



## Material Amplitude and Ultrasonic Weldability Quick Reference Guide for 20 kHz

Material	Common Trade Names ®	Near Field*	Far Field*	Welding Amplitude **20 kHz (microns)
<b><i>Amorphous Polymers</i></b>				
Acrylonitrile Butadiene Styrene (ABS)	Cycolac, Lustran, Magnum, Terluc	1	2	30-70
Acrylonitrile Styrene Acrylate (ASA)	Centrex, Geloy, Luran	1	1	30-70
Polycarbonate (PC)	Apec, Calibre, Lexan, Makrolon	2	2	60-100
PC/ABS	Bayblend, Cycloy, Pulse	2	2	60-100
Polycarbonate/Polyester	Makroblend, Xenoy, Xylex	2	4	50-100
Polyetherimide (PEI)	Tempalux, Ultem	2	4	70-100
Polyethersulfone (PES)	Radel, Ultrason	2	4	70-100
Polymethyl Methacrylate (Acrylic, PMMA)	Acrylite, Lucite, Lucryl, Oroglas, Plexiglas	2	3	40-70
Polyphenylene Oxide (PPO)	Noryl, Norylux	2	2	50-90
Polystyrene (PS)	Bapolan, Lacqrene, Polystyrol, Questra, Styron	1	1	30-70
Polysulfone (PSU)	Mindel, Thermalux, Udel	2	3	70-100
Polyvinyl Chloride (Rigid PVC)	Nakan, Novablend, Solvin	3	4	40-80
Styrene-Acrylonitrile (SAN)	Lustran, Tyril	1	1	30-70
<b><i>Semi-Crystalline Polymers</i></b>				
Liquid Crystal Polymer (LCP)	Vectra, Vectran, Xydar, Zenite,	3	4	70-120
Polyoxymethylene, Polyacetal (POM)	Acetal, Celcon, Delrin, Ultraform	2	4	70-120
Polyamid (Nylon, PA)	Capron, Ultramid, Zytel	2	4	70-120
Polybutylene Terephthalate (Polyester, PBT)	Celanex, Crastin, Durlux, Ultradur, Valox	3	4	70-120
Polyethylene Terephthalate (Polyester, PET)	Impet, Mylar, Petlon, Petra, Rynite	3	4	80-120
Polyetheretherketone (PEEK)	Ketron, Peek, Victrex	3	4	70-120
Polyethylene (PE)	Dowlex, Sclair, Vytek	4	5	90-120
Polyphenylene Sulfide (PPS)	Fortron, Ryton, Supec, Techtron, Tedur	3	4	80-120
Polypropylene (PP)	Acclear, Appryl, Astryn, Fiberfil, Fortilene, Polyfort	3	4	90-120

Code: 1 = Easiest, 5 = Most difficult.

The codes indicate **relative ease of welding** for the more common thermoplastics. In addition to the material factors covered in the preceding sections, ease of welding is a function of part size and geometry, joint design, energy requirements, amplitude, and fixturing. **The ratings do not relate to the strength of the weld obtainable. Use these tables as a guide only, since variations in resins, fillers, and part geometry may produce slightly different results.**

\* Near-field welding refers to a joint 0.250 inch (6.35 mm) or less from the horn contact surface; far-field welding refers to a joint more than 0.250 inch (6.35 mm) from the horn contact surface. You should consider using 15 kHz equipment when welding far field with difficult-to-weld materials. 15 kHz can, in most cases, increase the ease of welding near or far field.

\*\*To convert to 40 kHz multiply x (0.6), 30 kHz x (0.8), and 15 kHz x (1.2), or refer to TL-2, Amplitude Reference Guide.

- Moisture will inhibit welds. Consider using a 2000f welder with force profiling for achieving hermetic seals with hygroscopic materials.
- Semi-crystalline resins in general require higher amplitude and energy levels due to polymer structure, higher melt temperatures, and heat of fusion. Consider using 15 kHz when welding large parts in semi-crystalline materials.

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