

EVERCLEAN™ ultimate anti-clogging technology for continuous casting nozzles

Krosaki Harima Corporation has achieved to develop a novel anti-clogging material which has both excellent anti-clogging effects against alumina inclusion in molten steel and corrosion resistance by using ZrO_2 -CaO raw materials containing high CaO in order to improve anti-clogging characteristic.¹⁾

We expect that significant benefits can be delivered to the customer by using nozzles applied this ultimate anti-clogging technology EVERCLEAN™.

Customer benefit

- 1 Reduces inclusion adhesion
 - Reduces pinhole defects - quality improvement
 - Stabilizes molten steel flow in the mold - quality improvement
 - Increases the length of casting sequences - productivity improvement
 - Improves the yield rate of steel products - productivity improvement
 - Reduces the risk of mold break out - productivity improvement
- 2 Reduces the number of SEN replacement
 - Improves the yield rate of steel products - productivity improvement
 - Lighten operators' workload and contribute to safe operation - safety
 - Reduces steel production cost per ton - cost-saving
- 3 Reduces Ca addition amount
 - Improves molten steel cleanliness - quality improvement
 - Improves the service life of SN refractories for ladle and CC.
 - Reduces Ca addition cost - cost-saving
- 4 Reduces CO₂ emission
 - Shortens refining processing time - energy-saving
 - Reduces the amount of scarf on the slab surface - energy-saving
 - Reduces the number of preheating of SEN - energy-saving
 - Reduces industrial waste by reducing the refractories consumption - energy-saving

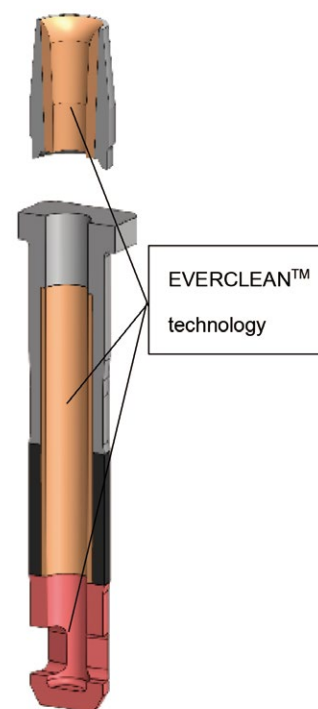


Fig. 1 Application example of EVERCLEAN™ technology

Actual performance

EVERCLEAN™ shows very clean bore and port, regularly used for high-end steel (IF grade) with outstanding anti-clogging performance.



Fig. 2 Comparative photos after 3-heat casting of Al-Si killed steel

EVERCLEAN™ solution for various problem in the mold

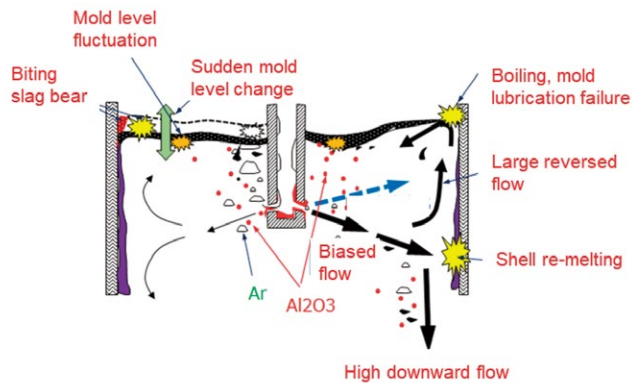


Fig. 3 Various problem in the casting mold

Product portfolio 1

EVERCLEAN™ has Z series, Z means ZrO₂.

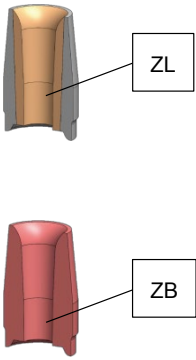
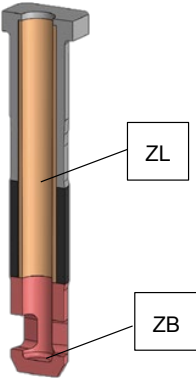
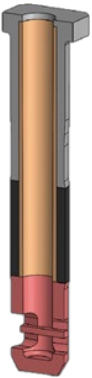
Table. 1 EVERCLEAN™ product line-up

Technology		EVERCLEAN™	
Product code		ZL	ZB
Application		Liner	Body
Chemical content	F.C.	Low	High
	ZrO ₂	✓	✓
	CaO	✓	✓

Product portfolio 2

EVERCLEAN™ technology extends to equalizer and port.

Table. 2 Application of EVERCLEAN™ technology

EVERCLEAN™ for tundish upper nozzle	EVERCLEAN™ for submerged entry nozzle		
	Standard	EVERCLEAN™ equalizer	EVERCLEAN™ port
		 EVERCLEAN™ equalizer is a product for optimizing the flow in the mold by equalized port flow.	 EVERCLEAN™ port is a product for optimizing the flow in the mold by uniform port flow.

Reference

1) Ling Li and Akinari Sasaki: Krosaki Harima Technical Report, 171, 147-161 (2023)