LEV CHEK™
Solder Wave Gauge
Simple, Effective Diagnostic Tool Designed to Monitor
the Quality of Your Automatic Wave Soldering Process.
What is Lev Check

LEV CHEK Solder Wave Gauge is a custom tempered glass panel made similar in size and shape to a printed wiring board and is designed to be used on wave soldering equipment to monitor flux coverage, waveshape, wave turbulence, leveling of conveyor and other soldering quality factors. Heat resistant gauge markings are printed on the top surface of the LEV CHEK glass in 1/2" or 1" grid patterns. The tempered glass is designed for normal wave soldering temperatures. When used according to the recommended procedure, LEV CHEK glass will not break from the heat of the molten solder. Flatness of this precision gauge is essential to its function. The gauge surface is held to a flatness tolerance of 0.0003 inch per linear inch.

Why it is Needed

The need for a process control gauge such as LEV CHEK is indicated by the many variable factors which control the actual contact of solder on the working surface of the circuit board being soldered. Consistent, measurable wave contact of solder to the board is assured through the use of this gauge. Diagnostic observations through the clear glass reveal:

1. **Leveling** the transport system to the solder wave.
2. Evaluation of smooth solder pump performance.
3. Adequacy of flux distribution and thickness.

This unique method of topside observation of the actual "wave-to-board" contact provides added opportunity for precise analysis of your own particular process. LEV CHEK is helpful in identifying proper angle of contact, flux and/or oil intermix, displacement, flushing action, direction of solder flow, and meniscus velocity at the break away "trailing edge" of the solder contact. It also allows visual observation of wave impingement on board surface for skips or turbulence.

How to Use

LEV CHEK Solder Wave Gauge is easy to use. The basic principle is to simulate all conditions as close as possible to your own production process. This means fluxing, preheating, conveyor speed etc. to be kept the same as if soldering actual printed wiring boards. Simulating these conditions will demonstrate visibly how your process works. Place glass with grid pattern side facing up.

**Flux Application** Visual observation of the pattern of the flux wave or foam head through the transparent LEV CHEK gauge monitors adequate, uniform quantity of flux application. Subsequent action of air knife or brush control can be monitored and precisely adjusted to prevent waste and fire hazard of flux spillage on preheaters.

**Preheater Effectiveness** can be observed for controlled evaporation of flux solvent prior to entry of gauge or PWB into hot solder wave.

**Evaluation at the solder wave** may be done in two different ways.

1. **Dynamic test** is a fast "qualitative" method performed by simply running the LEV CHEK gauge across the entire soldering operation at the same continuous rate as a standard production PWB. Observe uniformity of solder sweep across entire width of contact surface. The total area of glass contacted by the solder wave illustrates the immersion depth of the board in the solder. Trailing edge at break away of solder from gauge should show a minimum of 1/32" of flux line — a good indicator for reducing tendency for icicling. The velocity of meniscus of solder draining should be greater than velocity of board over solder machine. Simple observation will allow swift adjustment of conveyor speed or wave height. The "float effect" due to impingement action of solder wave and thermal gradient produced on the board can be observed and controlled by fixture adjustment, conveyor speed and temperature of solder.

2. **Stationary test** is done by stopping the conveyor with the LEV CHEK gauge centered across the solder wave within the marked gauge lines. This test is "quantitative" as now the precise contour can be seen as well as the total area of contact with the solder. If the width of the wave is not uniform at each end as lined up by the gauge lines as seen in Figure 1, then leveling adjustments may be made while the LEV CHEK gauge is still in place.

![Figure 1](image)

**Figure 1**

Leveling adjustments may be made while the LEV CHEK gauge is in place.

To determine contact time, place gauge on conveyor using normal speed. Measure width of wave as glass is centered on solder. Conveyor may be stopped briefly to obtain width. Contact time and the resulting time/temperature ratio can be calculated by multiplying thickness of wave observed on gauge by 60 sec/min. and dividing this product by conveyor speed in inches per minute. See example of contact time calculation below:

\[
\text{contact time} = \frac{3 \text{ in. contact length} \times 60 \text{ sec/min}}{4 \text{ ft/min conveyor speed}} = 3.75 \text{ seconds contact time at specified conveyor speed.}
\]
Effective action of flux and solder depend upon minimal time/temperature of solder contact. On the other hand, a long dwell time at too high a temperature may damage both thermal sensitive components as well as delicate board substrates.
The purpose of the edge brackets is to set the bottom of the glass plate at the same level as the bottom of the PWB (as shown in figure 2). The edge brackets are made from 0.020” titanium and are sold for a specific glass thickness either 0.125” or 0.187” and come in sets of four to a package.

