S 482

(138) Need for Low Oxygen, Low Sulphur and Low Phosphorus in Steel

Chas. Pfizer Corp. E. J. Dunn

Introduction

This report illustrates the development of an effective, reproducible and practical technique for the deoxidation and desulfurization of steels. Processing problems and product problems have been resolved by removing sulphur oxygen and/or phosphorus to low levels.

Experimental procedure

This procedure was devised: 1. Melt down in a basic-lined furnace. 2. Skim off melt down slag to remove as many acid melt down constituents as possible. 3. Reduce or deoxidize the bath directly, rather than via a reducing slag, by the addition of a normal amount of Al. 4. Immediately add unslaked lime to a depth of one to 2 in. to form a strongly basic slag. 5. At a temperature high enough to prevent freeze up (2900F), take a metal sample for a complete chemical analysis, and immediately inject Ca or CaMnSi into the metal bath. Induction furnaces of 300 and 600 lb capacities were used in the development of the desulfurization procedure, afterwhich it was proved on 1000 and 2400 lb induction furnace melts.

Results

The proposed method of desulfurization quickly and effectively reduced the sulfur conent of a medium carbon, medium alloys steel from average initial sulfur contents of 0.022 percent to final average sulfurs of 0.002 percent. Along with the sulfur and Al reduction in the metal and their apparent subsequent increase in the slag, an increase of Fe, Mn and Si in the slag was also suggested by typical slag analysis taken before and after 2 percent CaMnSi additions. This procedure is followed: 1 Melt down in a basic lined furnace.

2 Remove melt down slag.

3 Deoxidize the metal bath with 0.15 percent Al

4 Add lime in minimum quantities of 2 lb/100lb charge (6 lb/100 lb charge is required if 0.001/0.002 percent sulfur is desired).

5 At a sufficiently high enough temperature to prevent freezeup, immerse 2 lb/100 lb of charge of CaMnSi into the steel bath.

6 Tap at the desired temperature.