11.0 WARRANTY

ELECTROMATIC Equipment Co., Inc. (ELECTROMATIC) warrants to the original purchaser that this product is of merchantable quality and confirms in kind and quality with the descriptions and specifications thereof. Product failure or malfunction arising out of any defect in workmanship or material in the product existing at the time of delivery thereof which manifests itself within one year from the sale of such product, shall be remedied by repair or replacement of such product, at ELECTROMATIC's option, except where unauthorized repair, disassembly, tampering, abuse or misapplication has taken place, as determined by ELECTROMATIC. All returns for warranty or non-warranty repairs and/or replacement must be authorized by ELECTROMATIC, in advance, with all repacking and shipping expenses to the address below to be borne by the purchaser.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY AND FITNESS FOR ANY PARTICULAR PURPOSE OR APPLICATION. ELECTROMATIC SHALL NOT BE RESPONSIBLE NOR LIABLE FOR ANY CONSEQUENTIAL DAMAGE, OF ANY KIND OR NATURE, RESULTING FROM THE USE OF SUPPLIED EQUIPMENT, WHETHER SUCH DAMAGE OCCURS OR IS DISCOVERED BEFORE, UPON OR AFTER REPLACEMENT OR REPAIR, AND WHETHER OR NOT SUCH DAMAGE IS CAUSED BY MANUFACTURER'S OR SUPPLIER'S NEGLIGENCE WITHIN ONE YEAR FROM INVOICE DATE.

Some State jurisdictions or States do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. The duration of any implied warranty, including, without limitation, fitness for any particular purpose and merchantability with respect to this product, is limited to the duration of the foregoing warranty. Some states do not allow limitations on how long an implied warranty lasts but, not withstanding, this warranty, in the absence of such limitations, shall extend for one year from the date of invoice.

ELECTROMACTIC Equipment Co., Inc.
600 Oakland Ave. Cedarhurst, NY 11516—USA
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1.0 INTRODUCTION

The CHECK•LINE® TI-25M Ultrasonic Thickness Gauge measures the wall thickness of metals, glass, ceramics and many rigid plastics. This gauge uses the “pulse-echo” principle of ultrasonic testing where a short ultrasonic signal is transmitted from the probe. The signal travels through the measurement sample until it is reflected back towards the probe from the back side of the material. The elapsed time for the complete cycle is measured and converted to an accurate thickness reading.

The TI-25M can be used to measure the extent of corrosion on the opposite, inaccessible side of the wall by using the “Subtractive Method.” When the thickness of the original wall is known, subtracting the thickness reading obtained from the TI-25M will determine the extent of corrosion at the point of probe placement. If the original wall thickness is not known, test readings should be made along a grid of equally-spaced points to obtain a profile of the thickness readings. The smallest thickness reading will locate the area of greatest concern.

The TI-25M is factory-set to measure steel. The gauge can be easily adjusted for accurate thickness readings on other materials. Refer to sections 6.0 through 6.3. To change the measuring units from inch (factory setting) to mm refer to section 4.4.

2.0 PRECAUTIONS

Do not use the standard probe in applications where material temperatures exceed 200 °F (100 °C) as the probe will be damaged. Special *High Temperature* Probes should be used. Consult factory.

Keep the gauge free of dust (especially metal powders, carbon, etc.) as they will damage the gauge. Use a damp cloth to clean the gauge after use. DO NOT USE CHECMICAL SOLVENTS OF ANY KIND.

10.0 MATERIAL SAFETY DATA SHEET (MSDA)

Section 1— Product Identification

Product Name: TI-25M
Manufacturer: Electromatic Equpt. Co.
Generic Name: Ultrasonic Couplant
NFPA Hazardous Materials Identification System (est)
Health 0 Flammability 0 Reactivity 0

Section 2— Hazardous Ingredients

This material does not contain any ingredients having known health hazards in concentrations greater than 1%. This material does not contain any known or suspected carcinogens.

