

sheet, and none to be accepted that show mechanical defects. In every boiler one sheet to be ordered 3 inches longer than the size required, from which a strip is to be cut and tested. The piece so tested must have an ultimate tensile strength with the grain of not less than 50,000 lbs. per square inch, an ultimate tensile strength across the grain of not less than 45,000 lbs., and must show a ductility, measured by elongation or reduction of area, of not less than 20 per cent. Should any of the test pieces fail to fulfil the above requirements, the entire boiler may be rejected. Should any plates develop defects in working, they must be rejected. Each plate must be stamped with the maker's name.

*Boiler and Fire-box Steel.*—A careful examination to be made of every sheet, and none to be accepted that show mechanical defects. A test strip from each sheet, taken lengthwise of the sheet and without annealing, should have a tensile strength of 55,000 lbs. per square inch, and an elongation of 30 per cent. in an original length of 2 inches. Sheets are not to be accepted if the test shows a tensile strength less than 50,000 lbs. or greater than 65,000 lbs. per square inch, nor if the elongation falls below 25 per cent. Should any sheets develop defects in working, they must be rejected.

*Iron and Steel Stay-Bolts and Boiler Braces.*—Iron or steel for stay-bolts and braces must have an ultimate tensile strength of not more than 60,000 lbs. nor less than 48,000 lbs. per square inch, with an elongation of not less than 20 per cent., and a reduction of area of fractured section of not more than 35 per cent. It must also withstand the following test. A piece of the iron or steel from 18 inches to 24 inches in length is to have one end fastened in a vice; over the other end a piece of pipe is to be passed to within 6 inches of the vice. By means of the pipe the sample must be bent until the end is at right angles to the portion in the vice, and then bent back to its original position. This must be repeated not less than twelve times without showing fracture, the bending being each time in the opposite direction to that previous.

*Boiler Tubes of Steel or Iron.*—All boiler tubes must be carefully inspected and be free from pit-holes or other imperfections. They must be rolled accurately to the gauge required. They must be