1.0 PURPOSE

To provide instructions on proper equipment to be utilized and procedures and precautions to be followed to insure safety during a hydrostatic test.

* 2.0 GENERAL

The supervisor in charge of the installation shall be responsible for the hydrostatic testing. All personnel involved with the hydrostatic test must be familiar with the test procedure and safety considerations to be followed during the hydrostatic test.

3.0 SAFETY CONSIDERATIONS

3.1 Take precautions, as necessary, to protect employees and the general public during testing. These shall include, but are not limited to, the following:

3.1.1 Locate the test equipment and instrumentation a safe distance from the test section (see Gas Standard A-37.6).

3.1.2 Keep personnel not working on the test operation out of the test area.

3.1.3 Place barriers along the test section, where appropriate, to prevent public access.

3.1.4 Notify public agencies of the scheduled test, when necessary, and notify parties located in the general vicinity of the test section to avoid the area during the test.

3.1.5 Patrol and use flagmen to keep people away during testing.

3.1.6 Schedule the test at a time that will minimize public exposure in highly populated areas.

3.2 Visually inspect temporary piping, closures, and other equipment used in conjunction with the test to verify that they are in safe working order. Maintain a periodic visual inspection of this equipment from a safe distance during the test.

*Paragraph Revised

APPROVED BY		REV.	DATE	DESCRIPTION	GM	DWN.	CHKD.	SUPV.	APVD.
WJH	PAL	6	11/29/89	Revised as noted by asterisks.			BFO	[illegible]	SHP
RTA	RFD	5	12/13/84	Added Paragraph 10.6				BFO/PAL	/CJT
TET	JBS	4	3/23/84	Rev 'd Par. 7.0, 9.1.2, 9.2.2, 10.3, 10.5 Test Hd Table				BFO/PAL	/CJT
NLB	CJT	3	1/5/83	Added Sec. 3.4, Rev'd Sec. 10.2 & Pg. 7			KAFL		PAL

GM	PIPING - DATA SHEET HYDROSTATIC TESTING PROCEDURE GAS STANDARD	B/M	
SUPV.		DWG. LIST	
DSGN.		SUPSDS	
DWN.		SUPSD BY	
CHKD.		SHEET NO. 1 of 9 SHEETS	
O.K.	PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CALIFORNIA	DRAWING NUMBER	REV.
DATE 4/24/79	SCALE	086870	6
		MICROFILM	

3.3 Do not remove caps, plugs, or valves from the test head, or any other test equipment, until a positive determination is made from two independent taps that the test section is depressurized.

3.4 During the preparation for a test or retest of a section of existing pipeline, consideration must be given to the potential for gas leakage into the test section from an adjacent section of pipeline that remains in service, or from the release of gas from residual liquid which may remain in the line. Special precautions shall be taken to verify that a combustible mixture is not present in the section which is to be tested, prior to performing cutting or welding operations on the section.

4.0 TEST PROCEDURE

4.1 Establish a plan for the hydrostatic test. As appropriate, this shall include detailed written instructions covering problem areas for the specific test involved. These shall be developed by the engineer responsible for the test in conjunction with the supervisor on the test.

4.1.1 Consider the potential for flooding or other damage should a failure occur.

4.1.2 Consider the safety of company personnel and the general public.

4.1.3 Have a copy of the Strength Test Pressure Report and schematic sketch of the test section at the test location.

4.2 Prepare a sketch of the test section showing stationing of the test section and points of maximum and minimum elevation (see Gas Standard A-37.2).

5.0 TEST EQUIPMENT

5.1 Test Heads

* 5.1.1 General Construction, Gas Construction Department (GC) is responsible for the construction and maintenance of all test heads. Table I of this standard lists all test heads authorized for use to date. Test heads not on this list shall not be used until they have been inspected and issued serial numbers by GC.

* 5.1.2 Test heads are to be constructed and tested in accordance with Gas Standard A-37.1, Drawing No. 386527. All test heads must be visually inspected, X-rayed, hydrostatically tested, properly tagged for maximum test pressure, and issued serial numbers before they are authorized for use. The necessary paperwork to verify the inspection and testing, and to verify the wall thickness, size, and grade of pipe and fittings used to make each test head shall be on file with GC.

