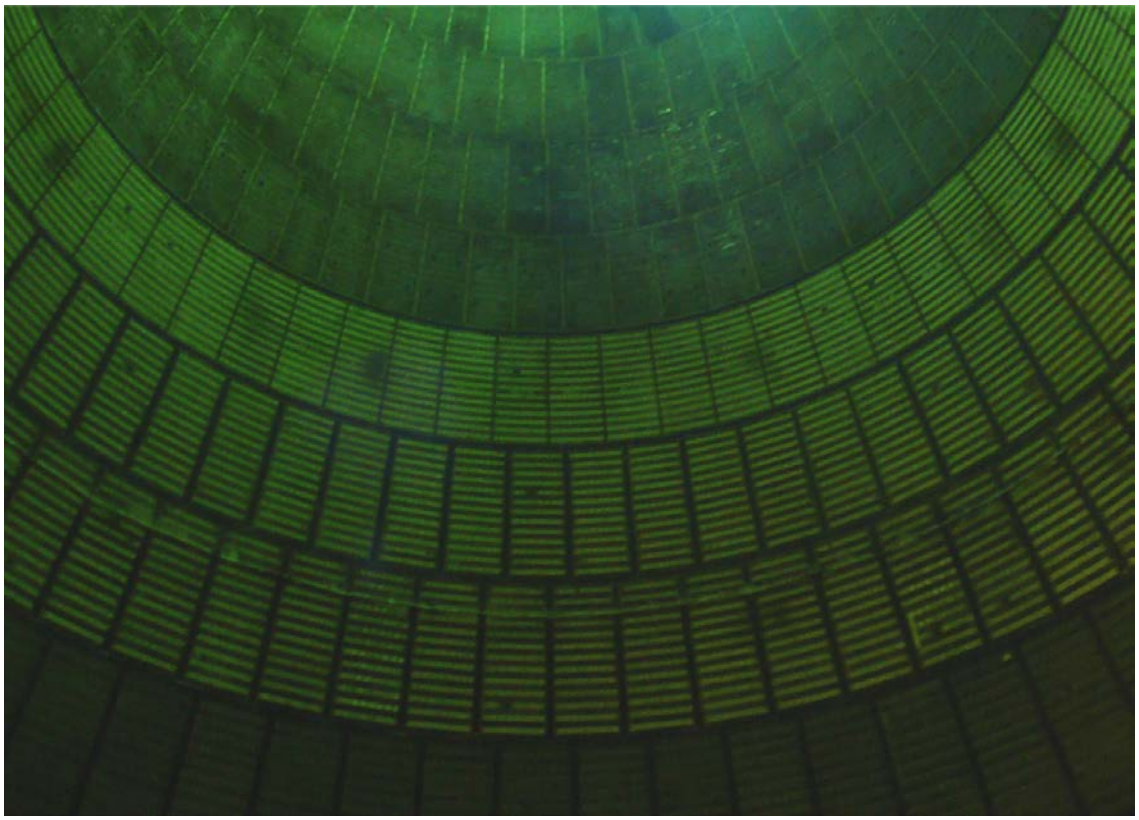
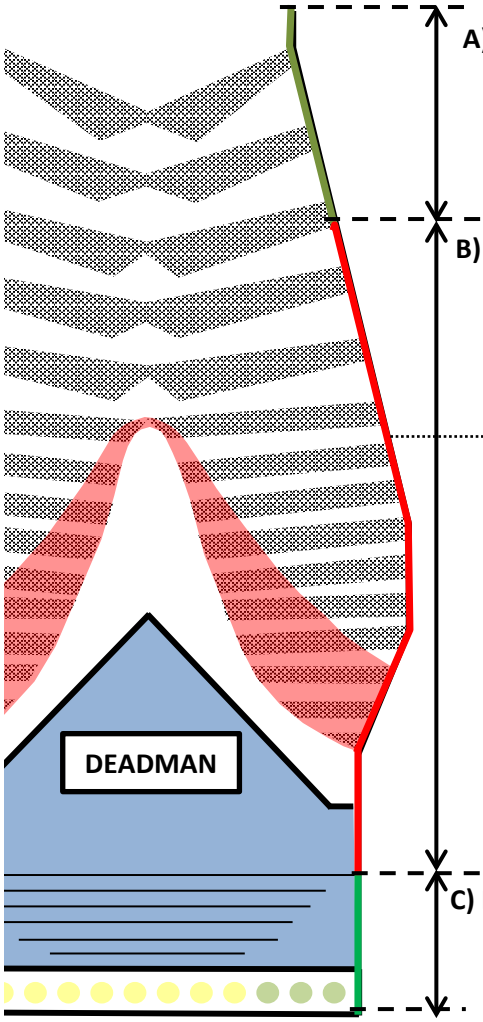
Furnace cooling system