Figure 2

**Edge Bracket** — two bracket sizes are available for 1/8” and 3/16” glass thicknesses.

This tempered glass panel has been designed to withstand normal heat of soldering for short duration. The glass will not tolerate thermal shock as well as a laminated epoxy glass substrate and certain precautions should be taken to prevent accidental breakage. Do not force the glass into a fixture or mount it too tightly. Expansion from heating may increase the risk of breakage. Soldering temperatures of 500-525 degrees F will not adversely affect the LEV CHEK. Normal transport speeds across preheaters are acceptable, and stationary dwell time on wave for observation is allowable for up to 30 seconds. Temperatures above 525° F require extra precautions to reduce the sudden build up of uneven thermal strain on the glass. At these higher temperatures the use of a slower speed across the preheaters is suggested. **Do not hold the glass panel stationary on the solder wave longer than thirty seconds.**

### When to Use

How often the LEV CHEK gauge is used depends on the degree of process control you need to satisfy your company’s quality requirements. Time required for the dynamic test as a routine quality check of the wave process is not much longer than the cycle time of soldering a standard production board. This makes frequent monitoring easy and inexpensive without costly delays of production interruption.

As a general rule, the gauge should be used at the start of each shift. If many different sizes of boards are used or the wave parameters are changed an additional test is recommended.

Several standard size gauges are suitable for adjustable fixtures. If special sizes are needed for dedicated production fixtures, they may be ordered to any custom size required. A 10 piece minimum is required.

### Caution

**Do Not** expose glass gauge to soldering heat without flux and preheat cycle.

**Do Not** position gauge so glass extends beyond width of solder wave. Choose gauge or wave width so that solder spreads completely across the width of the LEV CHEK gauge.

Position LEV CHEK for use with marking side up.

The LEV CHEK Solder Wave Gauge is tempered borosilicate glass specially designed to withstand the extreme thermal shock of a typical 525° F solder wave. Do not try this with ordinary glass.

Although it has good mechanical strength and excellent impact properties, (5 times as strong as standard annealed glass) it is sensitive to mechanical stress on the corners and edges. Do not force it or mount tightly in a rigid holding fixture. Expansion from heating may cause unusual mechanical stress and together with the thermal shock increase the risk of breakage. Because of the nature of this tempered glass, if breakage should occur, the glass may shatter completely into “gravel type” particles not needle sharp slivers like ordinary window glass. Any glass particles will float on the solder surface and are readily removed.

**Use all normal safety precautions while observing LEV CHEK including safety glasses.**

A patent has been applied for this product.

### Cleaning and Storage

Allow the LEV CHEK gauge to COOL before handling. Because it is thicker than a production PWB, it will take more time. **Do Not Chill** the hot glass suddenly. Allow it to air cool. Clean off excess flux remaining with suitable solvent. Dry and replace glass gauge in its protective bag and envelope. Store LEV CHEK carefully. It is more likely to be broken through careless handling than from heat. Bookcase or file drawer storage is advised. Use the shipping box for convenient storage.
LEV CHEK™ Solder Wave Gauges are available in sizes 3" to 18". Gauges may be used with either the narrow or wide dimension across the width of the wave. Important to choose a gauge size the same or narrower than the width of the solder wave. Hot solder should extend completely across the width of the gauge.

**Stock Standards**
- Model LC 810 8" x 10" x 1/8"
- Model LC 1510 15" x 10" x 1/8"

**Stock Specials**
- Model LC 304 3" x 4" x 1/16"
- Model LC 610 6" x 10" x 1/8"
- Model LC 811 8" x 11" x 1/8"
- Model LC 1210 12" x 10" x 1/8"
- Model LC 1218 12" x 18" x 3/16"

**Custom Sizes and Grid Patterns** Quoted upon request. Minimum quantity 10 pieces. One time charge for custom grid patterns.

**Edge Brackets**
- Model LC 125 adapts 3/8" thick glass to 1/16" fixture.
- Model LC 187 adapts 3/16" thick glass to 1/16" fixture.

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