



# EIE INSTRUMENTS PVT. LTD.

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# Organization's ISO 9001:2015 Certificate

QUALITY MANAGEMENT SYSTEM

## Certificate of Registration



This is to Certify That The Quality Management System of

### EIE INSTRUMENTS PVT. LTD.

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has been assessed and found to conform to the requirements of

## ISO 9001:2015

for the following scope :

MANUFACTURER & SUPPLIER OF LABORATORY TESTING INSTRUMENTS.

Certificate No	23DQLL85	Issuance Date	: 14/10/2023
Initial Registration Date	: 14/10/2023	Date of Expiry*	: 13/10/2026
1st Surve. Due	: 14/09/2024	2nd Surve. Due	: 14/09/2025

  
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 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Water Absorption Bath for Ceramic Tiles	<b>Equipment Serial No.:</b>
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# Forward

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Once again, we would like to thank you for your trust and kind patronage. We look forward to serve you better in the future.

Yours sincerely,

EIE Instruments Private Limited



EIE INSTRUMENTS PVT. LTD.

## Operation & Maintenance Instruction Manual

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## 1 Introduction

**EIE – Water Absorption Bath for Ceramic Tiles** is used for determining the water absorption and bulk density of all ceramic tiles. There are two methods of obtaining impregnation with water of the tile's open pores:

- a) Boiling, and
- b) Immersion under vacuum.

Boiling will impregnate open pores that are easily fillable, and the vacuum method fills almost all the open pores.

## 2 Getting Started

The instructions for preparing the equipment assume that the user is aware of the contents of this document, which lists the warranty conditions and important precautions.

## 3 Delivery and Uncrating of the Apparatus

- 1) Inspect equipment and shipping crate immediately upon receipt. If any damage is apparent, immediately discuss it with the delivery person and contact the transportation company immediately. Make notes of any damages on the bill of landing.
- 2) Retain all shipping material for later inspection.
- 3) Check packing slip carefully and ensure all materials have been received as indicated in the packing slip.
- 4) Instrument is supplied in enclosed wooden case. Unpack the wooden case, locate and count the number of accessories and main working unit. Remove packing strip from surroundings of the instrument and all its accessories. Please inspect and note whether any part of the instrument is damaged or any accessory is missing according to packing slip? If it is so, then immediately make note of it and report to the manufacturer.
- 5) Due to the vibration incurred during shipping and handling, it is possible that mechanical connection could become loose. Inspect all connection to ensure that they are secure.
- 6) After visual inspection, if everything is found to be okay, transit the instrument to suitable safe place where it is intended to install. **CAUTION: Heavy weight, protect yourself first. Handle with care.**
- 7) Recycle the packing material and wooden box. Do not throw it away for environment protection.

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### 3.1 How to Make Instrument Ready for Use?

- a) Place the equipment on a plain, even and sturdy surface leaving 5-6" space away from the wall.
- b) Do not install unit in a corrosive environment. A corrosive environment may lead to poor performance and deterioration of unit.
- c) Do not place the equipment in a draft, sunlight or near a place of equipment, which emits heat as well as electromagnetic conduction emission.
- d) Check the electrical specifications label located on the equipment. Make sure the power specifications must confirm to your local standard.
- e) Provide Single phase / 230V / 50Hz stabilized power source with proper earthing.
- f) Clean the inner chamber of bath thoroughly.
- g) Plug the power cord into a properly grounded outlet.

### 4 Apparatus Required to Conduct the Test

1. Drying oven capable of operation at about 110°C.
2. Heating apparatus
3. Source of heat
4. Weighing balance
5. De-ionised or distilled water
6. Desiccator
7. Chamois leather
8. Wire loop, halter, basket – capable of supporting specimens under water for making suspended mass measurements.
9. Glass beaker
10. Vacuum chamber and vacuum system

### 5 Test Specimen

- 1) A sample for each type of tile under test should consist of 10 whole tiles.
- 2) If the proper surface area of each individual tile is greater than  $0.04 \text{ m}^2$ , then only 5 whole tiles should be used for the tests.
- 3) When the mass of each individual tile is below 50 g, a sufficient number of tiles should be taken so that each test specimen reaches a mass of 50 g to 100 g.

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- 4) Tiles with sides larger than 200 mm may be cut up, but all pieces should be included in the measurement. With polygonal and other non-rectangular tiles, the length and width should be those of the enclosing rectangles.