Section 3 — Physical Data (nominal)

Boiling Point: >220°F
Freezing Point: <20°F
Vapor Pressure: N/A
Evaporation Rate: N/A
Specific Gravity: >1.0Z
Solubility in Water: complete
pH: 7.35 – 7.9
Acoustic Imp.: $1.726x10^6$
Vapor Density: N/A
Appearance and Odor: water white, opaque gel; bland odor

Section 4 — Fire and Explosive Hazard Data

Flash Point: none Upper Exposure Limit: none Lower Exposure Limit: none
Special Fire Fighting Procedures: N/A
Extinguishing media: N/A
Unusual Fire and Explosion Hazards: none

Section 5 — Reactive Data

Stability: Stable Conditions to Avoid: none
Incompatibility (Materials to Avoid): none known
Hazardous Polymerization: will not occur
Hazardous Decomposition or Byproducts: none known

Section 6 —- Health Hazard and First Aid Data

Routes of Entry[1]:
Skin: not likely Ingestion: not normally Eyes: not normally Inhalation: no
Effects of Overexposure:
Acute: May cause temporary eye irritation Chronic: none expected

First Aid Procedures:
Skin: Remove with water if desired. Eyes: Flush with water for 15 minutes.
Ingestion: For large quantities, induce vomiting and call a physician Inhalation: N/A

Section 7 - Storage and Handling Information

Precautions to be taken in handling and storage: Store between 20 °F and 120 °F. Spills are slippery and should be cleaned up immediately. Steps to be taken in case material is released or spilled: Pick up excess for disposal. Clean with water. Waste disposal method: Dispose of in accordance with federal, state, and local regulations.

Section 8 — Control Measures

Respiratory Protection: not required Ventilation: not required
Protective Gloves: on individuals demonstrating sensitivity to TI-25M
Eye Protection: as required by working conditions Other Protective Equipment: not required

1. TI-25M contains only food grade and cosmetic grade ingredients.

9.0 Specifications

Range*	0.025–6.00" (*0.60–150.0 mm)* Other ranges available with optional probes.
Resolution	.001" *(0.01 mm)*
Display	4 ½ -Digit, 0.5" Backlit LCD
Velocity Range	6500–33,000 ft./sec.*(2000–10,000 m/sec.)*
Probe	7.5 MHz, 0.25" Diameter *(6.35 mm)* with rubber molded grip.
Probe Wearface	PEEK (Polyethylethylkeytone)
Cable	4 ft. *(1.2 m)* waterproof cable with non-polarized, quick-disconnect connectors. Optional lengths up to 100 ft. *(30 m*).
Probe Zero Test Plate	Steel plate built into battery cover, approximate thickness of 0.416" *(10.57mm)*.
Temp. Limits	Ambient: –20 to 120 °F *(–30 to 50 °C)* Material: 0 to 200 °F (*–20 to 100 °C*) Special high temperature probes are optionally available.
Battery Type	Two AA batteries
Battery Life	200 hours
Weight	7 ounces *(196 g)*
Size	3.25 x 6.00 x 1.35" *(82.5 x 152.4 x 34.3 mm)*
Accessories Included	Probe/cable assembly. 4oz. bottle of coupling fluid, NIST Calibration Certificate, 2 AA batteries, operating instructions, hard-plastic carrying case.
Warranty	Gauge: 5 years Probe: 90 days

**Measuring Range indicated is for steel. Actual range for other materials will vary based upon the material's sonic velocity and attenuation.*

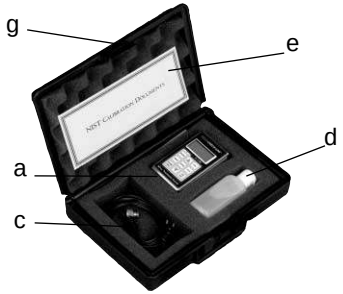
3.0 Overview Of Gauge

3.1 Gauge

3.2 Contents Of Kit

The TI-25M is supplied as a complete kit with the following:

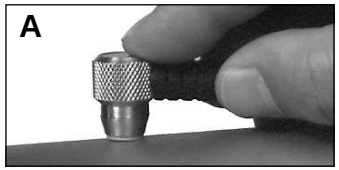
a. Gauge
b. Two (2) AA batteries (installed in gauge)
c. Probe/cable assembly
d. 4 oz. Bottle of coupling fluid
e. NIST-traceable calibration certificate
f. Operating instruction manual
g. Foam-filled carrying case

