WELDING AND COATING RECOMMENDATIONS FOR THE CLEARWELD PROCESS

Please read prior to welding:

The suggestions below are only to provide a starting point. The parts to be welded may differ from the samples tested, for example, the parts may be different grade of plastic, coloration, or thickness. Your specific application may also have different requirements, such as hermetic seal rather than parent strength. *Testing of the specific part is highly recommended to obtain the desired results.*

Nomenclature:

LD110-MOP based, LD120-Acetone based, LD130-MEK based, LD140-ethanol based
Concentration from lowest to highest A<B<F<C

Rules of Thumb:

1) Coating series LD120 and LD130 provide faster drying times than LD140.
2) LD140 coatings generally have less coloration than LD120 and LD130.
3) Energy density was calculated as follows: Energy Density = Power/(Beam Size* Weld Speed)
4) Welding parameters were determined using a 2mmx2mm beam size. If a larger beam size is required, use the equivalent energy density for the larger beam size.
5) For semi-crystalline plastics, if the part is thicker than 3mm, a higher energy density may be required. If the part is thinner, a smaller energy density may be required.
6) Use of lower powers may require a higher energy density than suggested.
7) The coating was applied using a paint brush. The brush applies more coating than a felt tip marker and less coating than a liquid dispenser. When using a felt tip marker, a higher energy density (i.e. higher power or slower speed) may be required. Liquid dispensing may require a lower energy density due to the higher amount of coating applied.
8) Faster speeds can be achieved by increasing power, increasing the amount of coating applied or using a higher concentration coating (in addition to increasing speed). An increase in clamping pressure may also be required to achieved high strengths at fast speeds.
9) In order to evaluate welding parameters, generally change one parameter at a time. As a last resort, change the coating concentration appropriately.

PLASTIC	COATING	POWER (W)	WELD SPEED (mm/sec)	CLAMP PRESSURE (psi)	ENERGY DENSITY (J/mm²)	COMMENTS
ABS	LD130B LD120B	100	4.0	350	12.5	MEK and Acetone causes plastic to swell but does not affect strength. Dry rapidly using heat lamp to minimize swelling.
Acetal	LD120C LD130C	100	2.0	350	25.0	
Acrylic, PMMA	LD130B LD120B LD140B	100	2.0	350	25.0	
Cellulose Acetate	LD140B LD130B LD120B	100	8.0	350	6.25	MEK and Acetone causes hazing. Haziness eliminated in weld zone.
Cyclic Olefin Copolymers	LD130B LD120B LD140B	100	8.0	350	6.25	
Ethylene Vinyl Acetate (EVA)	LD130B LD120B LD140B	100	8.0	350	6.25	
Fluoropolymers: FEP, ETFE, PFA, THV, ECTFE	LD130B LD120B LD140B	100	2.0	350	25.0	Surface should be abraded prior to dye application for more even coating application. For example, abrade with sand paper.
HDPE	LD120C LD130C	100	2.0	350	25.0	
Ionomer: Surlyn	LD130B LD120B LD140B	100	4.0	350	12.5	
LDPE	LD120B LD130B LD140B	100	6.0	350	8.33	
PEEK	LD130C LD120C	100	2.0	350	25.0	Apply coating to both sides. Eliminate air on all surfaces exposed to the laser to prevent burning.
Polyamide: Nylon 6	LD120C LD130C	100	2.0	350	25.0	
Polyamide: Nylon 6,6	LD120C LD130C	100	2.0	350	25.0	Coating may have to be applied to both sides.

PLASTIC	COATING	POWER (W)	WELD SPEED (mm/sec)	CLAMP PRESSURE (psi)	ENERGY DENSITY (J/mm^2)	COMMENTS
Polyamide, glass reinforced	LD120C LD130C	100	2.0	350	25.0	Coating may have to be applied to both sides. Surfaces may melt.
Polycarbonate	LD130B LD120B	80	8.0	350	5.0	MEK and Acetone causes swelling and hazing, however, welds are clear.
Polyethylene Terepthalate, semi-crystalline (PET)	LD120C LD130C	100	2.0	350	25.0	
PETG	LD130B LD120B LD140B	100	2.0	350	25.0	MEK and Acetone causes slight swelling.
Polyetherimide (PEI)	LD130C LD120C	100	2.0	350	25.0	Apply coating to both sides. Parent strength could not be achieved. Eliminate air at high energy density to prevent burning.
Polyether Block Amide (PEBAX)	LD130B LD120B LD140B	100	6.0	350	8.33	
Polyphenylene Oxide, Modified (PPO)	LD120C LD130C	100	2.0	350	25.0	
Polypropylene	LD130B LD120B LD140B	100	4.0	350	12.5	
Polystyrene	LD140B	100	4.0	350	12.5	Ethanol causes some hazing that is removed upon welding.
Polysulfone	LD120C LD130C LD140F	100	2.0	350	25.0	MEK and acetone may cause crazing in highly stressed parts.
Polyurethane	LD130B LD120B LD140B	100	4.0	350	12.5	
Polyvinylidene Fluoride (PVDF)	LD130B LD120B LD140B	100	4.0	350	12.5	
Polyvinyl Chloride (PVC)	LD140B LD130B LD120B	100	16.0	350	3.13	Burning may occur if surfaces are not clean. Eliminate air at surfaces exposed to the laser beam.

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