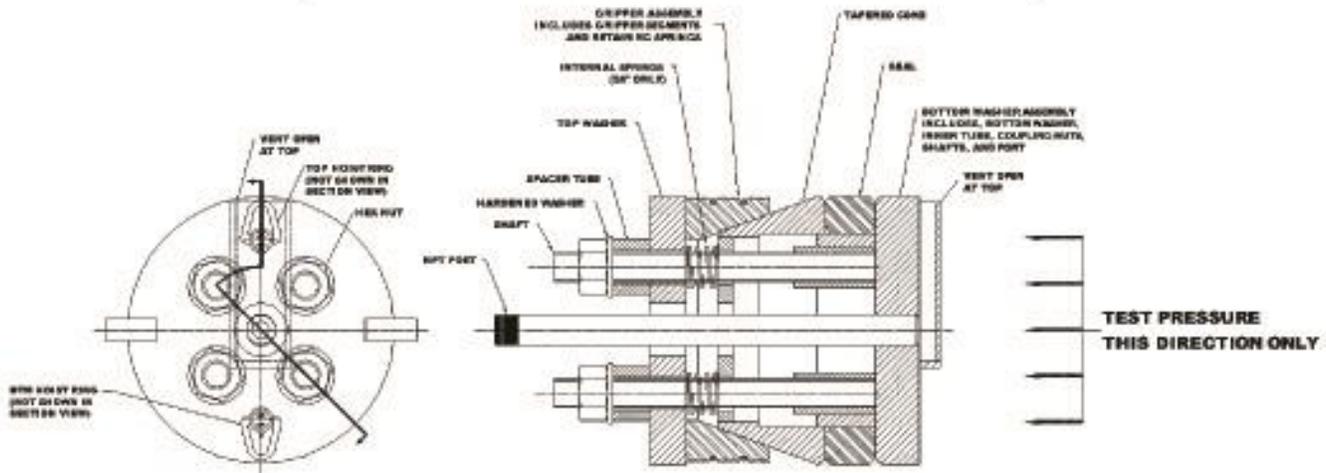


OPERATING INSTRUCTIONS FOR PETERSEN® 147-SERIES HIGH PRESSURE TEST PLUGS LARGE SIZES 10" TO 24"



10" through 24" Test Plugs

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

- **PRESSURE TESTING IS INHERENTLY DANGEROUS. STRICT ADHERENCE TO THE OPERATION INSTRUCTIONS AND INDUSTRY SAFETY PRACTICES COULD PREVENT INJURY TO PERSONNEL.**
 - **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.**
 - **THESE TEST PLUGS ARE DESIGNED TO WITHSTAND PRESSURE IN THE DIRECTION SHOWN IN THE ABOVE DRAWINGS. 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 THESE PLUGS IN PIPES WITH ID COATINGS. CONTACT US PRIOR TO USE OF THE TEST 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 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 anti-seize. Inspect threads and apply anti-seize 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 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. 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 FOLLOWED WHEN LIFTING AND MOVING THESE TEST PLUGS AND DURING ALL STEPS RELATED TO INSTALLATION OR REMOVAL OF THESE PLUGS.

3. Two hoist rings and a handle (not shown) have been provided for ease of installation and lifting the plug. Insure that the top hoist ring is positioned as shown in relation to the vent for horizontal installation. The top 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 to 8 ft long lever bar is recommended. For plug sizes 10" to 16" 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" to 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, tighten 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 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 0.60" (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 Customer Service for technical assistance.

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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 TABLE 1 AND 2. 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. Any plug component, which is worn or damaged, must be replaced before attempting further testing. Contact 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 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 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.

Call Petersen with any questions or suggestions relating to the use of any Petersen product. 800-926-1926