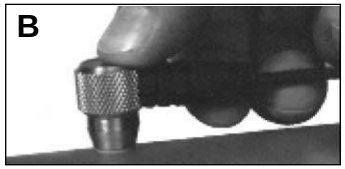


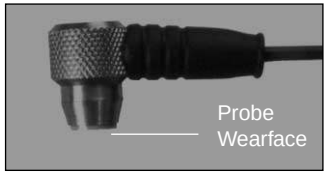
3.3 Probe

The probe transmits and receives the ultrasonic sound waves which the TI-25M uses to calculate the thickness of the material being measured. The probe must be used correctly in order for the TI-25M to produce accurate and reliable results.

A small amount of “coupling” fluid, commonly called “couplant” is used to insure that there are no air gaps between the probe and the material surface. Grasp the probe by the molded rubber grip and place it on top of the material surface. Apply moderate pressure to the top surface of the probe with your index finger (A) or thumb (B) to stabilize the probe and to keep the wearface seated flat against the measurement surface.







8.3 Measurements On Materials At High Temperatures

When it is necessary to measure wall thickness on surfaces that are in excess of 200 °F (100 °C), special-purpose high temperature probes should be used. These probes are built using special materials and techniques that allow them to withstand high temperatures without damage. Additionally, care must be taken when performing a “Probe Zero” or “Calibration To Known Thickness” using a High Temperature probe.

At such elevated temperatures, it is recommended that the user follow these procedures:

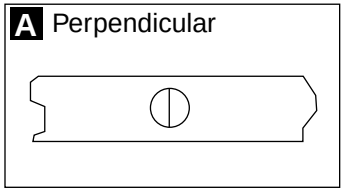
1. Perform a calibration procedure on a sample of known thickness (refer to section 6.3) with the material temperature at or near the temperature that will be encountered during measurement.

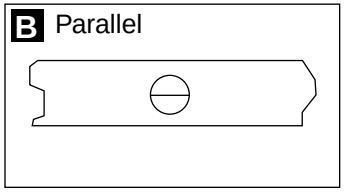
2. Remove the probe from the hot surface immediately after a “stable” reading is displayed. Even though the High Temperature Probes are constructed using materials which can withstand high temperatures, the probe can begin to heat up, through thermal expansion and other effects, adversely affecting the accuracy of the measurement.

6. If two materials are press-fitted or laminated together, the gauge will only measure the thickness of the sample that contacts the probe.

8.2 Measurements Of Pipes Or Cylindrical Parts

When using the TI-25M to measure the wall thickness of a pipe, the orientation of the probe is very important to obtain accurate readings.





Pipe diameter is greater than 4 inches (100 mm):

Position the probe so the centerline of the probe wearface is perpendicular to the long axis of the pipe as shown in illustration “A.”

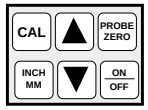
Pipe diameter is less than 4 inches (100 mm):

Two measurements should be performed at the same location, one with the centerline of the probe perpendicular to the long axis and one parallel (illustration “B”).

The smaller (thinner) of the two measurements should be used as the actual wall thickness at the measurement location.

Additionally, on applications on pipe diameters less than 3 inches, we recommend using the optional V-Block fixture which helps maintain stable probe placement on the rounded measuring surface.

3.4 Keypad



The TI-25M is supplied with a membrane keypad mounted on the front of the instrument body. It consists of six (6) keys, each performing one or more functions as described below.

CAL The **CAL** key is used to enter and exit the Tl-25M’s two Calibration modes. The *Acoustic Velocity Calibration* mode is used to adjust the acoustic velocity for the material to be measured. The *Measurement Calibration* mode is used to increase or decrease the displayed thickness reading to calibrate to a known thickness value.

INCH MM The **INCH/MM** key is used to change the measuring units from inches to mm. Each time the key is pressed the units will change from one to the other.

