

News Release

June 19th, 2020

Nippon Steel Engineering Co., Ltd.

Order of Copper Staves for Usiminas' Ipatinga Plant Blast Furnace 3

Nippon Steel Engineering Co., Ltd. (Representative Director and President: Yukito Ishiwa; Head Office: Shinagawa-ku, Tokyo; hereinafter, "NSE") is pleased to announce that it has received an order of 240 copper staves from Usiminas (Usinas Siderúrgicas de Minas Gerais S.A., Brazil) for its Ipatinga Plant Blast Furnace 3.

The cast-in steel pipe copper staves^{*1} adopted for high thermal load area have been vastly improved in performance over conventional products. As a result, they contribute to a **longer service life and increased energy efficiency of blast furnaces**.

- (1) **High abrasion resistance is achieved for longer life** by adopting a unique upward- rib structure that pushes materials in front of the copper staves back toward the inside of the furnace, reducing the contact force and descending speed of materials at rib tips.
- (2) **Energy is saved** by the insulation layer on the copper stove formed from the deposits retained by the upward rib. This insulation layer reduces the heat taken from the furnace and lowers the coke consumption.
- (3) **High thermal deformation resistance is achieved for longer life** with steel pipes casted in the stove body that serves as the framework. Furthermore, the protective pipes are fixed to gas seal boxes, which is fixed to directly to the shell, constraining displacement at the upper and lower ends of the copper staves.
- (4) **The risk of leaking at welding points is completely eliminated for longer life** by making the plug welding and pipe welding required in conventional rolled copper staves unnecessary and omitting structurally weak welding points.

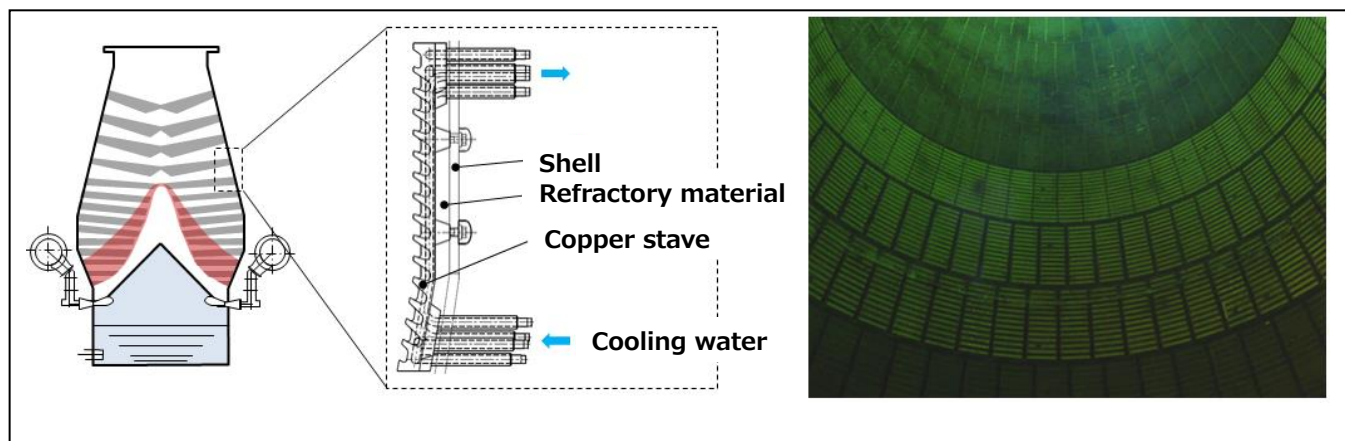
Our cast-in steel pipe copper staves are manufactured in Vietnam as well as Japan, and we conduct quality control based on the technology we have cultivated up until now. In addition to the above features, we proposed an optimal copper stove layout that utilized the high freedom of design inherent to casting, and this combined with the high regard for our comprehensive technical ability led Usiminas to choose us over other overseas competitors.

Leveraging its cast-in stave design and manufacturing know-how cultivated over 40 years, NSE has developed cast-in steel pipe copper staves and sold them since 2004. NSE's cast-in steel pipe copper staves have been met with excellent reviews from customers in Japan, northern Europe, South Africa, and elsewhere. To date, the total number of deliveries has reached approximately 875 staves. Going forward, NSE will contribute to longer life and energy saving blast furnaces by expanding sales of its cast-in steel pipe copper staves.

***1: Cast-in steel pipe copper stave**

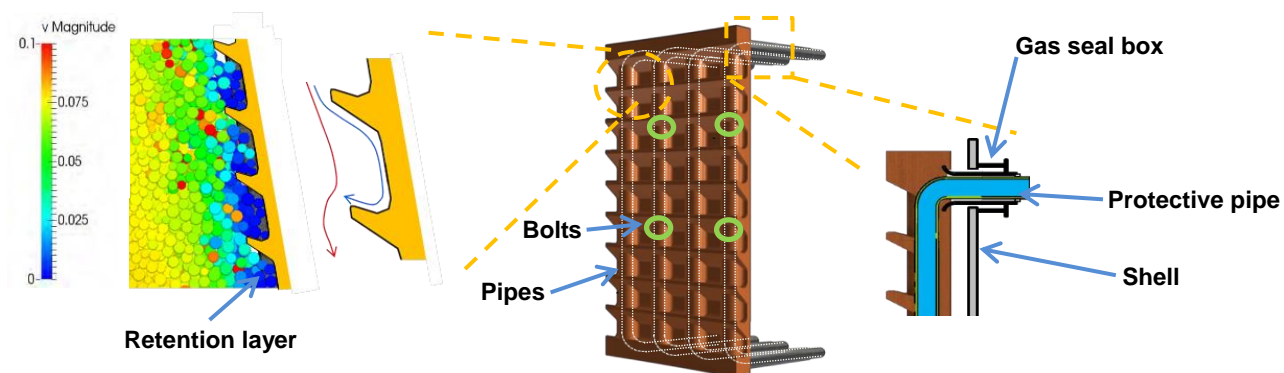
Cooling equipment installed inside a blast furnace that is used for extracting molten iron from iron ores, a primary process in steelmaking. The stave helps to maintain the furnace shape and protect the shell from high-temperature gas and molten material inside the furnace.

[Cast-in steel pipe copper staves installed inside the furnace (conceptual image)]



[Simulated behavior of descending material based on DEM analysis]

[Constraint of the upper and lower ends of the copper stave by gas seal boxes]



[For more information, please contact below]

<https://www.eng.nipponsteel.com/english/contact/index.html>