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
10	sch 100	9.28	9.59	235.7	243.6	3993	275.4	180	325	24.9	44.9
10	sch 80	9.53	9.80	242.1	248.9	3284	228.1	180	325	24.9	44.9
10	xs	9.72	9.97	246.9	253.2	2725	187.9	180	325	24.9	44.9
10	sch 40	9.99	10.21	253.7	259.3	1966	135.6	180	325	24.9	44.9
10	sch 30	10.10	10.31	256.5	261.9	1645	113.4	180	325	24.9	44.9
10	sch 20	10.22	10.41	259.6	264.4	1333	91.9	180	325	24.9	44.9
10	sch 10s	10.39	10.56	263.9	268.2	873	60.2	180	325	24.9	44.9
10	sch 5	10.45	10.61	265.4	269.5	707	49.6	180	325	24.9	44.9
12	sch 80	11.34	11.84	288.0	295.7	3184	219.8	180	325	24.9	44.9
12	sch 60	11.59	11.86	294.4	301.2	2577	177.7	180	325	24.9	44.9
12	xs	11.72	11.97	297.7	304.0	2282	157.4	180	325	24.9	44.9
12	std	11.91	12.19	302.5	309.6	1840	126.9	180	325	24.9	44.9
12	sch 30	12.06	12.27	306.3	311.7	1467	102.6	180	325	24.9	44.9
12	sch 20	12.22	12.41	310.4	315.4	1120	77.2	180	325	24.9	44.9
12	sch 5	12.36	12.57	313.9	319.3	892	55.3	180	325	24.9	44.9
14	sch 140	11.47	11.91	291.3	302.5	5438	375.0	180	325	24.9	44.9
14	sch 120	11.78	12.18	299.2	309.4	4713	325.0	180	325	24.9	44.9
14	sch 100	12.09	12.45	307.1	316.2	4001	275.9	180	325	24.9	44.9
14	sch 80	12.47	12.78	316.7	324.6	3160	217.9	180	325	24.9	44.9
14	sch 60	12.78	13.05	324.6	331.5	2478	170.8	180	325	24.9	44.9
14	xs	12.97	13.22	329.4	335.8	2071	142.8	180	325	24.9	44.9
14	sch 40	13.09	13.33	332.5	338.6	1607	124.6	180	325	24.9	44.9
14	std	13.22	13.44	335.8	341.4	1540	108.2	180	325	24.9	44.9
14	sch 20	13.34	13.55	338.8	344.2	1276	88.0	180	325	24.9	44.9
14	sch 5	13.47	13.82	342.1	351.0	1018	70.2	180	325	24.9	44.9
16	sch 120	13.53	13.96	343.7	354.6	4567	316.3	180	325	24.9	44.9
16	sch 100	13.91	14.29	353.3	363.0	3839	264.8	180	325	24.9	44.9
16	sch 80	14.28	14.62	362.7	371.3	3109	214.4	180	325	24.9	44.9
16	sch 60	14.66	14.95	372.4	379.7	2390	164.8	180	325	24.9	44.9
16	sch 40	14.97	15.22	380.2	386.6	1805	124.5	180	325	24.9	44.9
16	std	15.22	15.44	386.6	392.2	1343	92.6	180	325	24.9	44.9
16	sch 20	15.34	15.55	389.6	395.0	1113	76.6	180	325	24.9	44.9
16	sch 5	15.47	15.81	392.9	401.6	889	61.3	180	325	24.9	44.9

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
18	sch 120	15.22	15.89	386.6	388.5	4600	317.2	180	325	24.9	44.9
18	sch 100	15.66	16.07	397.8	408.2	3825	263.8	180	325	24.9	44.9
18	sch 80	16.08	16.45	408.7	417.8	3089	211.7	180	325	24.9	44.9
18	sch 60	16.47	16.78	418.3	426.2	2430	167.6	180	325	24.9	44.9
18	sch 40	16.84	17.11	427.7	434.6	1803	124.3	180	325	24.9	44.9
18	xs	16.97	17.22	431.0	437.4	1599	110.3	180	325	24.9	44.9
18	sch 30	17.09	17.33	434.1	440.2	1396	96.3	180	325	24.9	44.9
18	std	17.22	17.44	437.4	443.0	1191	82.1	180	325	24.9	44.9
18	sch 20	17.34	17.55	440.4	445.8	987	68.1	180	325	24.9	44.9
18	sch 5	17.47	17.81	443.7	452.4	789	54.4	180	325	24.9	44.9
20	sch 100	17.41	17.88	442.2	454.2	3814	263.0	180	325	24.9	44.9
20	sch 80	17.91	18.32	454.9	465.3	3035	209.3	180	325	24.9	44.9
20	sch 60	18.34	18.70	465.6	475.0	2366	163.2	180	325	24.9	44.9
20	sch 40	18.78	19.09	477.0	484.9	1713	118.1	180	325	24.9	44.9
20	xs	18.97	19.25	481.8	489.0	1435	99.0	180	325	24.9	44.9
20	std	19.22	19.47	488.2	494.5	1070	73.8	180	325	24.9	44.9
20	sch 5	19.47	19.80	494.5	502.9	799	56.9	180	325	24.9	44.9
22	sch 100	19.22	19.72	488.2	500.9	3717	258.3	180	325	24.9	44.9
22	sch 80	19.72	20.18	500.9	512.1	3009	207.5	180	325	24.9	44.9
22	sch 60	20.22	20.59	513.6	523.0	2316	159.7	180	325	24.9	44.9
22	xs	20.97	21.25	532.6	539.8	1302	89.8	180	325	24.9	44.9
22	std	21.22	21.47	539.0	545.3	971	67.0	180	325	24.9	44.9
22	sch 5	21.47	21.80	545.3	553.7	644	44.4	180	325	24.9	44.9
24	sch 120	20.34	20.95	516.6	532.1	4543	313.3	180	325	24.9	44.9
24	sch 100	20.91	21.45	531.1	544.8	3798	261.9	180	325	24.9	44.9
24	sch 80	21.53	21.99	546.9	558.5	2985	205.9	180	325	24.9	44.9
24	sch 60	22.03	22.43	559.6	569.7	2352	162.2	180	325	24.9	44.9
24	sch 40	22.59	22.92	573.8	582.2	1851	113.9	180	325	24.9	44.9
24	sch 30	22.84	23.14	580.1	587.8	1342	92.6	180	325	24.9	44.9
24	xs	22.97	23.25	583.4	590.6	1191	82.1	180	325	24.9	44.9
24	std	23.22	23.47	589.8	596.1	889	61.3	180	325	24.9	44.9
24	sch 5	23.47	23.74	596.1	603.0	589	40.6	180	325	24.9	44.9

NEVER use a test pressure greater than the weakest component that the system can safely handle. Test pressure specified in the 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 size. **DO NOT** use in coated pipe at any pressure.