72. The inspector shall stamp each piece accepted with a private mark. Any piece not so marked may be rejected at any time, and at any stage of the work. If the inspector, through an oversight or otherwise, has accepted material or work which is defective or contrary to the specifications, this material, no matter in what state of completion, may be rejected by the purchaser.

FULL-SIZED TESTS.

73. Full-sized parts of the structure may be tested at the option of the purchaser. If tested to destruction, such material shall be paid for at cost, less its scrap value, if it proves satisfactory.

74. If it does not stand the specified tests, it will be considered rejected material, and be solely at the cost of the contractor, unless he is not responsible for the design of the work.

75. In eye-bar tests the ultimate strength, true elastic limit and the elongation in 10 feet, unless a different length is called for, shall be recorded.

76. In transverse tests the lateral and vertical reflections shall be recorded.

BOILER SETTING.

Employers as a rule, when they anticipate the purchase of a new boiler, expect the engineer not only to be in possession of the proper knowledge of that which is directly analogous to his profession, namely—the design, quality, etc., of the boiler to be accepted, but he is also expected to be able to figure the cost of setting, the material to be used, and many times to be able to draw up the proper plans and specifications for the work to be done. In fact this is true of the advent of any added improvements to the machinery department which the engineer may be compelled to ask for, says "Practical Engineer." Of course there are exceptions to this rule, but the reader of this article will agree with me that the exceptions are rare indeed. In writing this article it is the intention to, as nearly as possible, place the engineer in possession of the proper knowledge of the methods used in the construction of the average boiler setting; of the material used in the work, and such other tips as will be valuable in accomplishing such a job.

In setting a horizontal tubular boiler never use any but the hardest brick obtainable; they already having been subjected to such a heat that they are not liable to disintegrate under the heat from the furnace fire. Always reckon on the first quality of fire brick for the furnaces; lay the hard brick in lime and the fire brick in fire clay mortar. In placing the boiler in position it should set on an incline to be one inch to the ten feet in length of the boiler; this is to incline all sedimentary collections to the rear or cooler end of the boiler, thus preventing such matter from precipitation upon the plates immediately over the fire. The forward lugs of the horizontal boiler should rest directly on lug plates placed on the walls, and the rear lugs on expansion rollers placed crosswise between the lug and the plate. Pockets must be built around all but the front lugs so that the boiler will have absolute freedom of motion during the action of expansion and contraction, otherwise the walls will crack. From the top of the bridge wall to the under side of the boiler the distance should be six inches, in boilers up to three and one-half feet in diameter, and eight inches in boilers that are larger. The curve of this inverted arch of bridge wall should be drawn with a radius equal to the diameter of the boiler to be set. For ordinary jobs only the furnace bridge walls and the rear walls, upon which the fire directly impinges, are lined with fire brick. However, all strictly first-class jobs should be lined with fire brick the entire length of the flue and from the under side of the lugs to the grate bars as well. In many cases the conditions are such that a flue will have to be returned over the top of the boiler; of course, fire brick are not necessary there, a flat arch of brick can be sprung from the side walls, in which case heavy brick stays and tie rods should be used, as the arch has a tendency always to spread to the side walls. It is, no doubt, a better plan to run up the side walls about twelve inches above the top of the boiler and cover the top straight across with wrought-iron plates about two feet wide of number 12 iron—these plates to be supported by 3½ or 4-inch wrought-iron T girders, and the whole covered over with two thicknesses of brick laid flat in loose sand. This plan permits an easy access to the top of the boiler at any place, and at all times, and prevents the spreading of the side walls as well.

When the size of the boiler to be used is known, you can, by the aid of the following data, ascertain the number of bricks, etc., that may be required in the setting. Let us take, for an example, a boiler three feet in diameter by twelve feet long, with a return flue over the top, set in twelve-inch walls. Allowing one foot front connection and two feet for back, would make the length of side walls sixteen feet over all, and eight feet high; hence 16×8=128 cubic feet, or 256 cubic feet for both side walls; rear walls 3¼ feet wide by 8 feet high equals 26 feet, or for both back and front walls 52 cubic feet. The bridge wall should be 3.25 feet wide, and an average of 3½ feet high x 1 1-3 feet thick, or fifteen cubic feet, making a total of 323 cubic feet. This multiplied by 21, the number of brick in a cubic foot, gives us a total of 6,783 brick, 5 per cent. of which should be fire brick for lining furnace, bridge wall and back connection wall. If full length of side walls are lined, allow 10 per cent. for fire brick. The superficial area to cover the return flue on top is 16 feet long by 5¼ feet wide over all, equals 84 feet, 4½ bricks to the superficial foot when laid flat, equals 378 bricks, two thicknesses 756, floor of ash pit, 3¼ x 5, equals 16; 25 feet equals 73 brick, or a total of 7,612.

21 bricks, when laid up ..... 1 cubic foot
14 bricks, when laid up ..... 8-inch wall
7 bricks, when laid up ..... 4-inch wall
4½ bricks, when laid flat ..... 1 superficial foot

For setting a thousand brick in lime mortar, 1 barrel of lime, 4 of sand. For setting a thousand brick in cement, 1 barrel of cement, 2 of sand. Rubble, 1 barrel of cement, 2 barrels of sand, 3 barrels broken stone. Height of chimneys, about 26 times their diameter.

CANADIAN TRADE ENQUIRIES.

The following are among the recent enquiries relating to Canadian trade received at the Canadian Government Office in London. The names of the firms may be obtained by applying to The Canadian Engineer: The names of parties in Canada able to ship ore for German steel works. A firm of merchants and agents at Calcutta, desirous of interesting themselves in Canadian trade, are anxious to correspond with parties in the Dominion with a view to business.

—A famous firm of Edinburgh engineers has received instructions to make a survey and prepare plans for a canal between the Forth and Clyde, through which the largest vessel afloat may safely pass. A syndicate of responsible London financiers is at the back of the plan. The scheme has grown out of the selection of St. Margaret's Hope, in the Frith of Forth, as a naval base.

AN INTERESTING ELECTRIC SUIT.

When the Ottawa Electric Company, which consists of several companies doing lighting and power business in the city of Ottawa at one time, was allowed to consolidate under one management, the city council passed a by-law authorizing the consolidation under certain conditions. The principal condition was to the effect that the companies so consolidated would permit the Corporation, or any person or company authorized by the Corporation, to use their poles for electric purposes, on paying such compensation as in the event of the parties being unable to agree should be determined by arbitration. The Ottawa Electric Co. later refused this permission to the Consumers' Electric Co. on the ground that the stringing of the Consumers' wires on its poles would impair the efficiency of its service. Proceedings