The Home Rubber Company
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FURNACE HOSE

(Furnace/Furnace Door/Dry Refractory)

Industries Served: Steel, Glass, etc - where cooling is required in heat, flame or molten material environments

Introduction

"Furnace Hose" refers to hose used in the steelmaking industry, primarily on electric arc furnaces, providing cooling water in various parts of the process, including the door (Furnace Door Hose), and to the electrodes. These hose types are also used in various refractory operations.

Because of the high heat in this process, the hose is constructed with special protective covers to provide resistance to extreme radiant heat. In many applications, resistance to radiant heat alone is not enough because the hoses are subjected to molten slag. Flame resistance is required in many applications.

Heat resistance is not the same as flame resistance. Many 'heat resistant' covers are flammable, and burn when they contact molten slag. This destroys the hose quickly by simply disintegrating it.

Furnace Hose Types

"Small Bore Furnace Hose" ranges in size from 1/2" to 3.0" inside diameter and is a soft wall (non-helix) construction. The hose is used to provide cooling water to the furnace doors.

"Large Bore Furnace Hose" is over 3" in diameter and usually contains a helix component to provide maximum flexibility without kinking. Many of these hoses provide cooling water to the furnace electrodes.

Working Pressure

Hoses are normally designed for 150-PSI working pressure (WP) water service.

Bend Radius

Many hoses 'hang' in the installation. Kink resistance and supporting the weight of the hose (and cooling water) need be considered when selecting the proper Furnace Door Hose. Minimum bend radius consideration is necessary in many applications to avoid flow restriction and premature failure. There are field applications where the hose minimum bend radius is commonly exceeded, resulting in kinking and quick hose failure. Non-helix constructions have a minimum bend radius of 8 times the hose ID, wire reinforced constructions typically reach 6:1, and Profax (Home Rubber Company's special plastic helix material) achieves a minimum bend radius 4:1.

A helix component is incorporated in larger ID hoses to provide maximum kink resistance along with a high degree of flexibility. The use of a helix in the hose enables the cover to be corrugated, which additionally enhances flexibility. Steel or Profax helixes are chosen depending on the overall application requirements. The Profax construction is also referred to as 'crush resistant' because the hose returns to shape after being crushed. Profax is more flexible than steel wire, and allows smaller minimum bend radii than steel wire constructions. Profax is non-conductive, and it enables Home Rubber to offer Furnace Hose that is non-conductive throughout.

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Conductivity

Hose applications can range from those with non-conductive requirements (non-conductive tube, and Profax helix), to those with high conductivity requirements (usually a conductive tube and wire helix). In a highly electrically charged environment, i.e. electric arc, electrodes and molten metal, a hose that is totally non-conductive is required to prevent grounding through the hose. This type of environment may require a non-conductive hose construction with non-conductive stainless steel hose fittings.

Handling

Home Rubber recommends storage in a non-heat environment, with the hose protected from dirt, and kept from harm's way. High temperature resistant covers are susceptible to abrasion, tearing, and gouging damage and must be properly handled and protected.

Hose Life

The primary cause of Furnace Hose failure is exposure to heat over time. Although extreme radiant heat is resisted by the protective covers, heat eventually can and will cause degradation of the components of the furnace hose. When molten splash comes in direct contact with the hose, the cover can char and burn unless the cover is flame resistant. Heat resistance is not the same as flame resistance. Nomex and Norfab fabrics used as part of the hose cover can degrade rapidly when in direct contact with flame and molten splash.

For maximum heat/flame resistance a fiberglass cover is recommended. A Silicone rubber layer over the fiberglass provides a smooth surface that hinders molten splash and spatter from sticking.

A Silicone/Fiberglass cover is recommended for 'extreme' furnace applications.

Cover Materials

Nomex

Our standard cover for furnace door hose and supplied in 1, 2, or 3 plies. Nomex is rated at 600 ° F for heat resistance; degrades when exposed to flame.

Norfab (Aramid fiber)

A higher rated heat resistant material for furnace hoses supplied in 1 and 2 ply covers. Norfab is rated at 700° F for heat resistance; degrades when exposed to flame.

Fiberglass

Premium heat resistance in single or multiple ply covers up to 1,000° F, and does not burn when exposed to flame. Fiberglass has poor abrasion resistance. A Silicone covering can be added to protect the fiberglass component of the hose during handling.

Silicone

An integral protective shield for fiberglass covered hose constructions. Silicone covers provide a smooth surface that resists degradation caused by molten splash and spatter. Additionally Silicone enhances flame resistance. Silicone protection can be applied to the entire length of hose or to specific areas, i.e. one end only, where molten splash and spatter is a problem.

Comments

Hoses used in furnace applications require the proper combination of materials. Based on application requirements, The Home Rubber Company provides hose design and materials recommendations. Home Rubber Company routinely manufactures furnace hoses with most commercial couplings, including stainless steel and carbon steel built-in ends, integral Duck and Rubber Flanges, and swaged hose ends.

Don't forget to CALL HOME! (800) 257-9441