

ENGINEERING BULLETIN #155

Comparing Metal and Rubber Lance Hoses

Robust lance hoses are needed to deliver oxygen to a Basic Oxygen Furnace. The heat of the surrounding environment, the frequent handling—and mishandling—of the hoses, and the need to maintain strict cleanliness present a set of challenges for engineering and maintenance.

There are various options when it comes to lance hose design. One of the biggest decisions to make revolves around what material to use for the inner hose, whether to opt for metal or rubber. In either design, layers of braid or insulation and metal armor complete the assembly.

WORKING TEMPERATURES

Metal has a higher maximum working temperature than rubber. Rubber hoses require insulation to reach working temperatures of 1000 °F while the 300 Series austenitic stainless steels can handle temperatures up to 1500°F. Exotic alloys such as Inconel 625 can accommodate even higher temperatures.

It's often the ambient heat that engineers must keep in mind when designing components for steel mills, but this can vary greatly depending upon proximity to furnaces and other pieces of equipment.

HOSE FLEXIBILITY

As lance hoses move in and out of the furnace, flexibility is a desired characteristic. Rubber hoses are often more flexible than metal hoses in smaller diameters, but that difference decreases or becomes negligible as hose size increased.

Lances are typically six, eight or ten inches in diameter, fitting into this second category where neither metal nor rubber have a definitive edge in terms of flexibility.

LIGHTWEIGHT LANCE HOSES

Despite having a heavy wall construction, metal hose assemblies weigh significantly less than rubber hose assemblies. The increased weight of the latter, which is about 1.5 – 2 times more, can be difficult to handle and put a lot of stress on the piping system.

Complete rubber hose assemblies used for oxygen lancing are generally far more expensive than a metal hose assembly and, given life span ends of being the same, one wonders whether the increased price justifies an arguable marginal increase in flexibility. And a heavier, harder to handle flexible hose at that.