*Paragraph Revised

* 5.1.3 Test heads shall be requested from GC, 220 South Airport Way, Manteca, CA, (209) 239-6618, company phone 842-1220, as far in advance as possible. In some instances, when a new test head must be fabricated, the lead time may be as long as 6 to 8 months. Expenses for newly fabricated test heads, and their shipment to and from the requesting location, will be charged to the construction GM. The proper job number and accounting will be required with the request.

* 5.1.4 If the proper size test heads are not available for a test, substitute test heads may be used. Due to the unequal O.D. and W.T. of the pipe to be tested and the substitute test heads, Gas System Design Department (GSDD) can provide assistance in determining the proper installation procedures for these test heads.

* 5.1.5 For the safety of personnel, the protection of the test head, and ease of shipment, special steel skids have been made for each test head. Care must be taken in placing the test head on the skid. For most test heads, there is only one mounting position which will allow for proper placement of the tie down chains. Improper mounting could result in an injury or damage to the test head.

* 5.1.6 Modification, welding, or cutting shall not be made in the field (except welding the test head to the pipe being tested). If modifications are required, the test head must be returned to GC in Manteca for modifications.

* 5.1.7 All test heads shall be returned to GC in Manteca immediately after completion of the test. All test heads must be returned with the same valves, plugs, caps, and nipples intact.

5.1.8 A pup of tested pipe may be left on the test head only if it is: (a) relatively close to the same grade and wall thickness of the test head, and (b) clearly marked with the grade, wall thickness, and pressure to which it was tested. This information must also be on the shipping notice when returning the test head.

5.1.9 A shipping notice must accompany each test head that is being returned or relocated to another job site.

5.2 Pigs, spheres, scrapers, etc., for use on a job must be properly sized for the largest internal diameter of the test section or test head. When necessary, use scraper cups, discs, or polyurethane pigs for post-test pipeline cleaning. Gas Standard A-37.3 illustrates typical manufacturer's instructions for filling and sizing a sphere.

*Paragraph Revised

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5.3 Test Instruments

* 5.3.1 Pressure records are required on all hydrostatic tests. The recorders must be calibrated every six months. A chart with the proper pressure scale and time interval must be used. If both a dead weight tester and a pressure recorder are used on a hydrostatic test, adjust the pressure recorder to read the same as the dead weight tester before beginning the test.

* 5.3.2 Dead weight testers must be calibrated within the last 12 months by GC, 220 South Airport Way, Manteca, CA (209) 239-6618, company phone 842-1220. A dead weight tester is required when testing over 90% SMYS of any segment of the test section.

5.3.3 Indicating pressure gauges should be available for possible installation at the remote end of the test section or at maximum or minimum elevations of the test section. These gauges are for information purposes only.

5.4 Pressurizing equipment, hoses, and other associated equipment must be checked out and be in good working condition before the test. Make sure the equipment is properly sized and rated for the maximum test pressure.

6.0 VERIFY THE STRENGTH TEST PRESSURE REPORT

If Part I of the Strength Test Pressure Report does not show the latest design changes on the design drawings or the actual pipe to be tested, return the Strength Test Pressure Report to the Project Engineer or Gas System Design for necessary corrections (the Gas Estimator's Manual and the Gas Foreman's Manual give complete instructions on the Strength Test Pressure Report).

7.0 NOTIFICATION OF HYDROSTATIC TEST

7.1 For pipeline projects that have been reported to the CPUC (those costing more than $250,000 and to operate at more than 20% SMYS), the following notifications shall be given:

* 7.1.1 For work assigned to GC, notify the General Office Gas Construction Department at least seven days prior to the date the hydrostatic test is scheduled, so the test can be properly reported to the CPUC.

* 7.1.2 If work is performed by the division, the responsible division person shall notify the region who must notify the Gas System Design Department at least seven days prior to the date of hydrostatic testing, so the test can be properly reported to the CPUC.

* 7.2 If the job was reported to the CPUC, the hydrostatic test might be witnessed by a member of the CPUC staff accompanied by a member of the region staff.

*Paragraph Revised

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8.0 WATER SUPPLY

8.1 The water used for testing shall be reasonably clean. Contaminated water or salt water shall not be used. Water shall be obtained from the most readily available source, subject to authorizations by the appropriate local, county, state of federal regulating agency or agencies.

8.2 If wells must be used as the water source and the quantity of water needed for the test is substantial, a draw-down test shall be performed. If the wells prove to be inadequate, an alternate source should be found. Transporting water by truck shall be used only as a last resort when the quantity of water needed is substantial.

