1948

PACIFIC GAS AND ELECTRIC COMPANY

S P E C I F I C A T I O N S

FOR PIPE

Purchase Order 7R-71963 61963

February 26, 1948

1. GENERAL

(a) These specifications apply to 30" O.D. electric welded steel pipe for gas line purposes, to be furnished to the Pacific Gas and Electric Company, hereinafter designated as the Purchaser.

(b) The pipe shall be fabricated from steel made by the Open Hearth Process.

Long Seam info

(c) Longitudinal seams shall be joined by electric fusion welding.

2. CHEMICAL PROPERTIES AND TESTS

(a) Ladle Analysis. A ladle analysis of each heat of steel shall be reported to the Purchaser. Only those heats conforming to the following chemical composition shall be used in the manufacture of pipe under this specification:

Carbon	.30 % Max.
Manganese	1.15 % Max.
Phosporous	.045% Max.
Sulphur	.05 % Max.

1.25% Max. Manganese will be acceptable if furnished without additional cost to the Purchaser.

(b) Check Analysis. A check analysis of one plate from each heat of steel shall be reported to the purchaser. Samples for check analysis shall be taken in accordance with standard mill practice.

If the check analysis varies from the requirements for Ladle Analysis by more than the permissible limits set forth below, additional analyses from

the heat may be made. The composition, based on the average of all the separate determinations made, may vary from that specified for Ladle Analysis to the following extent:

	Over Max. Limit Per cent
Carbon	.04
Manganese	.04
Phosporous	.01
Sulphur	.01

3. PHYSICAL PROPERTIES AND TESTS

(a) Physical Properties. The finished pipe shall conform to the following physical properties:

Transverse yield strength of plate material, min. p.s.i.	52000
Transverse ultimate strength, min., p.s.i.	~~65000~~ 72000
Transverse elongation in 2" of plate material, min., per cent	22 %

The yield strength is defined as the stress required to produce a total elongation under load of 0.5 per cent of the gage length on the test specimen as determined by multiplying dividers or extensometer.

(b) Hydrostatic Pressure Tests. Each length of pipe, including jointers, shall be tested to a hydrostatic pressure which will produce a fiber stress of 90% of the specified minimum transverse yield strength, which pressure shall be maintained for not less than ten seconds. This pressure shall be determined by the formula:

$$P = \frac{2ft}{D}$$

in which

P = hydrostatic test pressure, p.s.i.

t = thickness of wall, inches

D = outside diameter, inches

f = allowable fiber stress, p.s.i.

For the following diameter and thickness, this test pressure is as follows:

O.D.	Wall Thickness	Test Pressure, p.s.i.
30"	3/8"	1170

While under pressure, the pipe length shall be struck a blow with a 2-pound hammer, or its equivalent, near both ends of the weld.

All hydrostatic tests will be conducted with 2" rubber seals inside the pipe ends.

(c) Physical Tests. All physical tests shall be made at room temperature.

All tensile test specimens shall be 1" wide within a 2" gage length and may be flattened prior to machining and testing.

Tensile tests shall be made on one length of pipe from each heat of steel as follows:

test of weld?

One transverse tensile test across the weld, with the weld in the center of the specimen, for determination of ultimate strength.

One transverse tensile test 90 degrees from the weld, for determination of yield strength, ultimate strength, and elongation.

The results of these tests shall at least equal the applicable physical properties specified in Section 3 hereof.

(d) Retests. If the results of any tensile test of a length of pipe, from any heat of steel do not conform with the requirements of Section 3. (a), two retests of that test shall be made on the same length of pipe. If both of these

retests meet the requirements, the material of that heat shall be considered acceptable. If either retest fails, additional tests shall be made of lengths of pipe, selected at random from that heat, until the required results have been obtained from tests of three successive lengths of pipe, whereupon those lengths which previously have failed, shall be considered acceptable.

Individual pipe lengths which have failed in the above tests may be further retested and shall be acceptable if the required results are obtained from two successive tests.

If the elongation of any tensile test specimen is less than that specified and any part of the fracture is outside of the middle third of the gage length, a retest shall be allowed.

If any specimen fails because of flaws resulting from preparation of the specimen, it may be discarded and another specimen substituted.

4. DIMENSIONS AND TOLERANCES

(a) Dimensions. The finished pipe sections shall have the following dimensions, within the tolerances specified below:

O.D.	Wall Thickness	Length
30"	3/8"	31'-2"

(b) Circumference Tolerance. The outside circumference of the pipe, for a distance of 8" from each end, shall not vary from the circumference calculated from the specified outside diameter by more than minus 3/32" or plus 9/32".

(c) Wall Thickness Tolerance. The wall thickness at any point shall not be less than ninety per cent of the specified thickness.

(d) Length Tolerance. At least ninety-five per cent of the pipe sections shipped shall be between 30'-6" and 31'-4" in length, and no section will be acceptable which is less than 27'-0" in length. Jointers (two pieces joined by welding) shall be acceptable to a maximum of five per cent of the order, the minimum length of the shortest piece to be five feet.

The materials and workmanship involved in making girth welds on jointers are subject to approval by Purchaser's inspector.

5. WORKMANSHIP AND FINISH

(a) Defects. The finished pipe shall be free from injurious defects, both in plate and in weld. When the depth of defect reduces the wall thickness to less than 90 per cent of the specified wall thickness, such defect shall be considered injurious. Repair of injurious defects by welding shall be permitted, provided the depth of the defect does not exceed 33-1/3 per cent of the specified wall thickness (except in the case of sweats or leaks in the weld), and provided the length of the defect is not greater than a length equivalent to one diameter of the pipe.

The repairing of sweats or leaks in the welds shall be permitted to the full thickness of the pipe.

Repairs shall be made by completely removing the defect, cleaning the cavity, and then welding. The pipe shall be preheated to a temperature not exceeding 400° F. in the vicinity of the repair before welding. The workmanship involved in the repair is subject to approval of the Purchaser's inspector.

Hydrostatic retest of the pipe which has been repaired in this manner may be required by the Purchaser's inspector.

(b) End Finish. The ends of the sections of pipe shall be beveled to an angle of 30 degrees, plus 5 degrees, minus zero, and with a width of flat at the end of the pipe of 1/16", plus or minus 1/32". It shall be understood that the angle is to be measured from a line drawn perpendicular to the axis of the pipe. The bevels shall be reasonably free from burrs.

(c) Surface Treatment. All surfaces of the pipe shall be free from loose mill scale; but no surface treatment, such as blasting or pickling, shall be required.

The inside and outside weld reinforcement need not be removed.

6. INSPECTION, MARKING AND SHIPPING

(a) Inspector. While work on this contract is in progress, the inspector representing the Purchaser shall have free entry at all times to all parts of the manufacturer's plant engaged in the manufacture of pipe under this contract. The manufacturer shall afford the inspector, free of charge, all reasonable facilities for inspection of the pipe and shall permit him to witness all tests. The manufacturer shall not be obligated, however, to delay any of its operations because of the absence of the inspector.

(b) Marking. Each section of the pipe to be shipped shall be marked by painting on the inside surface near both ends the measured length and the specified thickness of the section.