

Chapter 8

Oxygen Steelmaking Furnace Mechanical Description and Maintenance Considerations

K. J. Barker, Manager of Technology—Steelmaking and Continuous Casting, USX Engineers and Consultants, Inc.

J. R. Paules, Manager, Technical Services, Berry Metal Co.

N. Rymarchyk, Jr., Vice President, Sales and Engineering, Berry Metal Co.

R. M. Jancosko, Exec. Vice President, Vulcan Engineering Co.

8.1 Introduction

The intent of this chapter is to provide a mechanical description of the basic oxygen furnace (BOF), as well as the maintenance of certain BOF components. The components covered in this report include basically all components of the BOF vessel and the trunnion ring up to the trunnion pins. Excluded areas are probes, couplings, bearings, foundations and the various drive units. The BOF components covered are: top ring and lip ring; cone, barrel, bottom shells and transition knuckle sections or flanges; brick retainer rings, slag shields and taphole assembly; working and safety refractory linings; vessel support system; trunnion ring, trunnion blocks and trunnion pins; cooling system for the vessel or trunnion ring; and oxygen lances.

This chapter is an abridged version of *AISE Technical Report No. 32, Design and Maintenance of Basic Oxygen Furnaces*,¹ with the addition of Section 8.5 which addresses oxygen lance design, and Section 8.6 which addresses sub-lance design.

8.2 Furnace Description

8.2.1 Introduction

This chapter is established to provide a description and preliminary design considerations for the manufacture and supply of BOFs. Basic oxygen furnaces are so called by virtue of the refractory and the additives used in their steelmaking processes. The processes referred to in this chapter are those which involve the treatment of a mixture of steel scrap and molten iron, generally transported from the blast furnace to the BOF. The steel scrap and hot iron are charged into the BOF vessel and oxygen is injected in one of many different methods into the furnace for purposes of producing a steel melt of specific chemical and physical properties.

The processes involved share one common operating factor; the injection of oxygen into the furnace is the agent for decarburizing the molten hot iron and generating the reaction heat required to melt the scrap.