

ENGINEERING & MAINTENANCE INSTRUCTIONEL PASO REFINERY ENGINEERING & MAINTENANCE INSTRUCTIONS

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## PURPOSE

1. A system of El Paso Refinery Engineering & Maintenance Instructions is established to guide, coordinate, instruct and inform Engineering and Maintenance personnel of the El Paso Refinery of Standard Oil Company of Texas.

TYPE OF  
MATERIAL TO  
BE COVERED

2. Engineering & Maintenance Instructions will be issued as required on any of a variety of subjects whenever it is appropriate to issue instructions of a semi-permanent or permanent nature. Instructions will be issued as required to cover engineering, maintenance, inspection, and engineering office procedures.

## PREPARATION

3. Any Engineering and Maintenance Division personnel may prepare engineering instructions in draft form for submission to the Refinery Engineer for his review and possible acceptance as an Engineering & Maintenance Instruction.

## FORM

4. For uniformity, El Paso engineering instructions shall be presented generally in the form of this Engineering & Maintenance Instruction, EP-2001-A. Numbering of sub paragraphs should follow the decimal system.

NUMBERING &  
INDEXING

5. The Engineering Secretary-Clerk will maintain number control records and will be responsible for the proper numbering of the Engineering & Maintenance Instructions in accordance with the following paragraph.

- 5.1 All instructions will be given an EP- prefix and a letter suffix in accordance with the following table.

|   |                                                                           |
|---|---------------------------------------------------------------------------|
| A | General                                                                   |
| C | Columns & Pressure Vessels                                                |
| D | Tanks                                                                     |
| E | Heat Exchangers, Condensers, Coolers,<br>Unfired Heaters & Cooling Towers |
| F | Furnace & Boilers                                                         |
| G | Pumps & Drivers                                                           |
| J | Instruments                                                               |
| K | Compressors, Blowers, & Mechanical Equipment                              |
| L | Lines (Piping)                                                            |
| M | Steel & Concrete Structures, Walks, Stairs                                |
| N | Insulation                                                                |
| P | Power & Lighting                                                          |
| Q | Foundations                                                               |
| R | Control Rooms & Other Buildings                                           |
| S | Services, Sewers, Roads & Miscellaneous                                   |

- 5.2 The series from 1 through 2000 will be reserved for instructions which have the same subject as other instructions issued at El Segundo, Richmond, or San Francisco. El Paso instructions will be given the same number as their Calif. counterparts, except for the EP prefix and letter suffix.

EL PASO REFINERY ENGINEERING & MAINTENANCE INSTRUCTIONS

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5.3 Instructions which have no California counterpart will be assigned numbers in the 2001- and up series.

## DISTRIBUTION

6. El Paso Engineering & Maintenance Instructions will be distributed as follows:

J. H. Kitchen

Maintenance (Cont'd)Engineering

Anderson, R. L.  
\*Beckley, J. V.  
Brown, M. L.  
\*Cates, M. F.  
Cox, V.L.  
DeBello, F.J.  
File Copy (1)  
Hayden, J. E.  
Mora, J. S.  
O'Neill, D. M.  
Simpson, H. D.  
Stuart, I. J.  
Swegler, J. A.  
Winslow, L. T.

Peters, L. E.  
Pickle, J. M.  
Rackley, R. A.  
Tiernan, R. P.  
Wainwright, H. T.  
Wheeler, J. R.  
Wilson, W. C.

Inspection

Petrash, J. J. (7)

Operations

Bland, W. E.  
Carruth, J. B.  
Cole, J. D. (5)  
Dulaney, E. W.  
Durnford, L. A.  
Hudson, W. H. (10)  
Hurt, E. L.  
Jones, E. W.  
Jordan, R. A.  
Mustain, P. P.  
Turner, M. E. (14)

Maintenance

Alexander, N.A.  
Allen, A. S.  
Davis, F. R.  
Espersen, W. E.  
Feld, H. R.  
File (1)  
Hall, C. D.  
Heist, C. M.  
Henry, J. D.  
Hofmann, C.  
Lewis, J. B.  
Lynch, D. P.  
Martin, R. B.