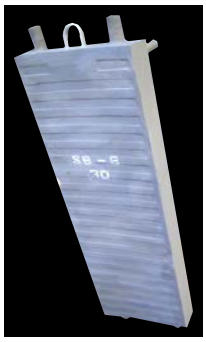
Furnace cooling system

Concept

① Setting of the proper cooling capacity of stave coolers matched the heat load in furnace.
② Stave Cooler of high cooling capacity and highly reliable at low price.
③ Control of underbottom cooling capacity according to the condition of DEADMAN.



A) Heating zone
→Low for keeping temperature of burden high



B) High heat load zone
→Strong cooling for keeping inner-furnace profile and scab

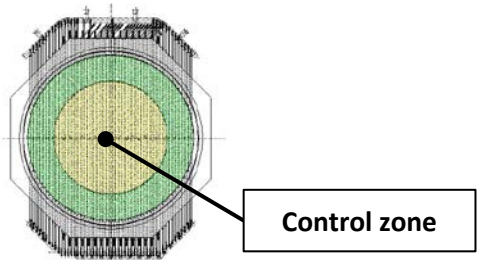
Upper shaft
Lower shaft

(Cast-in Steel pipe copper stave)

C) Hearth zone
→Strong & constant cooling for carbon bricks

(Enhanced cooling cast iron stave)

D) Bottom zone
→ Cooling capacity is adjusted according to the temperature condition of bottom.



Advantage

- Low operation cost (Low FR)
- Low investment
- Long life

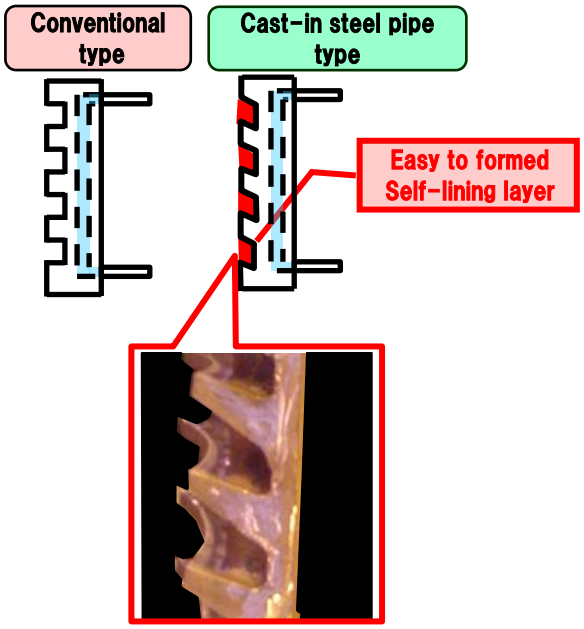
Furnace cooling system

Type

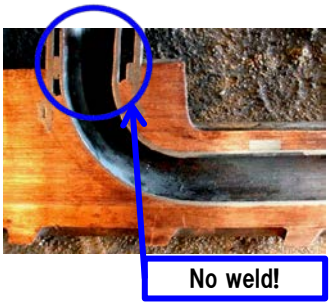
1） Cast-in steel pipe copper stave cooler [Most Recommended]
2） Cast copper stave cooler
3） Rolled copper stave cooler