## 6 Standard Operating Procedure

### 6.1 Water Impregnation by Boiling Method

1. Dry the tiles in the oven at  $110 \pm 5^\circ\text{C}$  until constant mass is reached, that is, when the difference between two successive weighing at intervals of 24 hours is less than 0.1 percent.
2. Cool the tiles in the desiccator over silica gel or other suitable desiccant, but not an acid, until cooled to room temperature.
3. Weigh each tile and record the results of the corresponding accuracy shown in the table 1.
4. Place the tiles vertically, with no contact between them, in water in the heating apparatus/water bath so that there is a depth of 50 mm water above and below the tiles. Maintain the water level of 50 mm above the tiles throughout the test.
5. Heat the water until boiling and continue to boil for 2 hours. Then remove the source of heat and allow the tiles to cool, still completely immersed in this water overnight.
6. Remove the surface water from the tile pieces by chamois leather.
7. Immediately after this procedure weigh each tile and record the results to the same accuracy as for the dry state.

*Table 1: Tile mass accuracy of measurement*

Serial Number	Mass of tiles, in gram	Accuracy of measurements, in gram
1	0 to 100	0.02
2	101 to 500	0.05
3	501 to 1000	0.25
4	1001 to 3000	0.50
5	Above 3000	1.00

### 6.2 Water Impregnation by Vacuum Method

Place the tiles vertically, with no contact between them, in the vacuum chamber. Evacuate to a pressure of  $10 \pm 5$  kPa ( $91 \pm 5$  kPa below standard atmospheric pressure of 101 kPa) and maintain it for 30 min. Then, while maintaining the vacuum, slowly admit sufficient water to cover the tiles by 5



cm. Release the vacuum and allow the tiles to remain submerged for 15 minutes. Prepare the Chamois leather by wetting and wringing out by hand. Place it on a flat surface and lightly dry each side of each tile in turn. Dab any relief surfaces with the Chamois leather. Immediately after this procedure, weigh each tile and record the results to the same accuracy as for the dry state (see the table 1).

### 6.3 Suspended Weight

After water impregnation of the test specimens, determine to the nearest 0.01 g the mass  $m_3$ , of each specimen while suspended in water. Perform the weighing by placing the specimen in the wire loop, halter, or basket that is suspended from one arm of the balance. Before actually weighing, counterbalance the scale with the wire loop, halter, basket in place and immerse in water to the same depth as is used when the specimens are in place.

## 7 Control Panel and its Accessories

The following are the switches for various functions provided on the Control panel.

**Mains Switch cum indicator:** In this advanced model, mains switch serves the purpose of switching and indicating both. An operator can switch on / switch off the entire unit from mains switch mounted on front panel. Also, the switch incorporates a lamp inside which indicates that the mains supply is on and the unit is currently in the operating mode.

**Digital temperature controller:** Water bath incorporates the PID temperature controller to monitor and maintain the set-point temperature value. A proportional–integral–derivative controller (PID controller) is a generic control loop feedback mechanism (controller) which calculates an "error" value as the difference between a measured temperature value and a desired set-point value. The controller attempts to minimize this error by adjusting the process control inputs.

**Heater switch:** This switch controls turning ON/OFF the Permanent heaters installed within the chamber. These heaters are mostly responsible to take care of set point temperature.

## 8 Standard Operating Procedure (With the Digital Controller)

- 1) Clean the container properly with clean, dry and smooth cloth before starting your operation.
- 2) Remove the chamber cover and Fill the container with distilled water/ R.O. Water.
- 3) Heater must be immersed in the water completely otherwise it may burn. Water level must be always "1" inch above the water heater. This leads your unit for long lasting.
- 4) Plug in the main supply cord to the power source to properly grounded outlet.

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**Note:** Before running a test, make sure the unit is levelled. Otherwise, the results will be affected.

- 5) Now switch on the mains switch on the control panel. This will turn on the digital temperature controller on the control panel. The digits in red on the upper side will indicate the chamber temperature while the digits in green/white in the bottom line will indicate the set point temperature.
- 6) Set the desired operation temperature using the **(Up) and (Down) keys** on the controller. Controller will now automatically start tuning the set point temperature.

## 9 Expression of Results

### 9.1 Water Absorption

- ◆ For each tile, calculate the water absorption as a percentage of the dry mass using the expression:

$$\frac{m_2 - m_1}{m_3} \times 100$$

Where,

$m_1$  = mass of the dry tile; and

$m_2$  = mass of the wet tile.

- ◆ The results should be given to the first decimal place.
- ◆ Calculate the average water absorption of the sample as the average of the individual results.

### 9.2 Bulk Density

- Bulk density, B, in  $g/cm^3$ , of a specimen is the quotient of its dry mass divided by the exterior volume, including pores. Calculate the bulk density as follows:

$$B = \frac{m_1}{V}$$

Where,

$m_1$  = mass of the dry tile;

$V$  = exterior volume, in  $cm^3$  ( $m_2 - m_3$ ); and

$m_3$  = mass of the suspended tile impregnated.