Storehouse

Martinez, S. B. (2)

Tech. Service

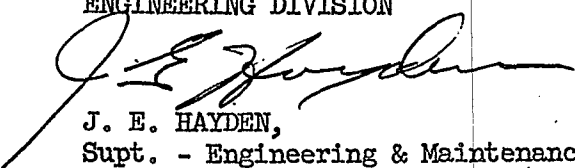
\*Novelli, C. M. J.

## REVISIONS

7. Revisions to Engineering & Maintenance Instructions will be initiated, reviewed, approved and distributed in the same manner as new Engineering & Maintenance Instructions.

Issued: 9-17-59  
Revised: 6-17-60\*

ENGINEERING DIVISION

  
J. E. HAYDEN,  
Supt. - Engineering & Maintenance

CHEV BB

GENERAL INSTRUCTIONS ON HYDROSTATIC TESTING OF EQUIPMENT

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- |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Purpose &<br>Scope    | 1. This Instruction covers the general principles to be followed in the hydrostatic testing of fired or unfired equipment which is subjected in service to internal or external pressure. The purpose of such tests is to establish the strength, tightness or suitability of equipment for service and ensure its safety in operation.                                                                                                                               |
|                       | 2. Specific Instructions covering various types of equipment will be issued as required.                                                                                                                                                                                                                                                                                                                                                                              |
| Frequency             | 3. Ordinarily a hydrostatic test shall be applied to equipment: <ul style="list-style-type: none"><li>a. Before it is initially placed in service.</li><li>b. After repairs or alterations which may affect the strength of the equipment.</li><li>c. At scheduled intervals as specified in Safety Instruction Sheets, or as directed by this office.</li><li>d. Whenever considered necessary or advisable by the Inspector, and approved by this office.</li></ul> |
| Specifications        | 4. The pressure to be applied, the duration of the test, the testing medium and other specifications which may apply to each test shall be as detailed in separate Engineering Instructions, Safety Instruction Sheets or as directed by this office. An air, gas, or steam pressure test shall not be applied to any installation without first obtaining the approval of this office.                                                                               |
| Responsibility        | 5. The Foreman Mechanic or Job Foreman in charge shall be responsible for the proper direction of all work required for testing.                                                                                                                                                                                                                                                                                                                                      |
|                       | 6. The Operating Department will supervise the setting of lines to fill the equipment with the testing medium and will operate any special equipment required in connection with the test.                                                                                                                                                                                                                                                                            |
|                       | 7. The Inspector assigned to this work shall be responsible for seeing that the equipment is properly prepared for the test, that the test pressure is applied as required, and that the necessary inspections are made during the test. He shall also approve the test before the equipment is released for service.                                                                                                                                                 |
| Safety<br>Precautions | 8. The necessary precautions shall be taken to assure that the test is made in a safe manner. It should be kept in mind that a considerable amount of energy may be stored in large vessels at high pressure due to entrainment of air, compression of the water, and extension of the steel; and only those persons who are essential to the test should be permitted in the vicinity.                                                                               |
|                       | 9. The Inspector shall be responsible for his own safety while making inspections on any equipment under test.                                                                                                                                                                                                                                                                                                                                                        |

GENERAL INSTRUCTIONS ON HYDROSTATIC TESTING OF EQUIPMENTHYDROSTATIC TESTING

- |                       |                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Preparing<br>for Test | 10. Disconnect or blind off from the equipment on test all operating pressure gages, meters, relief valves, or other equipment not capable of withstanding the test pressure, and all service lines and equipment not included in the test.                                                                                                                                                                                 |
| Test Gages            | 11. Employ only calibrated test gages for test purposes. Connect an indicating pressure gage to the test pump discharge so that it is visible to the pump operator, who shall stand by the pump throughout the duration of the test.                                                                                                                                                                                        |
|                       | 12. Connect a recording pressure gage to the equipment to record the test whenever a test record is requested by this office.                                                                                                                                                                                                                                                                                               |
| Relief<br>Valve       | 13. See that the relief valve on the test pump is in place. Set and check the valve at <u>5% over</u> the hydrostatic test pressure. The size of this valve shall be sufficient to discharge the capacity of the pump at the test pressure. No relief valve is required on hand test pumps. When using yard air pressure for an air test, the relief valve shall be large enough to discharge the capacity of the air line. |
| Vent Air              | 14. Vent <u>all</u> high points in the equipment so that all air will be displaced from the system while it is being filled with the testing medium.                                                                                                                                                                                                                                                                        |
|                       | 15. Refer to Page 4 of this Instruction for Typical Assembly of Hydrostatic Testing Equipment.                                                                                                                                                                                                                                                                                                                              |
| Testing               | 16. When all preparations have been made and precautions taken, fill the system with the testing medium. Check that all air is properly bled from the system and, when this has been done, close the vents. Then apply the required hydrostatic test pressure to the equipment.                                                                                                                                             |
|                       | 17. If any indication of yielding or incipient failure of the equipment is apparent at any time while building up the pressure, stop the test pump and report the result to this office for further instructions.                                                                                                                                                                                                           |
| Inspecting            | 18. While the equipment is under test pressure, the Inspector shall make a close inspection of the installation, paying special attention to castings (particularly at fillets and at sudden changes in section), forgings, new welds, connections and repairs to existing equipment, for sweats, cracks or other defects.                                                                                                  |
| Vent<br>Equipment     | 19. Do not allow equipment filled with a testing medium to stand for any length of time without venting it to the atmosphere as temperature changes of the testing medium may build up an excessive pressure or vacuum, either of which may injure the equipment.                                                                                                                                                           |

