EVIDENT OLYMPUS

Ultrasonic Thickness Gauge Tutorial

Material Sound Velocities

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The table below lists typical longitudinal wave ultrasonic velocities in a variety of common materials that can be measured with ultrasonic thickness gauges. Note that this is only a general guide. The actual velocity in these materials may vary significantly due to a variety of causes such as specific composition or microstructure, grain or fiber orientation, porosity, and temperature. This is especially true in the case of cast metals, fiberglass, plastics, and composites. For best accuracy in thickness gauging, the sound velocity in a given test material should always be measured by performing a velocity calibration on a sample of known thickness.

Ultrasonic Velocities in Common Materials

Material	V (in./µsec)	V (m/sec)
Acrylic (Perspex)	0.1070	2730
Aluminum	0.2490	6320
Beryllium	0.5080	12900
Brass	0.1740	4430
Composite, graphite/epoxy	0.1200	3070
Copper	0.1830	4660
Diamond	0.7090	18000
Fiberglass	0.1080	2740
Glycerin	0.0760	1920
Inconel®	0.2290	5820
Iron, Cast (soft)	0.1380	3500
Iron, Cast (hard)	0.2200	5600

Iron oxide (magnetite)	0.2320	5890
Lead	0.0850	2160
Lucite®	0.1060	2680
Molybdenum	0.2460	6250
Motor oil	0.0690	1740
Nickel, pure	0.2220	5630
Polyamide	0.0870	2200
Nylon	0.1020	2600
Polyethylene, high density (HDPE)	0.0970	2460
Polyethylene, low density (LDPE)	0.0820	2080
Polystyrene	0.0920	2340
Polyvinylchloride, (PVC)	0.0940	2395
Rubber, polybutadiene	0.0630	1610
Silicon	0.3790	9620
Silicone	0.0580	1485
Steel, 1020	0.2320	5890
Steel, 4340	0.2300	5850
Steel, 302 austenitic stainless	0.2260	5740
Tin	0.1310	3320
Titanium	0.2400	6100
Tungsten	0.2040	5180
Water (20 °C or 68 °F)	0.0580	1480
Zinc	0.1640	4170
Zirconium	0.1830	4650

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