Features of Cast-in Steel pipe copper stave cooler

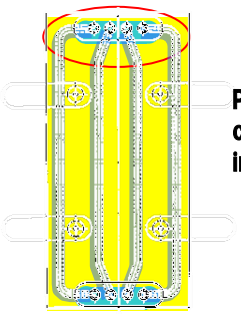
①Self-lining



②No welds

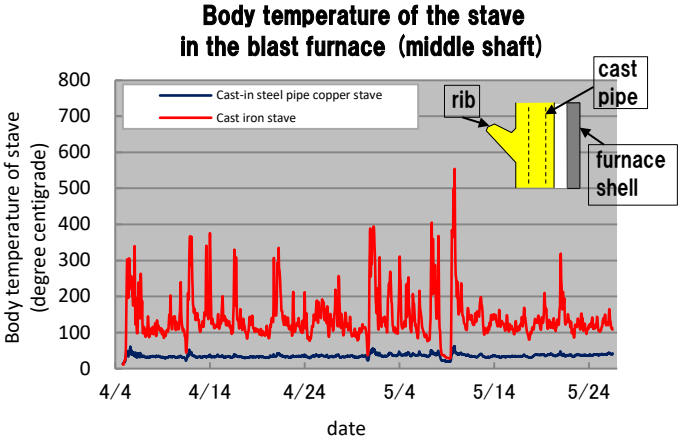


④Flexible layout



Possible to adopt copper stave in existing shell.