▲ The **UP** arrow key performs the following two functions:

1. When in the *Calibration* mode, pressing the UP arrow key will cause the numeric values to increase. By pressing and holding the key, the numbers will change more rapidly.
2. When in the *Measuring* mode, pressing the UP arrow key will turn the *Scan* Measuring mode on and off each time it is pressed. The display will momentarily flash indicating whether the Scan mode is on or off.

▼ The **DOWN** arrow key performs the following two functions:

1. When in the *Calibration* mode, pressing the DOWN arrow key will cause the numeric values to decrease. By pressing and holding the key, the numbers will change more rapidly.
2. When in the *Measuring* mode, pressing the DOWN arrow key will change the *Display Backlight* mode from OFF to AUTO to ON. The currently selected mode will momentarily flash on the display.

PROBE ZERO The PROBE ZERO key is used to “zero” the probe in a similar way as a micrometer is “zeroed” before use. If the tool is not zeroed correctly, the measurements will not be accurate.

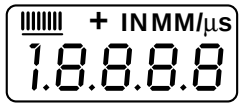
ON / OFF The ON/OFF key is used to turn the power on as well as turning the power off. If the Tl-25M is idle for five (5) minutes the gauge will automatically power off.

3.5 LCD Display

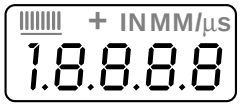
The LCD Display provides the operator with important information as detailed below. The display has a user-selected *Backlight* mode which can be set for the following operation:

1. ON. The backlight is illuminated whenever the power is on.
2. OFF. The backlight is never illuminated (to save battery power).
3. AUTO. The backlight is automatically illuminated each time a measurement is made.

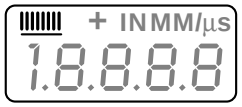
The Backlight mode is set by pressing the ▼ key. Each time the key is pressed, the mode will change from one to the other. “ON,” “OFF” or “AUTO” will momentarily flash on the display indicating the currently set *Backlight* mode..



- Measurement values
- Acoustic velocity values
- Units of measure
- Bar graph signal stability indicator
- Configuration messages



The numeric portion of the display consists of 4-digits preceded by a leading "1", and is used to display numeric values, as well as occasional simple words, to indicate the status of various settings. When the TI-25M is displaying thickness measurements, the display will retain the last measured value, until a new measurement is performed.



The eight vertical bars shown form the Stability Indicator. When the TI-25M is idle, only the left-most bar and underline will be illuminated. When a measurement is being performed, six or seven bars should be illuminated indicating that it is a stable measurement. If fewer than five bars are illuminated, the TI-25M is having difficulty obtaining a stable and reliable measurement and the thickness value shown should be ignored, as it is most likely erroneous.

8.0 MEASURING PROCEDURE

After setting the TI-25M for the correct acoustic velocity, or retaining the factory-set acoustic velocity for steel, the gauge is ready to take wall thickness measurements.

1. Turn on the power by pressing the ON/OFF key.
2. Plug the probe cable into the receptacle at the top of the gauge.
3. Place a small amount of coupling fluid on the surface to be measured.
4. Grasp the probe by the molded rubber grip and place it on top of the material surface. Apply moderate pressure to the top surface of the probe with your index finger or thumb to stabilize the probe and to keep the wearface seated flat against the measurement surface.
5. The gauge will display the thickness of the steel wall along with the Stability Indicator showing the relative stability of the reading.
6. Repeat steps #3 - #5 as required.

8.1 General Notes On Measurements

1. When the probe is removed from the sample after a measurement, the last reading will be retained on the display.
2. If fewer than five (5) bars of the Stability Indicator are illuminated, the thickness reading displayed is most likely inaccurate.
3. Occasionally, a small film of couplant will be drawn out between the probe and the surface as the probe is removed. When this happens, the TI-25M may perform a measurement that is larger or smaller than it should be. This phenomenon is obvious when one thickness value is observed while the probe is in contact with the material, and another value after the probe is removed.
4. The gauge will automatically power off after 5 minutes of non-use.
5. The following surface conditions can prevent accurate measurements (refer to section 4.6 *Preparation Of The Surface*):

   - More than 0.020" (20 mils or 500 µm) of paint or other coating
   - Flaking or loosely adhered coatings
   - Rough or heavily pitted surface

7.0 DESCRIPTION OF MEASURING MODES

The TI-25M can be used in either the *Single Thickness Reading* mode or the *Scan* mode.

