

METALLIC MATERIALS – practice

Task no. 6

Topic: MARTENSITIC PRECIPITATION HARDENABLE STEELCharacterize steel 18 Ni 1700

1. Specify the effect of the main alloying elements for the given chemical composition of the steel.
2. Qualitatively and quantitatively estimate the phase composition (matrix and minority phases)
 - a) in quenched condition according to the Schaeffler diagram using chromium and nickel equivalents calculated by the following formulas in [% wt.]

$$Cr_{equ} = Cr + 0.75 \times W + 1.5 \times (Mo + Si + Ti) + 1.75 \times Nb + 2 \times (Al + V)$$

$$Ni_{equ} = Ni + 0.3 \times Cu + 0.5 \times Mn + 0.7 \times Co + 25 \times N + 30 \times C$$
 - b) in precipitation hardened state under usual conditions
 - c) in a condition after partial austenitizing at temperature of 640°C and time of 0,5h
3. Estimate the phase transformation temperatures (M_s , M_f , A_s , A_f) and indicate the sequence of phase transformations during:
 - a) quenching
 - b) artificial aging
 - c) reaustenitizing

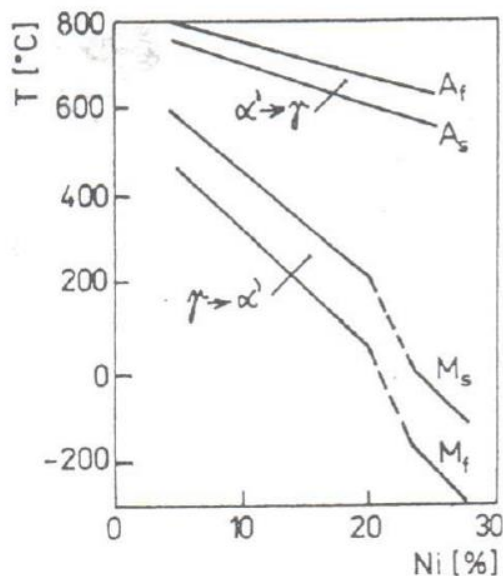


Fig.1 The influence of Ni on phase transformation $\gamma \leftrightarrow \alpha'$ in Fe-Ni alloys

4. Characterize the corrosion resistance of discussed steel (compare with low alloy steels and stainless steels).