

FUME OR DUST PRODUCED BY ARC WELDING (Continued)

| Material Being Welded                                       | Electrode Used      | Size of Electrode | Particles Per cu. ft. | Characteristics of Dust Particles. (Sizes and Percentages Estimated)                                                                                      |
|-------------------------------------------------------------|---------------------|-------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Welding 2" Ring on 1" Mild Steel Boiler Plate Inside Booth. | Fleetweld #7 Coated | 3/16"             | 27,662,976            | All particles less than 2 microns. 70% round, opaque; 30% slightly angular, crystalline. Countless number of black particles, reddish brown smudge.       |
| Mild Steel Scrap Plates Inside Booth.                       | Stainweld A Coated  | 5/32"             | 2,605,440             | All particles black opaque, 2 microns or less in size.                                                                                                    |
| Ka2S Steel Inside Booth.                                    | Stainweld A Coated  | 5/32"             | 12,460,800            | About 80% angular opaque, 2 microns or less; 20% slightly angular crystalline, 5 microns or less. Countless number black particles, brownish grey smudge. |

The U.S. Navy recently conducted some extensive tests with coated electrodes, and found that the quantity of dust or fumes developed while welding on galvanized steel plate was greater than when bare steel plates were used and the dust remained in suspension for far longer periods of time. It was also found that the average size of the dust particles was 0.27 microns and that there were 130,000 particles under four microns diameter per cubic centimeter. Quoting the Navy report:

"It is apparent that considerable quantities of dust are found in any arc welding operation. The dust formed when operating on plain mild steel or corrosion resisting steel is largely derived from the flux coating on the electrodes, as is shown by the composition of these dusts".

What Physiological Effect on Welders is Produced by The Use of Coated Electrodes. According to a study made by Doctors A. T. Doig and A. P. G. McLaughlin on lungs of Electric Arc Welders (Lancet - V. 20; 771 - 775 (April 4, 1936)), definite pulmonary lesions which gave rise to striking X-ray changes in the appearance of the lungs were found in welders which had breathed the dust or fume from coated electrodes. Quoting Doctors Doig and McLaughlin:

"The electrodes or welding rods which contain a core of metal and an outer covering are consumed gradually by the heat generated (about 1500°C.) during the welding operation. The metal in the core of the rod becomes molten and, assisted by the flux contained in the covering, spreads over the surface of the metal which is being welded. The fume is therefore made up of the volatilized constituents of the coverings of the rods together with fine particles of oxidized metal, usually in the form of iron oxides. In addition the fumes probably contain gases such as nitrogen peroxide and ozone which are formed by the action of an electric spark on the air. The composition of the coverings of the electrodes or welding rods becomes, in the circumstances, a matter of some importance. Many substances, all of which we do not propose to enumerate, are used. The basis of the majority of the coverings is sodium silicate which acts as a flux. Again, the