

# Engineering Dr. Karl Ableidinger

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## F. BAUERNSTÄTTER GmbH.

A-1040 Wien, Belvederegasse 6/54

Tel: +43-1-505 88 23; Fax: +43-1-505 24 79

e-mail: [ableidinger@karlableidinger.at](mailto:ableidinger@karlableidinger.at)

web page: [www.karlableidinger.at](http://www.karlableidinger.at)

### Main Differences of Steel Melting for Ingots and Castings:

In the world today most of the steel melted is used in steel plants for continuous casting or production of ingot. Less than 1% is used for steel sand casting. Two very different melting technologies are necessary for the different processes of Steel Melting for Ingots and Steel Castings.

A steel melt with the requested chemical analysis is not enough to get high integrity steel for castings. The right deoxidation of the liquid and the formation of hard secondary deoxidation products during the solidification of the casting are important to prevent hot cracks and pin holes.

	Ingots for milling	Castings
1) Hindrance of shrinkage	<b>no</b>	<b>High</b> the combination of stresses generated by the geometry of the mould and casting during solidification and the presence of liquid FeSiMn-oxide films → <b>HOT CRACKS</b>
2) Purity	quality acceptable level for work of deformation	control of mechanical properties, ultrasonic test, X-ray analysis, magnetic crack detection, no metallographic examination
3) Solidification:	<b>quick and uniform</b> in solidification time.	<b>slow and not uniform</b> because of different wall thickness and junctions causing therefore different solidification times and strain in the different areas of the casting.
4) Desoxidation after O <sub>2</sub> blowing	FeSiMn and Al	Al (sometimes Ti, Zr, CaSi)
5) Low gas contents:	low H and N content only total O <sub>2</sub> control	O <sub>2</sub> – activity max: 4 – 5 ppm a higher content causes <b>pin holes</b> and liquid FeSiMn-oxide films → <b>hot cracks and slag causing penetration.</b>
6) Secondary desoxidation products during solidification:	<b>liquid</b> (mainly FeSiMn) (hard desoxidation products would cause grooves on the surface of the sheet)	only <b>hard</b> desoxidation products (liquid desoxidation products → <b>hot cracks</b> ).

The two commonest problems with steel melting technology for castings which lead to hot cracks and pin holes are:

- 1) Too high free O<sub>2</sub> – activity in the ladle after tapping and in the mould during solidification.
- 2) Not enough or incorrect desoxidation products in the steel during pouring and solidification.