The *Single Thickness Reading* mode is suitable for most applications. While the probe remains in contact with the material being measured, the TI-25M performs four (4) measurements every second, updating the LCD display after each reading. When the probe is removed from the surface, the last reading is retained on the display.

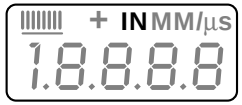
The *Scan* mode is used to survey or examine larger sections of material. When set for *Scan* mode, the TI-25M performs sixteen (16) measurements every second, but does not display each reading. This mode is designed for those applications where the probe will be "dragged" or lightly "scrubbed" over the measuring surface. While the probe maintains contact with the material being measured, the TI-25M is keeping track of the lowest (thinnest) measurement it encounters. Any brief interruptions in the signal will be ignored. When the probe is removed from the surface for more than one second, the TI-25M will display the thinnest reading encountered during the measurement survey.

To enable and disable the Scan mode:

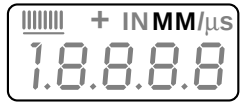
Press the ▲ key.

Each time the key is pressed the Scan mode status will change from Off-to-On-to-Off-etc. As the mode is changed, the current status "Off"

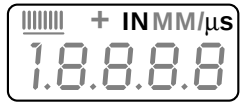
or "On" will momentarily flash on the display.



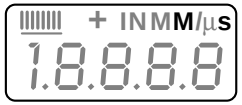
When the "IN" indicator is illuminated, the TI-25M is displaying a wall thickness measurement in **INCH** units.



When the "MM" indicator is illuminated, the TI-25M is displaying a wall thickness measurement in **MM** units.



When the "IN" and the "µs" indicators are illuminated simultaneously, the TI-25M is displaying an acoustic velocity in inches per microsecond.



When the "M" and the "s" are illuminated simultaneously, the TI-25M is displaying an acoustic velocity in meters per second.

3.6 Probe Zero Plate

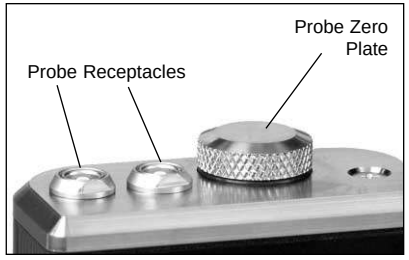
When first connecting the probe supplied with the TI-25M, the user should perform a "Probe Zero" as described in Section 4.3. The Probe Zero Test Plate is used for this task. It is located on the top edge of the gauge as shown in the photo (see sec. 3.7) It also serves as the battery compartment cover

Note: The thickness of this plate is not imporatnt, and it should not be used as a Calibration Test Plate. A precision 4-step Test Block is optionally available for this purpose.

3.7 Probe Connector Receptacle

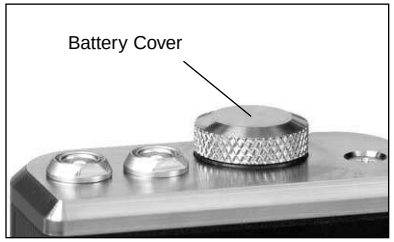
Located on the top edge of the TI-25M housing are the receptacles for the probe and the probe zero plate.

The connectors for the probe are non-polarized so the connector at the end of the probe cable can be inserted into this receptacle in either orientation. Make sure the connector is “well seated” in the receptacle.



3.8 Battery Compartment (Changing The Battery)

The battery compartment is located under the probe zero test plate. To open the battery compartment, unscrew the probe zero plate by rotating it counterclockwise. The TI-25M operates on two (2) AA Batteries (1.5 V). If desired, rechargeable batteries may be used.



The TI-25M is shipped with the batteries installed. Insert batteries in the polarity indicated on the rear label.

Note: When the display elements begin to flash off and on repeatedly, the batteries are low and should be replaced.