9.0 WATER FILLING (See Gas Standard A-37.4 for Typical Setup)

9.1 Make sure the following points are considered in the water filling operation:

9.1.1 The test section must be completely filled with water. A pig must be run ahead of the water to force as much air as possible out of the test section. For test sections where a pig cannot be used, the air must be vented at the high points.

9.1.2 Fill the test section from only one direction, preferably from the low end.

9.1.3 If necessary, anchor or support the pipe to prevent excessive stress levels caused by the weight of the water. Special consideration should be given to bridge crossings and spans.

9.1.4 Open and close, fill and drain valves slowly to prevent pressure surges resulting from rapid changes in water velocity.

9.2 Water Filling Equipment

9.2.1 Size the fill pumps considering static head due to elevation difference in the test section and the fill time desired.

9.2.2 Install filters on the suction line of the pumps to prevent fish and other foreign matter from entering the test section.

9.2.3 The exhaust of the pump engine must have spark arrestors.

9.2.4 Water may be transferred from the one test section to another by use of a hairpin (see Gas Standard A-37.5). The hairpin shall not be left in place during the test.

10. WATER REMOVAL (See Gas Standard A-37.7 for Typical Setup)

10.1 Use extreme caution when releasing water at the test pressure. The pressure should be relieved by partially opening a small tap valve before opening the main dewatering valve.

10.2 Remove the water from long test sections by pigging. The most effective speed of a pig for dewatering is considered to be 1 to 5 miles per hour.

10.3 Where removal of moisture is critical, use two pigs with a slug of methanol between them. Special care must be taken in handling and disposing of any methanol remaining from such an operation.

10.4 Short sections may be inclined to drain and swabbed dry by hand.

10.5 Dispose of the water in a manner that will prevent damage to the environment and comply with any water disposal regulations. Special precautions must be taken when testing a pipeline which has been in service, because some residual material in the line might be a hazardous waste. Steps should be taken to prevent the test water from contacting such material, and the water should be tested prior to disposing of it to determine whether any contamination is present.

10.6 Caution! Although pigging will remove most of the free water from the test section, a substantial amount of moisture will remain on the surface of the pipe. While this moisture is being dissipated, there is a potential for the formation of hydrates. Precautions should be taken at regulator stations located downstream of the test section, to prevent the possibility of freezing. These may include monitoring the dew point of the gas until it has dropped below the level where freezing can occur, the injection of methanol into the gas stream ahead of the regulators, or the use of heaters to heat the gas stream and/or the regulators.

11. REPORTS

11.1 The Gas Estimator's Manual and Gas Foreman's Manual contain sections that provide complete instruction on the completion of the Strength Test Pressure Report. Completed reports must be signed, and all copies for distribution must be clear and show all pertinent data.

11.2 The test records required depend on the operating pressure in psig or as percent of SMYS of the gas facility being tested. Refer to Gas Standard A-34. The Strength Test Pressure Report form indicates the required distribution of test records.

TABLE I

TEST HEADS AUTHORIZED FOR USE

DIAMETER	SERIAL NO.	GRADE	W.T.	MAX. TEST PRESSURE (PSIG)	APPROX. WEIGHT (LBS.)
3"	3761	"B"	0.216"	2160	80
3"	3761-A	"	"	"	"
3"	3801-A	"	"	"	"
3"	3801-B	"	"	"	"
4" Comb.	4761-A (1)	"B"	0.237"	2160	750
4" Comb.	4761-B (1)	"	"	"	"
4"	4791-A	"	"	"	"
4"	4791-B	"	"	"	"
4"	4792-A	"	"	"	"
4"	4792-B	"	"	"	"
6"	6761-A	X-52	0.500"	2160	600
6"	6761-B	"	"	"	"
6"	6762-A	"B"	0.432"	2738	700
6"	6762-B	"	"	"	"
6"	6791-A (2)	"	"	2160	600
6"	6791-B (2)	"	"	"	"
6"	6851-A	"	"	"	"
6"	6851-B	"	"	"	"
6"	6852-A	"	"	2733	N/A
6"	6852-B	"	"	"	N/A
8"x4" Adapt	8761-A (1)	"B"	0.500"	2160	600
8"x4" Adapt	8761-B (1)	"	"	"	"
8"	8791-A	"	"	"	N/A
8"	8791-B	"	"	"	N/A
8"	8792-A	"	"	"	N/A
8"	8792-B	"	"	"	N/A
8"	8871-A	"	"	"	N/A
8"	8871-B	"	"	"	N/A
10"	10761	X-52	0.500"	2160	900
10"	10761-A	"	"	"	"
10"	10762-A	"B"	"	1627	"
10"	10762-B	"	"	1953	800
10"	10763-A	X-52	0.365"	1765	800
10"	10763-B	"	"	"	"
10"	10811-A	"	0.500"	2418	900
10"	10811-B	"	"	"	"
10"	10881-A	"	"	2160	"
10"	10881-B	"	"	2160	"

