

Lifetime Extension Tutorial

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Abstract

1 Part A

The value for σ_Δ was taken from the key (see Table ??). The value for M was calculated using Eq ???. The values for CF were linearly interpolated from the chemistry tables given, using the Cu and Ni parameters given in the Charpy data source.

The Cu content at the 95 % probability given by the normal distribution $\mathcal{N}(\mu = 0.213 \text{ wt\%C}, \sigma = 0.02 \text{ wt\%C})$ was found to be 0.245 90 wt%C.

$$M = 2\sqrt{\sigma_U^2 + \sigma_\Delta^2} \quad (1)$$

$$\Delta RT_{\text{NDT}} = R \times CF \times f \quad (2)$$

$$RT_{\text{NDT}} = RT(U) + \Delta RT_{\text{NDT}} + M \quad (3)$$

$$\Delta RT_{\text{PTS}} = R \times CF \times F^{0.28-0.10 \ln F} \quad (4)$$

$$RT_{\text{PTS}} = RT(U) + \Delta RT_{\text{PTS}} + M \quad (5)$$

2 Appendix

Table 1: σ_Δ values for different materials.

	Material	σ_Δ
0	Weld	28
1	Base Metal	17

Table 2: Parameters and results from calculation of RT_{NDT} and RT_{PTS} .

	Identity	Material	σ_{Δ}	M	f	CF	ΔRT_{NDT}	RT_{NDT}	ΔRT_{PTS}	RT_{PTS}
0	D-3803-1	PLATE	17	34.000	1.196	158.95	190.076	219.076	184.072	213.072
1	D-3803-2	PLATE	17	34.000	1.196	160.40	191.810	195.810	185.751	189.751
2	D-3803-3	PLATE	17	34.000	1.196	157.50	188.342	217.342	182.393	211.393
3	D-3804-1	PLATE	17	34.000	1.196	128.80	154.022	188.022	149.157	183.157
4	D-3804-1	PLATE	17	34.000	1.196	131.00	156.653	160.653	151.705	155.705
5	D-3804-1	PLATE	17	34.000	1.196	82.00	98.057	107.057	94.960	103.960
6	[...] 2-112 A/C	Axial Weld	28	65.513	1.123	230.15	258.431	267.944	255.248	264.761
7	[...] 3-112A/C	Axial Weld	28	65.513	1.123	217.10	243.777	253.291	240.775	250.288
8	[...] 3-112A/C	Axial Weld	28	65.513	1.123	230.15	258.431	267.944	255.248	264.761
9	[...] D 9-112	Circ. Weld	28	65.513	1.205	225.20	271.458	280.972	262.019	271.532