the highest point. It may be helpful to put a mark on the hex on the shaft prior to installation to help align the vent at the high point of the pipe. See DC2510 for GripTight operating procedure.

QUESTIONS? Contact EST Customer Service at any of the following locations with questions.
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On the Internet: www.expansionseal.com

Expansion Seal Technologies is part of the EST Group of companies. **EST Group** provides a complete range of repair products, services and replacement parts covering the life cycle of tubular heat exchangers and condensers; additionally EST provides products and services to facilitate pressure testing pipe, piping systems, pressure vessels and their components. Visit EST Group on the internet at www.estgrp.com.

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Expansion Seal Technologies
EST Heat Exchanger LLC
EST Field Services

Product Application Bulletin

Nylon Gripper GripTight™ Test Plug

Expansion Seal Technologies recently developed a special version of our GripTight™ high pressure test plug to satisfy a unique testing application for Jacobs Applied Technology, a division of Jacobs Engineering.

Jacobs Applied Technology manufactures and assembles modular sections of processing equipment for a variety of industries, with current business emphasis on pharmaceutical applications, at its manufacturing facility in Goose Creek, SC, USA. They need to produce, assemble, and then completely test these assemblies. Following the test phase, they break down the assemblies (which can be the size of a small factory) and in many cases put them on barges to ship to Puerto Rico, etc. The tough part for Jacobs, is that they are on a very tight time table. Once complete, they must test and breakdown the assemblies at a breakneck pace. Compounding the difficulties is that pharmaceutical processing equipment operates in an ultra pure environment. Equipment is cleaned constantly to prevent bacterial growth. Any scarring or damage to the tube ID occuring during testing would create a site that could possibly foster bacterial growth. For this reason, they were looking for a testing method that would meet their needs and timetable.

Jacobs evaluated a number of different techniques. Alternative methods were limited to welding on a blind flange because of both test pressure required and the need to not mar the polished stainless steel tubing. The blind flange method was impractical because they would have had to allow extra tubing/pipe for testing, which would then have to be cut off and finished after testing. Besides the considerable time required with this method, there were places where there was not enough room for the additional tubing/pipe required. The method that had been in use, was to use test plugs (including our Bolt Types) that were not up to the test pressure, and restraining them. Finding a way to restrain them was time consuming also.

Jacobs turned to EST because they had a situation where there would not be enough time to test the way they had been testing, before they had to ship the equipment. We had them send us a sample of the material to be tested and committed to them to engineer, test, and produce a nylon gripper plug to meet their timetable, from receipt of tubing/pipe sample to shipment of the order of test plugs in less than 1-½ weeks. Engineering, testing, and production departments all came together to expedite the development of this test plug.

The initial plug was designed for Jacobs test requirement of a 150 psi air test. Jacobs quality and engineering departments reviewed our test results and approved their use. Jacobs subsequently reported that the plug performed as designed and resulted in them being able to save a substantial amount of time and money, and keep the project on schedule. They have since ordered additional plugs in other sizes.

This plug design could satisfy applications ranging from the processing equipment manufacturer through the end user of such equipment. Industries, such as Aerospace, that make use of exotic metals, may also have a use for such a design.

Expansion Seal Technologies offers a complete range of testing and plugging equipment for tubular heat exchangers, pipelines, piping systems and pressure vessels. We have the technology, experience and manpower to meet the critical demands of our customers. For more information or to arrange a demonstration contact EST by phone at 800-355-7044, fax 215-721-1101, or e-mail: info@expansionseal.com.