Appendix

Reflectivity Diagram Calculations: Flat Bottom Holes (FBH)

Scenario 2: Table 2: Scenario 2 Calculations (Known Reflector Reference)

Probe Diameter (mm)	d_c	10
Probe Frequency (MHz)	f	4
Materials Velocity (m/s)	v	5920
Reference Echo Type	BWE / Known Reflector (FBH)	Known Reflector
Reference Reflector Diameter (mm)*	s_{ref}	4
Reference Reflector Beam Path (mm)	d_{ref}	125
Indication Beam Path (mm)	d_{ind}	75
Indication dB difference to reference	G	+ 14
Calculations:		
Wavelength (mm)	$\lambda = \frac{V}{f}$	1.48
Near Zone	$N_c = \frac{{d_c}^2}{4\lambda}$	24
Reference Position Near Zones	$D_{ref} = \frac{d_{ref}}{N_c}$	7.4
Indication Position Near Zones	$D_{ind} = \frac{d_{ind}}{N_c}$	4.4
Reference Reflector Relative Size*	$S_{ind} = \frac{s_{ref}}{d_c}$	0.4
Plot Both Positions on Graph Using reference position as initial point and plotting indication point after adjusting for Distance and Amplification	• Reference Position • Indication Position	Reference x = 7.4 , y = -31 Indication x = 4.4, y = -17
Determine Indication Relative Size from Graph	S_{ind}	Approx 0.55
Calculate Equivalent FBH Size	$d_f = S_{ind}$ x d_c	Approx 5.5mm

*Not applicable when using BWE as reference