

Steel Liquidus Temperature

Question

Could you please give me the formulae for steel liquidus temperature? C.L.S., Malaysia

Answer

In the 11th edition of The Making Shaping and Treating of Steel, Steelmaking and Refining Volume there are two formulae to be used for calculating liquidus temperature:

For Steel with C < 0.50 %

$$\text{Liquidus } T \text{ (}^\circ\text{C)} = 1537 - 73.1[\%C] + \Sigma\alpha[\%X]$$

For Steel with C in the range from 0.50 % to 1.00 %

$$\text{Liquidus } T \text{ (}^\circ\text{C)} = 1531 - 61.5[\%C] + \Sigma\alpha[\%X]$$

Where,

<u>Alloying element X</u>	<u>Coefficient α, $^\circ\text{C}/\%X$</u>
Al	-2.5
Cr	-1.5
Mn	-4.0
Mo	-5.0
Ni	-3.5
P	-30.0
Si	-14.0
S	-45.0
V	-4.0

These formulae are very good but they require the use of a calculator. At a plant in Thailand where I was working, one of the supervisors gave me a quick and easy formula for estimating liquidus temperature in merchant quality killed carbon steels:

$$\text{Liquidus } T \text{ (}^\circ\text{C)} = 1535 - 100[\%C]$$

I found the last formula to be fairly handy when making quick changes in the grade sequence.