GENERAL INSTRUCTIONS ON HYDROSTATIC TESTING OF EQUIPMENT

Drain  
Equipment

20. At the completion of a test, drain the equipment promptly and otherwise protect against deterioration and corrosion pending the time it is placed in service. The Inspector shall check that the top of each vessel to be drained is vented to the air and that it is drained slowly, so that a vacuum will not be formed.

Approve for  
Service

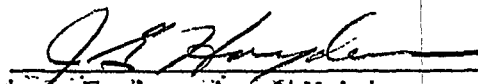
21. The Inspector shall report all defects, as found, to the Foreman in charge and shall follow the necessary repairs. The test shall be repeated after each repair. When the equipment has successfully passed the test and the Inspector is satisfied that it is safe for operation, he shall approve the installation for operating service.

Recording

22. The Inspector shall record the date, test pressure, and any other pertinent details of each hydrostatic test, and report the results as required.

APPROVED: 9/2/54

Retyped: 9/17/59

By   
Supt. Engineering & Maintenance

Attachment: Mfg. Dept. Requirements

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MANUFACTURING DEPARTMENT REQUIREMENTS

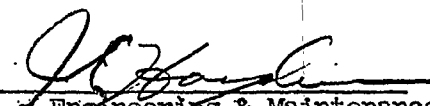
1. The normal test pressure for refinery equipment shall be 1-1/2 times the equivalent cold Maximum Working Pressure.
2. New pressure vessels built in accordance with the API-ASME Code shall be tested in accordance with the Code. Metal added for corrosion allowance shall be considered as a part of the shell thickness in determining test pressures.
3. Pipe fabricated from rolled steel plate fusion welded, 12" in diameter or larger, shall be tested in the same manner as for welded pressure vessels, including proof tests for special shapes which do not readily lend themselves to stress analysis.
4. The normal test pressure for piping is 1-1/2 times the adjusted cold (secondary rating) working pressure of the valves and fittings in the line.

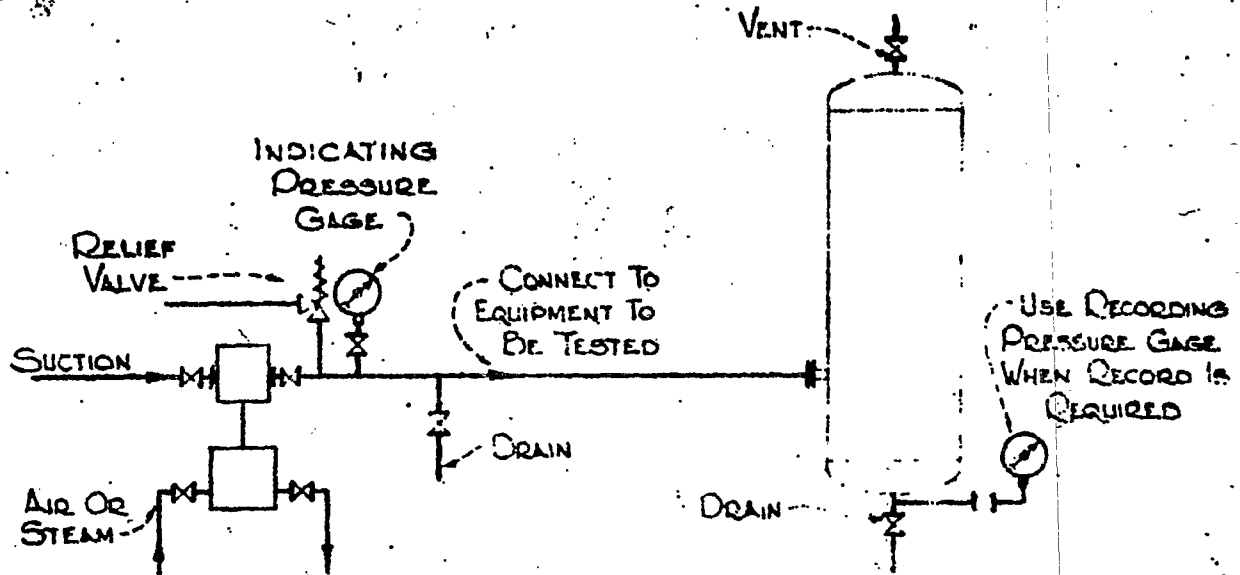
As an example:

