



CLEARWELD®

ADAPTING LASER WELDING TO YOUR IDEAS



## Coatings and Dispensing Guide

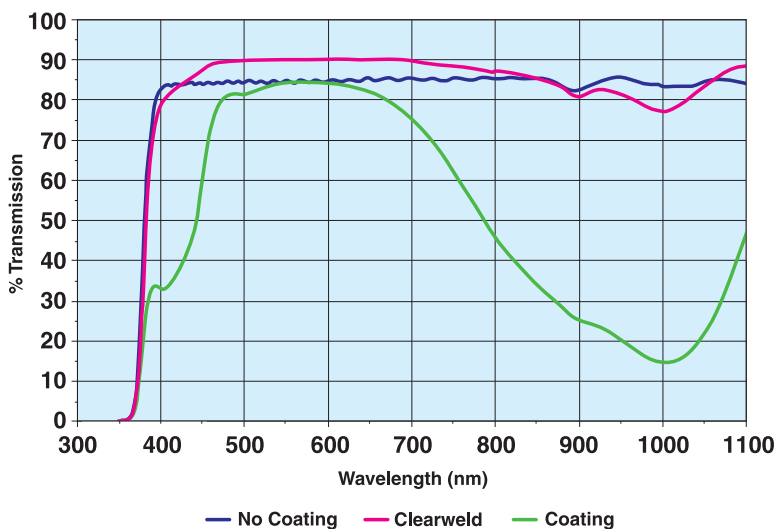
*Clearweld Through Transmission Laser Welding*

## PRODUCT DESCRIPTION

Clearweld coatings include a series of solutions that are used to enable the welding of thermoplastic substrates through the use of infrared laser systems. Clearweld coatings contain infrared absorbing materials and are designed for use with lasers in the 940 to 1100nm wavelength range. When a Clearweld coating is applied to the surface of a plastic part, a thin, uniform layer of an infrared absorbing material is deposited onto the surface.

If infrared energy is applied to the area that has been coated, the Clearweld material will absorb this energy and convert it to heat. As a result, a localized melting of the plastic will occur and a weld will form. Since most plastics will not absorb infrared energy, only the areas where the Clearweld coating has been applied will melt and form a weld. In addition, Clearweld coatings meet USP Class VI specifications.

## TRANSMISSION GRAPH—CLEARWELD COATING



## PROPERTIES

Clearweld coatings are low viscosity, solvent based liquids that are applied in production by liquid dispensing systems. Typical solvents that are used in Clearweld coatings include ethanol, acetone, and methyl ethyl ketone. The amount of coating applied is measured in terms of nanoliters per square millimeter. The solvent serves as a carrier and is flashed off rapidly, leaving a film of absorbing material on the surface of the plastic.

Typical drying times are between 1 and 7 seconds. It is possible to use assisted drying such as pre-heating or post-heating of parts with an infrared lamp to flash solvents off more quickly. In an enclosed work area, a localized air exhaust is recommended to eliminate the build up of low levels of solvent vapor at the application station. Coatings may be applied off-line.

## CLEARWELD COATING SYSTEMS

Clearweld coatings are provided in the following formulations:

CLEARWELD SERIES	SOLVENT SYSTEM
LD120, LD220	Acetone based
LD130, LD230	Methyl ethyl ketone based
LD140, LD240	Ethanol based

Each series is available in a variety of absorption levels. The appropriate coating is chosen by taking into account equipment, application requirements and the polymer to be welded.

## PACKAGING

Clearweld coatings are packaged in various size bottles. The solutions can be supplied in 50ml, 125 ml, 250ml, 500 ml, and 1 liter bottles. In addition, Clearweld coatings can be purchased in disposable felt tip marking pens.

## HANDLING AND STORAGE

All Clearweld coatings should be stored in a cool, dry place. Shelf life of Clearweld coatings is 6 months. It is recommended that Clearweld coatings be stored at temperatures between 0° C and 25° C. Avoid open flames and prolonged contact with strong ultraviolet light. All Clearweld coatings should be stored in their original containers.

## SAFETY INFORMATION

Material Safety Data Sheets are available upon request.

## APPLICATION METHODS

Clearweld coatings may be applied to substrates by various methods. The use of proper dispensing methods and equipment is critical to the success of each Clearweld process implementation. The optimum method for a particular production process is determined by factors such as process speed, surface geometry and the area to be coated. The application method which is selected should provide a uniform film across the entire area that is being coated.

### There are four standard methods recommended for the application of Clearweld coatings:

#### ***Needle Tip***

Needle tip dispensing is extensively used in the application of adhesives, epoxies, etc. It controls the flow of fluid by means of a pneumatic valve and a needle-like attachment at the outlet orifice of the valve.