6.4 Changing Calibration — Two-Point Calibration Procedure

NOTE: This procedure requires two samples with "known" thickness values are available during this calibration. The two samples should be at the high and low portions of the expected range thickness that will be encountered.

1. Turn on the gauge
2. Perform a Probe-Zero (refer to Section 4.3).
3. Apply couplant to the sample piece.
4. Press the transducer against the sample piece, at the first/second calibration point, making sure that the transducer sits flat against the surface of the sample. The display should show some (probably incorrect) thickness value,and the Stability Indicator should have nearly all its bars on.
5. Having achieved a stable reading, remove the transducer. If the displayed thickness changes from the value shown while the transducer was coupled,repeat step 4.
6. Press the CAL key. The IN (or MM) symbol should begin flashing.
7. Use the UP and DOWN arrow keys to adjust the displayed thickness up or down, until it matches the thickness of the sample piece.
8. Press the PROBE-ZERO key. The display will flash 1OF2. Repeat steps 3 through 7 on the second calibration point.
9. Press the PROBE-ZERO key again and the display will now show the sound velocity value it has calculated based on the two known thickness values that were entered.
10. The guage is now ready to perform measurements within this range on that material.

6.3 Changing Calibration - Acoustic Velocity Is Not Known

In applications where the type of material is not known or the material is not listed in the Acoustic Velocity Table, the following procedure can be used to calibrate the gauge for highest accuracy.

1. Obtain a sample of the material with a known thickness or use a micrometer, caliper or similar device to accurately measure it.
2. Turn on the gauge by pressing the ON/OFF key.
3. Place a small amount of coupling fluid on the sample of known thickness and place the probe on the sample. The Stability Indicator should have nearly all its bars illuminated. Having achieved a stable reading remove the probe from the sample.
4. Press the CAL key.
5. The units of measure indicator "IN" or "MM" will be flashing indicating that you are in the *Measurement Calibration* mode. (The other calibration mode is the *Acoustic Velocity Calibration* mode, as described in section 6.2, which is used to adjust the acoustic velocity to another known value.)
6. Use the ▲ and ▼ keys to adjust the displayed measurement value to match the thickness of the known sample. By pressing and holding the key, the numbers will change more rapidly.
7. Press the CAL key again and the acoustic velocity units indicator "IN/µs" or"M/s" will be flashing showing the acoustic velocity value that was calculated for this sample. If desired, record this value so it can be re-entered easily in the future.
8. Press the CAL key again to exit the calibration mode and return to the measurement mode.

Note: If the CAL key is pressed while in the calibration mode, the TI-25M will be reset to the factory default calibration for common steel (0.2330 IN/µs or 5920 M/s).

4.0 Getting Started

4.1 Connecting The Probe

Grasp the connector located at the end of the probe cable and carefully insert the connector plugs into the receptacle located at the top edge of the gauge. Make sure the connector is fully inserted into the receptacle. **The orientation of the plugs does not matter as they are non-polarized.**

4.2 Turn On The Power

Press the ON/OFF key. All of the LCD Display elements will momentarily illuminate. The firmware revision will then be momentarily shown (for factory troubleshooting purposes only). Eventually the display will show "0.000" (or "0.00" if using metric units), indicating it is ready for use.

Note: 1. The gauge is turned off by pressing the ON/OFF key again.
2. The gauge will automatically power off after 5 minutes of non-use.
3. All settings will be retained in non-volatile memory.

4.3 "Zeroing" The Probe

The Probe Zero Plate is used to "zero" the probe for calibration purposes. Normally, this procedure is required only when the probe is connected to the instrument for the first time, but since this process takes less than 10 seconds, we recommend performing the Probe Zero function occasionally as described below.

1. Check that the probe face (wear surface) is clean and free of debris.
2. Place a small drop of the supplied coupling fluid on the built-in Probe Zero Plate located on the top of the gauge.
3. Press the probe firmly against the Plate.
4. The Stability Indicator on the LCD display should have six or seven bars illuminated and a value should be shown in the display.
5. While maintaining probe contact with the Test Plate, press the PROBE ZERO key. The display will show "Prb0" while the TI-25M calculates its zero point.