| <u>Nominal or Primary<br/>Rating (Hot)</u> | <u>Secondary<br/>Rating (Cold)</u>         | <u>Hydrostatic<br/>Test Pressure</u> |
|--------------------------------------------|--------------------------------------------|--------------------------------------|
| 150# Raised Face<br>Flange at 500°F        | 230# @ 100°F<br>(1.5 x 230 = 350)          | 350 PSIG                             |
| 300# Small Tongue<br>Flange at 850°F       | 720# @ 100°F<br>(1.5 x 720 = 1100 Approx.) | 1100 PSIG                            |

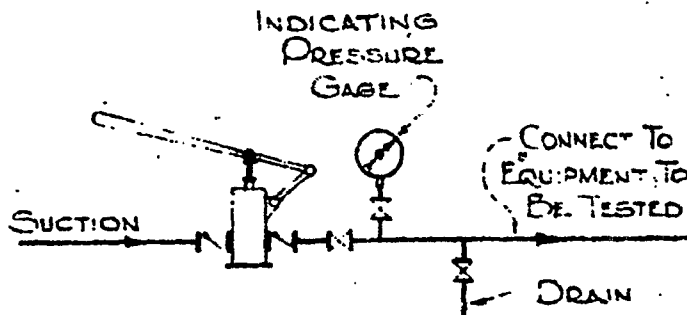
5. In assembled equipment it is permissible to test piping at only the maximum test pressure rating of included vessels or other equipment in the system if this pressure is equal to or more than 1-1/2 times the design working pressure of the piping. In no case shall the test pressure be less than the nominal pressure rating of the valves and fittings (i.e. 150 psi for 150# series steel fittings).
6. Piping in branch steam, water or air line service, at pressure below 150 psi, which readily may be isolated for repair, need not be tested before being placed in service.
7. Rupture tests for fired furnace coils shall be at 1-1/2 times the equivalent cold working pressure of the furnace design coil outlet operating conditions.
8. Tightness tests for fired furnace coils shall be at 1-1/2 times the actual furnace design outlet pressure except that in no case shall they be less than the actual furnace design coil inlet pressure (reformer furnaces) nor less than the nominal pressure rating of coil terminal flanges or fittings (i.e. 150 psi in a low pressure or vacuum furnace with 150# series steel fittings).
9. An air, gas or steam pressure test shall not be applied to any installation without first notifying the Equipment Inspector and obtaining the approval of the Refinery Engineer.
10. Special tests or exceptions such as air tests to avoid water in the system, reduced pressures, higher pressures, proof tests, etc., shall not be applied to any installation without first notifying the Equipment Inspector and obtaining the approval of the Refinery Engineer.

APPROVED: 9/2/54  
Retyped: 9/17/59 CHEV BB  
1002645

By   
Supt. Engineering & Maintenance



### USING RECIPROCATING TEST PUMP



### USING HAND TEST PUMP

NOTE: ALL PRESSURE GAGE READINGS SHALL BE CORRECTED FOR ELEVATION HEAD TO GIVE TEST PRESSURE AT LOWEST POINT OF EQUIPMENT UNDER TEST.

TYPICAL ASSEMBLY OF HYDROSTATIC TEST EQUIPMENT

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