(1) 4761 A & B and 8761 A & B are combination test heads.

(2) 6791 A & B are lost since 3/21/85.

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TABLE I (Cont.)

DIAMETER	SERIAL NO.	GRADE	W.T.	MAX. TEST PRESSURE (PSIG)	APPROX. WEIGHT (LBS.)
12"	12751-A	X-52	0.500"	2039	975
12"	12751-B	"	"	"	"
12"	12752-A	"	"	"	"
12"	12752-B	"	"	"	"
12"	12763-A	"	"	1976 (1)	1200
12"	12763-B	"	"	" (1)	"
16"	16751	X-52	0.500"	1625	1300
16"	16752	"	"	"	1250
16"	16753	"	"	"	1400
16"	16753-A	"	"	"	1300
16"	16753-B	"	"	"	"
16"	16753-C	"	"	"	1400
16"	16764-A	"	"	"	1200
16"	16764-B	"	"	"	"
16"	16765-A	"	"	"	1500
16"	16765-B	"	"	"	1300
16"	16766-A	"	0.680"	2160	1800
16"	16766-B	"	"	"	"
18"	18761-A	X-56	0.500"	1733 (1)	1600
18"	18761-B	"	"	" (1)	"
20"	20761-A	X-42	0.750"	1440	2100
20"	20761-B	"	"	"	"
20"	20762-A	X-52	0.500"	1560	1700
20"	20762-B	"	"	"	"
20"	20861-A	X-60	0.625"	2160	2600
20"	20861-B	"	"	"	"
22" (22.416 OD)	22761-A	Y-60	1.000"	2592 (1)	2900
22" (22.416 OD)	22761-B	"	"	" (1)	"
24"	24761-A	X-52	0.625"	1440	2900
24"	24761-B	"	"	"	2900
24"	24762-A	"	0.750"	1875 (1)	4200
24"	24762-B	"	"	" (1)	"
24"	24861-A	X-60	0.625"	1562	3600
24"	24861-B	"	"	"	"
24"	24881-A	"	"	"	"
24"	24881-B	"	"	"	"
24"	24882-A	"	"	"	"
24"	24882-B	"	"	"	"

(1) Present Max. Test Pressure with transition pieces, Max. Test Pressure can be increased by cutting off existing transition pieces. GSDD can provide assistance in rerating.

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TABLE I (Cont.)

DIAMETER	SERIAL NO.	GRADE	W.T.	MAX.TEST PRESSURE (PSIG)	APPROX. WEIGHT (LBS.)
26"	26761-A	Y-52	0.750"	1772 (2)	4500
26"	26761-B	"	"	" (2)	5200
26"	26762-A	"	"	" (2)	4200
26"	26762-B	"	"	" (2)	4700
30"	3081-1A	X-52	1.000"	1500 (2)	6400
30"	3081-1B	"	"	" (2)	"
34"	34761-A	X-52	1.000"	1109 (1)	7200
34"	34761-B	"	"	1109 (1)	"
34"	34801-A	Y-65	1.375"	1680 (1)	11445
34"	34801-B	"	"	" (1)	"
34"	34851-A	X-65	0.754"	1721 (2)	8000
34"	34851-B	"	"	" (2)	8000
36"	36761-A	X-60	0.750"	1248 (2)	4900
36"	36761-B	"	"	" (2)	4800
36"	36762-A	X-60	0.730"	1440	4000
36"	36762-B	"	"	1140 (2)	"
36"	36861-A	X-65	1.000"	2100	9500
36"	36861-B	"	"	"	"

(1) Present Max. Test Pressure with transition pieces, Max. Test Pressure can be increased by cutting off existing transition pieces. GSDD can provide assistance in rerating.

(2) Present Max. Test Pressure is governed by the pipe cap.