Note: The value shown on the display can be recorded and used in the future to confirm that the gauge is functioning properly.

6. The display will show a measurement value of approximately **0.416 in. *(or 10.57 mm)*** if the gauge is calibrated for common steel (factory default setting) with an acoustic velocity of 0.233 in/µs (5920m/sec). If the gauge is calibrated for any material other than common steel then the measured value of the Test Plate will be higher or lower than described above.

4.4 Changing Units — inches to mm

To change the measuring units from inch (factory setting) to mm, press the INCH MM key. Each time the key is pressed, the units will change.

4.5 Checking Calibration With The Probe Zero Test Plate

Calibration can be checked using a sample of known thickness or using our SB4H or SB4L 4-step calibration block.

4.6 Preparation Of The Surface

The TI-25M can be used to measure thickness over existing paint or coatings as long as the coating is in good condition, is well adhered to the surface and does not exceed 0.020" (20 mils or 500 microns) in thickness. Please note that the paint or coating thickness will be included in the overall wall thickness measurement.

The surface to be measured should be relatively clean and smooth, free of any small particulate, rust or scale. The presence of any of these conditions will prevent stable and reliable readings. Often, a wire brush, sandpaper or scraper will be helpful in cleaning the measurement surface. In situations where the surface is heavily corroded or pitted, a rotary sander, or grinding wheel will be necessary to properly prepare the surface for measurement. If the surface is still “rough” after preparation, using a more viscous couplant fluid similar to petroleum jelly or K-Y jelly will help obtain a stable, reliable measurement. This type of “thick” coupling fluid is a good choice when measuring on vertical surfaces or on the underside as it will help adhere the probe to the measurement surface while also acting as the coupling agent.

6.2 Changing Calibration - Acoustic Velocity Is Known

To change the calibration for a material where the acoustic velocity is known from either prior knowledge or from the Acoustic Velocity table, proceed as follows:

1. Turn on the gauge by pressing the ON OFF key .
2. Press the CAL key.
3. If the units of measure indicators “IN” or “MM” are flashing press the CAL key again.
4. The acoustic velocity units indicator “IN/µs” or “M/s” should be flashing showing that the *Acoustic Velocity Calibration* mode is enabled.
5. Use the ▲ and ▼ keys to adjust the displayed value to match the desired acoustic velocity setting. By pressing and holding the key, the numbers will change more rapidly.
6. When the desired value is reached press the CAL key to exit the calibration mode and return to measurement mode.

Note: If the PROBE ZERO key is pressed while in the calibration mode, the TI-25M will be reset to the factory default calibration for common steel (0.2330 IN/µs or 5920 M/s).

6.1 Acoustic Velocity Table

	Material Type	Velocity Inches/µs	Velocity Meters/s
	Aluminum	0.2500	6350
	Bismuth	0.8600	2184
	Brass	0.1730	4394
	Cadmium	0.1090	2769
	Cast Iron	0.18000	4572
	Constantan	0.2060	5232
	Copper	0.1840	4674
	Epoxy resin	0.1000	2540
	German silver	0.1870	4750
	Glass, crown	0.2230	5664
	Glass, flint	0.1680	4267
	Gold	0.1280	3251
	Ice	0.1570	3988
	Iron	0.2320	5898
	Lead	0.8500	2159
	Magnesium	0.2280	5791
	Nickel	0.2220	5639
	Nylon	0.1020	2591
	Paraffin	0.0870	2210
	Platinum	0.1560	3962
	Plexiglass	0.1060	2692
	Polystyrene	0.0920	2337
	Porcelain	0.2300	5842
	PVC	0.0940	2388
	Quartz glass	0.2220	5639
	Rubber, vulcanized	0.0910	2311
	Silver	0.1420	3607
✔	Steel, common	0.2330	5920
	Steel, stainless	0.2230	5664
	Stellite	0.2750	6985
	Tin	0.1310	3327
	Titanium	0.2400	6096
	Tungsten	0.2100	5334
	Zinc	0.1660	4216

Notes: 1. These values are to be used only when a suitable sample of known thickness is not available for calibrating, as slight variations in material composition, finishing (hardening, polishing, etc.) or shape can affect the accoustic velocity.