## 10 Test Report

The test report should contain the following:

- a) A description of the tiles;

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- b) Water absorption and bulk density of each individual tile; and
- c) Average water absorption and bulk density.

**11 Directions to Clean**

- 1) Disconnect the main cord from the power supply prior to clean.
- 2) Drain out the water from the container properly, wipe internal chamber with soft dry cloth and for external cover use moist cloth.
- 3) While cleaning take care that the heater must not be disturbed.
- 4) Wear hand gloves while cleaning of equipment.
- 5) Never use benzene or paint thinner or any other chemicals for cleaning.

**12 Precautions to be Followed**

- 1) Always disconnect from power supply prior to maintenance & servicing.
- 2) Keep correct level of bath media to avoid damage to heaters (At least above the heater level).
- 3) Never leave the bath connected to main supply after day's use.
- 4) Preferable use de-mineralized distilled water as a bath media, for long life of heaters.
- 5) While cleaning the inner chamber, take care that the **Immersion heater**, and **sensors** do not get damaged.
- 6) Clean the working chamber periodically and maintain proper hygiene.
- 7) Always connect the chamber to 230 volts, 50 Hz, Single phase, AC supply via voltage stabilizer of specified ratings.
- 8) To avoid electrical shock, this equipment must always use a properly grounded electrical outlet or correct voltage and current handling.
- 9) Maintain a safe distance of at least 1 – 2 feet away from the wall while installing the unit.
- 10) Keep the instrument tidy, clean and dry with mint cream. Before initiating the fresh day, use preferably clean soft cloth. Brush up the unit body as to maintain its finishing.
- 11) Disassembly of this equipment is strictly limited to the qualified persons and licensed engineers.
- 12) In case of any difficulty, please do not try to repair without consulting the manufacturer, especially when the instrument is under the warranty period.

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## 13 Troubleshooting

Causes	Reason	Solution
Water heater is not working (Water is not getting heated in the container)	<p>a) Terminals end of water heater may have lost the circuit connection.</p> <p>b) An operator may have not switched on permanent heater switch.</p> <p>c) Permanent heater switch may not be working.</p> <p>d) Sensor may not be functioning properly.</p> <p>e) S.S.R not working</p>	<p>a) Open right side chamber of the unit, find out the end terminals and fix it properly.</p> <p>b) Turn on the permanent heater switch.</p> <p>c) Replace the switch completely.</p> <p>d) Check the Sensor. It should indicate between 110 – 115 ohms, check it with the help of multi-meter. If found faulty replace it.</p> <p>e) Check Input voltage of SSR, it should be 3 to 12-volt DC and output voltage should be 230 volts AC.</p> <ul style="list-style-type: none"> <li>▪ If input is 3 -12 – volt not available, DTC may be faulty.</li> <li>▪ If 230 volts AC not available SSR may be faulty, Replace the SSR.</li> </ul>
Unit is completely dead, not a single part is working	<p>a) 1 ampere fuse may be shorted.</p> <p>b) Required operating power may not be supplied.</p> <p>c) Main cord wire may be damaged.</p> <p>d) Main switch cum indicator or control panel is not working.</p>	<p>a) Replace the fuse.</p> <p>b) Supply at least 220V of power to the unit.</p> <p>c) Replace the main cord wire completely.</p> <p>d) Replace the main switch cum indicator.</p>



# Warranty Certificate

Your EIE product is guaranteed to be free from defects in materials and workmanship for one (1) year under normal use from the date of purchase. This warranty does not apply to any product damaged by accident, misuse, mishandling, abuse, negligence, transit, improper line voltage, drop, fire, flood or if the products were altered or repaired by anyone other than the qualified service personnel. The liability of EIE Instruments is limited to repair or replacement and under no circumstances shall EIE be liable for any collateral consequential damages or loss. This guarantee specifically excludes the expendables and consumables. All warranty claims must be directed to your corresponding purchase organization that is responsible for the sale of this equipment. The users are responsible for shipping expense. The warranty cards which are not signed and stamped by the actual user will be treated as void. The warranty card should accompany the defective products sent for repair, without which no claims would be entertained. Please detach the below warranty card from following cut-line.

.....

Attributes	Details
Name of the company	
Address	
Telephone number	
Mobile number	
Email address	
Date of purchase	
Product model	
Serial Number	
Bill or cash memo number	

This card should be detached, filled in properly and posted within 15 days from the date of purchase otherwise the warranty becomes invalid.

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If you have any note or queries,

Please write to us at [info@eieinstruments.com](mailto:info@eieinstruments.com), Thank you!

Our other range of products...

Pharma & Microbiology Lab Testing Instruments	Yarn & Fabric Testing Instruments
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