③High cooling capacity



Furnace cooling system

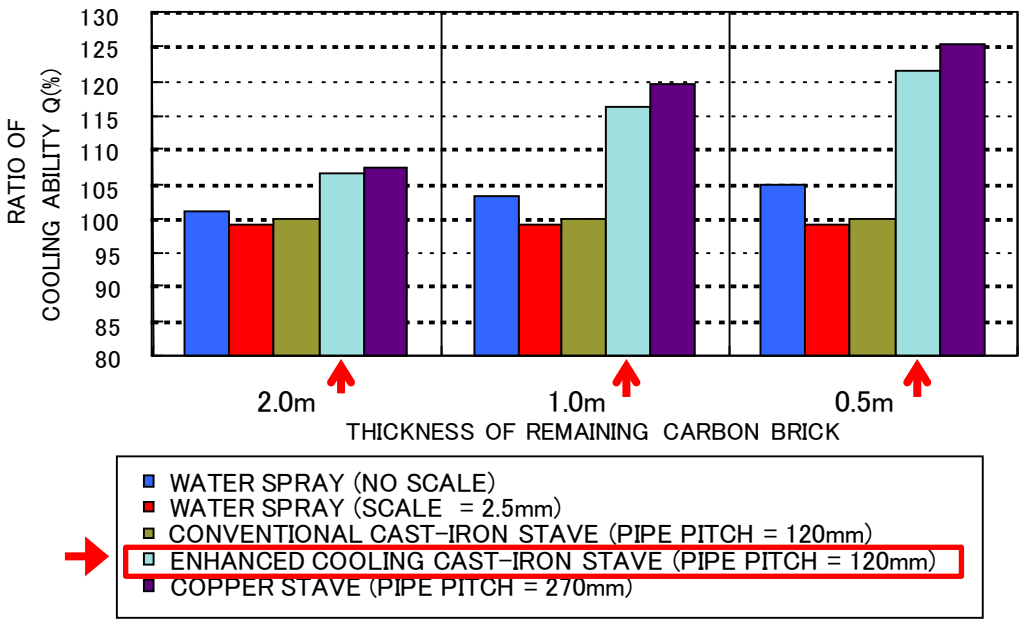
Type

1) Enhanced cooling hearth stave
2) 4th generation cast-iron stave cooler

Feature of enhanced cooling hearth stave cooler

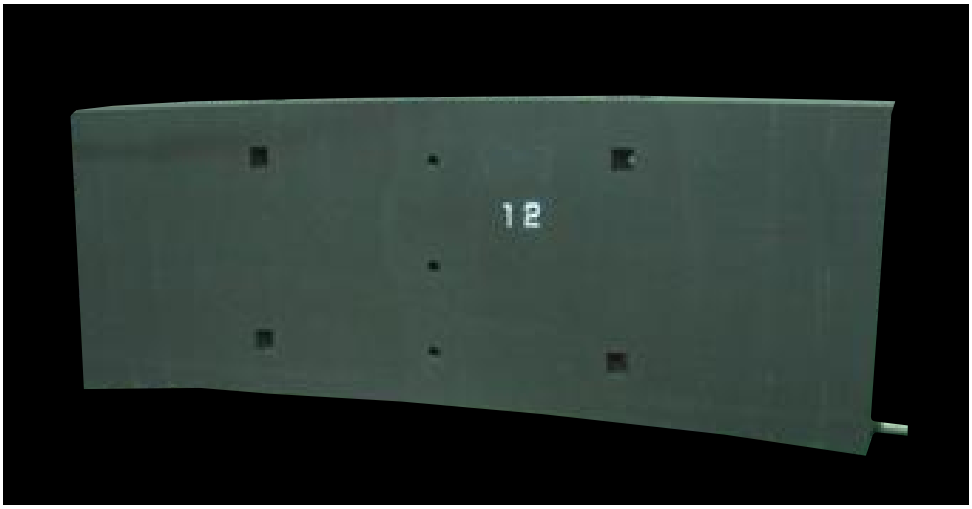
① Cast-iron stave cooler with the same cooling capability as copper stave cooler

Comparison of cooling capabity



Special cast technology realizes cast-iron stave cooler with the same cooling capability as copper stave cooler.

② Since stave base material is not copper but cast iron, it is very economical.



STAVE COOLER DELIVERY REPORT

NO.	YEAR	COUNTRY	CUSTOMER	BLAST FURNACE		Remarks
1	2001	JAPAN	NIPPON STEEL	KIMITSU	No.3(3)	
2	2001	BRAZIL	ACOMINAS		No.1BF	
3	2001	JAPAN	SUMITOMO METAL	KOKURA	No.2(3)	
4	2001	JAPAN	HOKKAI STEEL		No.2(2)	
5	2002	JAPAN	NIPPON STEEL	KIMITSU	No.4	
6	2002	JAPAN	NISSHIN STEEL	KURE	No.2(5)	
7	2002	JAPAN	SUMITOMO METAL	KASHIMA	NEWNo.1	
8	2003	ITALY	ILVA	TARANTO	No. 5 BF	
9	2003	BRAZIL	ACOMINAS		No.1BF	
10	2004	AUSTRALIA	BLUE SCOPE STEEL	PORT KEMBLA	No. 1 BF	
11	2004	JAPAN	NIPPON STEEL	OITA	No. 2BF(3)	
12	2004	INDIA	TATA STEEL	TISCO	G BF	
13	2004	AMERICA	US Steel	GARY	No. 13 BF	
14	2004	FINLAND	RAUTARUUKI		No. 2BF	
15	2004	SOUTH AFRICA	ISCOR	VANDERBIJLPARK D		
16	2006	ITALY	ILVA	TARANTO	No. 4 BF	
17	2006	JAPAN	SUMITOMO METAL	KASHIMA	No. 3 BF	
18	2007	AUSTRALIA	BLUE SCOPE STEEL	PK	No.5	
19	2007	JAPAN	KOBE STEEL	KAKOGAWA	No. 2 BF	
20	2007	JAPAN	NIPPON STEEL	NAGOYA	No. 1 BF(5)	
21	2008	JAPAN	KOBE STEEL	KAKOGAWA	No. 3 BF	
22	2008	JAPAN	SUMITOMO METAL	WAKAYAMA	New No. 1	
23	2008	JAPAN	NIPPON STEEL	OITA	No. 1 BF(4)	
24	2009	CHINESE TAIPEI	CSC		No.3	
25	2009	ITALY	ILVA	TARANTO	No.1	
26	2011	JAPAN	NIPPON STEEL	KIMITSU	No.2	
27	2012	JAPAN	SUMITOMO METAL	WAKAYAMA	No.2	

(After 2001)

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