2. "✔ "denotes the factory default setting for acoustic velocity.

Extremely rough surfaces such as the "pebble-like" finish of some cast irons, will prove most difficult to measure. These kinds of surfaces act on the sound beam like frosted glass acts on light; the beam becomes diffused and scattered in all directions.

Rough surfaces also contribute to excessive wear of the probe, especially in applications where the probe is "scrubbed" along the measurement surface for use in the *Scan* mode. The probe should be inspected regularly for signs of uneven wear on the probe surface (wearface). If this is detected, the probe should be returned to the factory for repair or replacement.

5.0 QUICK START INSTRUCTIONS — STEEL THICKNESS

These Quick Start procedures are intended for those applications where the thickness of steel is to be measured. If a material other than steel will be measured, the gauge must be calibrated for use on this particular material. Refer to Sections 6.0 through 8.0 for additional details.

Quick Start Instructions

1. Turn on the power by pressing the ON/OFF key.
2. Plug the probe cable into the receptacle at the top of the gauge.
3. Place a drop of coupling fluid on the built-in Probe Zero Plate.
4. Grasp the probe and place it on top of the Probe Zero Plate. Apply moderate pressure to the top surface of the probe with your index finger or thumb to stabilize the probe and to keep the wearface seated flat against the measurement surface.
5. The display will show some thickness value and the Stability Indicator will have most of its bars illuminated.
6. While keeping the probe on the Probe Zero Plate, press the PROBE ZERO key. The display will show a value that can be recorded for future use.
7. Remove the probe from the Probe Zero Plate. The gauge is now ready to perform thickness readings on steel samples.
8. Place a small amount of coupling fluid on the steel surface to be measured and proceed as explained in step #4 above.
9. The gauge will display the thickness of the steel wall along with the Stability Indicator showing the relative stability of the reading. If fewer than five (5) bars are illuminated, the thickness reading displayed is most likely inaccurate.

Notes

a. When the probe is removed from the sample after a measurement, the last reading will be retained on the display.

b. Occasionally, a small film of couplant will be drawn out between the probe and the surface as the probe is removed. When this happens, the TI-25M may perform a measurement that is larger or smaller than it should be. This phenomenon is obvious when one thickness value is observed while the probe is in contact with the material, and another value after the probe is removed.

c. The gauge will automatically power off after 5 minutes of non-use.

6.0 CALIBRATION FOR MEASURING THICKNESS OF MATERIALS OTHER THAN STEEL

Ultrasonic Thickness Gauges use sound waves to measure wall thickness. Different types of materials have different inherent acoustic velocities. For instance, the acoustic velocity of steel is 0.2330 IN/µs (inches-per-microsecond), versus that of aluminum, which is about 0.2500 IN/µs. It is critical that the TI-25M be set for the correct acoustic velocity depending upon the material to be measured.

The TI-25M is shipped from the factory calibrated for steel with an acoustic velocity of 0.2330 IN/µs (5920 M/s). To measure the thickness of any other material, the calibration will have to be changed by adjusting the acoustic velocity to the appropriate value for the specific material being measured. When checking the thickness of the built-in Test Plate, the gauge should display the “Equivalent Value” (inches or mm) listed in the *Acoustic Velocity Table* in section 6.1.

To determine the proper acoustic velocity for the non-steel material, refer to the Acoustic Velocity Table, section 6.1. After determining the proper acoustic velocity, the gauge must be re-calibrated for this new value as described in section 6.2 *Changing Calibration - Acoustic Velocity Is Known.*

If you do not know the type of material to be measured or if the material type is not listed in the Acoustic Velocity Table, refer to section 6.3, *Changing Calibration - Acoustic Velocity Is Not Known.*

CHECK·LINE®
BY ELECTROMATIC

TI-25M

ULTRASONIC THICKNESS GAUGE

Operating Instructions

CHECK·LINE®
INSTRUMENTS

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