

PENFLEX

EXPANSION JOINTS IN STEEL MILLS

Expansion joints accommodate movement and absorb vibration in piping systems and, in doing so, they protect adjacent piping and equipment from damage.

Penflex designs and manufactures a wide range of metal bellows and expansion joints for steel mills that play an important role in the functioning of key equipment such as blast furnaces.

While heat is often the main concern in steel mill applications, corrosion can also be a cause for concern in certain applications, such as those involving coke oven or furnace gases. Certain alloys, like 800H, Nickel 200, Titanium Grades 1 and 2 and Duplex 2205, can be used in extremely hot or highly corrosive applications.

BLAST SYSTEM FURNACE

Blast furnaces use chemical reactions between hot air and an iron ore-coke-limestone mix to produce molten slag and molten iron. The latter is then heated further with various other inputs to make steel.

Expansion joints are used within piping in and out of the furnaces to help accommodate thermal expansion and contraction. Depending on proximity to the furnace, and ambient temperatures, the components may be made using a higher-nickel alloy, like Inconel 625, which is better suited for extreme temperature environments.

COKE GAS LINES & COKE OVEN

Coke ovens are similar in structure and technology to blast furnaces, used to turn coal into a more efficient energy source: coke. Aside from coke, coke oven gas is a byproduct of the process. It can contain chemicals like ammonia, tar, sulfur, naphthalene, benzol, and most

At a glance

Sizes range from 2-1/2" to 120" ID using single, two-ply or multi-ply construction.

Materials of construction include 300 Series Stainless Steels, Inconel® 600, 625 and 718, Monel® 400, Hastelloy® C—22, C-276 and X, Titanium Grades 1 and 2 and Duplex 2205. Others available upon request.

The full complement of end fittings and accessories is available.

On-call engineering support for bellows and expansion joint products.

ASME IX certified welders and on-site Certified Welding Instructor and Non-Destructive Examiner ensures highest quality fabrication.

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notably carbon monoxide, meaning parts designed for coke applications will likely need to keep corrosion resistance in mind.

COMBUSTION LINES

Combustible gases produced from coke ovens, blast furnaces, and basic oxygen furnaces are repurposed at different stages of the steelmaking process and expansion joints are often used to help accommodate movements in the piping system as these byproducts are moved within the mill.

GAS CLEANING SYSTEM

Gas cleaning systems in steel mills clean exhaust gases, reducing air pollution. To compensate for vibrations and movements caused by thermal expansion and contraction, expansion joints are often required. This protects surrounding piping and equipment from damage.

Similar to the gas cleaning system, reverse air fans, also called the baghouse, control emissions of pollutants from the blast furnace specifically.

WATER COOLER DUCTS

Expansion joints for water cooler ducts are designed for low pressure and low spring rates with high flexibility. These components are desired to damp vibration.

Steel mills rely on a range of metal hoses and expansion joints for successful operation and Penflex Sales Engineers are always available to help define application requirements for your next project, replacement, or repair. In addition to engineering and design support, we offer resources to support proper installation and maintenance for longer life in service.