#### ***Microsolenoid***

A microsolenoid valve is a miniature valve that opens and closes very rapidly in order to dispense droplets of liquid onto a surface. It is used in drop on demand ink jet printers.

#### ***Spray***

A pneumatic valve with an atomizing air cap is used to create a fine spray. A spray nozzle can be used to uniformly coat large surface areas, such as sheets or films.

#### ***Ultrasonic Spray***

An ultrasonic nozzle combines the benefits of the needle tip and microsolenoid valves while dispensing a uniform mist of liquid. It can be used to deposit narrow lines at lower coating weights than either a needle tip or microsolenoid dispensing system.

Clearweld certifies its dispensing partners to ensure that their equipment meets application performance requirements. These partners have the expertise and support capabilities to service Clearweld customers.

## Dispensing Methods for Use with Clearweld Materials

Dispense	Principle of Operation	Main Advantages	Limitations
<b>EFD Needle Tip Dispensing</b>	<ul style="list-style-type: none"><li>• Pneumatic valve, with needle tip attached to its outlet orifice, controls the flow of liquid.</li></ul>	<ul style="list-style-type: none"><li>• Technology is well known.</li><li>• Relatively inexpensive.</li><li>• Provides latitude if a part is slightly bowed in X- or-Y-Axis.</li></ul>	<ul style="list-style-type: none"><li>• Difficult to control on perfectly flat surfaces.</li><li>• Variations in Z-axis can create problems.</li></ul>
<b>PDI Microsolenoid</b>	<ul style="list-style-type: none"><li>• Pneumatic pressure is used to force fluid through a miniature valve that opens and closes at a very high rate.</li></ul>	<ul style="list-style-type: none"><li>• Precise volume control.</li><li>• Precise location of depositions.</li><li>• Very small volumes can be dispensed accurately.</li></ul>	<ul style="list-style-type: none"><li>• Line width is relatively narrow (1-3mm) unless multiple valves are used.</li><li>• Price can vary from relatively inexpensive to very expensive, depending on the precisions of the system.</li></ul>
<b>EFD Spray Nozzle</b>	<ul style="list-style-type: none"><li>• Liquid is fed through an air cap attached to a pneumatic valve to create a spray mist.</li></ul>	<ul style="list-style-type: none"><li>• Can cover a large area.</li></ul>	<ul style="list-style-type: none"><li>• Overspray.</li><li>• Masking may be required.</li><li>• Small line size is difficult to achieve.</li></ul>
<b>Sono-Tek Ultrasonic Spray</b>	<ul style="list-style-type: none"><li>• Piezoelectric device atomizes a liquid as it flows through a dispense nozzle to create a fine mist.</li></ul>	<ul style="list-style-type: none"><li>• A wide variety of deposition widths are possible.</li><li>• Low maintenance nozzles, no moving parts.</li><li>• Low velocity, impingement and overspray are minimal.</li></ul>	<ul style="list-style-type: none"><li>• More expensive than standard spray techniques.</li></ul>

## Suggested Methods for Use with Coatings

Surface	Conditions	EFD Valve 741V-SS-CW	PDI Micro- solenoid Nano Dispense System	EFD Spray 781-SS	Sono-Tek Spray Nozzles
Ledge	Less than 1mm	Difficult	No	No	Yes
	1mm to 3mm	Yes	Possibly	Yes	Yes
	Larger than 3mm	Possibly	Difficult	Possibly	Yes
Channel	Less than 1mm	Possibly	No	No	Yes
	1mm to 3mm	Yes	Yes	Yes	Yes
	Larger than 3mm	Yes	Difficult	Yes	Yes
Flat Surface	Line applied to a smooth surface	Possibly	Possibly	Possibly	Yes
	Line applied to a rough surface	Possibly	Possibly	Possibly	Yes
	Total surface coating for a large area	No	No	Yes	No
Tubing	Outside	No	Yes	Possibly	Yes
	Inside	No	No	No	Unknown
	Capillary Tubes	No	No	No	Yes
Patterns	Circular Patterns	Possibly	Yes	No	Yes
3D Parts	Uniform Surface	Possibly	Yes	No	Yes
	Irregular Surface	No	Yes	No	Yes
Microfluidic	Thin channels	No	No	Yes	Unknown
Precision	Accuracy required	No	No	No	Possibly

**Note:** "Possibly" indicates that it may be possible to use this technology, however it would be on a case-by-case basis.

"Difficult" indicates that the technology could be used, but there might be some difficulty and may detract from the application.



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