



EIE INSTRUMENTS PVT. LTD.

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Organization's ISO 9001:2015 Certificate



EIE INSTRUMENTS PVT LTD

Operation & Maintenance Instruction Manual

Equipment Name: Tiles Autoclave

Equipment Serial No.:

Document Number: EIE/OM/TLSACV/01

Page No.: 2 of 17

Forward

Dear valued customer,

We are thankful of you for your keen interest in our company products. We hope you enjoy using them and find them to be helpful and reliable. We greatly appreciate your business and the opportunity you have provided us to assist you. You have joined a selected group of customers who have switched to the technologically superior and quality enhanced laboratory testing products.

Time has changed, so does the technology. Your purchase lists you on the cutting edge of the 21st century technology. To help you get the most out of your EIE Instruments Pvt. Ltd. products, we have created this instruction manual that is an excellent way of expressing and maintaining your trust in EIE's - superior quality testing products. Our continued efforts and commitment are to provide you with the best and efficient services after sales, prompt attention and the highest level of customer satisfaction. If for any reasons, you have questions or comments, we are delighted to hear from you. We welcome your feedback for further improvement in our product(s). We would be happy to help you in any way we can. You can contact us on **+91-9909903582** or send us an email at **service@eieinstruments.com/kunal@eieinstruments.com**. You can expect us to respond to your call or email within 24-48 working hours.

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



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Equipment Name: Tiles Autoclave


Equipment Serial No.:

Document Number: EIE/OM/TLSACV/01

Page No.: 3 of 17

Table of Contents

Organization's ISO 9001:2015 Certificate	2
Forward	3
Table of Contents	4
List of Tables	5
List of Figures	5
1 Introduction to EIE – Tiles Autoclave Apparatus.....	6
1.1 Working Principle and Application.....	6
1.2 Definition	6
2 Technical Specification	7
2.1 Electrical.....	7
2.1.1 Special Features	7
3 Delivery and Uncrating of Apparatus	8
3.1 How to Make the Instrument Ready for Use?	8
4 Test Report (If Required).....	8
5 Component Diagram of Tiles Autoclave Apparatus	9
6 Electric Circuit Diagram of the Apparatus.....	10
7 Introduction to the Control Panel	11
7.1 Other Important functioning accessories	12
8 Operating Instruction	13
8.1 How to set the Temperature in the controller?.....	13
8.2 General Procedure 1	14
8.3 General Procedure 2	14
9 Precautions to be Followed.....	15

 EIE INSTRUMENTS PVT LTD	Operation & Maintenance Instruction Manual	
	Equipment Name: Tiles Autoclave	Equipment Serial No.:
	Document Number: EIE/OM/TLSACV/01	Page No.: 4 of 17


Warranty Certificate	16
----------------------------	----

List of Tables

Table 1: Model specifications (For reference purpose only)	7
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List of Figures

Figure 1: Types of cracks on different types of tiles	6
Figure 2: Component diagram of the apparatus	9
Figure 3: Electric circuit diagram of the apparatus.....	10
Figure 4: Control panel	11
Figure 5: Controller	13
Figure 6: Sample holding stand.....	14

 EIE INSTRUMENTS PVT LTD	Operation & Maintenance Instruction Manual	
	Equipment Name: Tiles Autoclave	Equipment Serial No.:
	Document Number: EIE/OM/TLSACV/01	Page No.: 5 of 17

1 Introduction to EIE – Tiles Autoclave Apparatus

An autoclave, or steam sterilizer, is an insulated pressure chamber in which saturated steam is used to elevate the temperature. Autoclaves are found in research, diagnostic and microbiology laboratories, health centres and other places that require high-level disinfection. By taking above concept by taking above concept **EIE offers “Tiles Autoclave” as per IS 13630 –Part 9-2019.**

1.1 Working Principle and Application

The resistance to the formation of crazes is determined by subjecting whole tiles to steam at high pressure in an autoclave and then examining the tiles for crazes after applying a stain to the glazed faces.

The purpose of this work was to develop a simple, cheap, and rapid means for measuring the strains existing between glazes and the bodies to which they are applied. This test will also be of assistance in developing new glazes and bodies on which the glaze should be in adequate compression to prevent crazing, but still should not be in sufficient compression to cause shivering.

1.2 Definition

Craze – A craze is a crack, showing as a fine hairline, limited to the glazed surface of a tile.

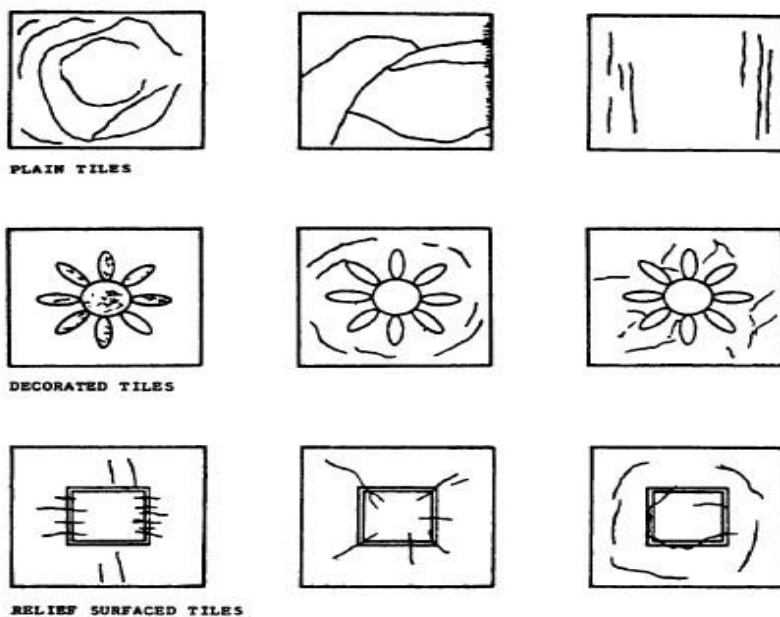



Figure 1: Types of cracks on different types of tiles

 EIE INSTRUMENTS PVT LTD	Operation & Maintenance Instruction Manual	
	Equipment Name: Tiles Autoclave	Equipment Serial No.:
	Document Number: EIE/OM/TLSACV/01	Page No.: 6 of 17

2 Technical Specification

2.1 Electrical


- POWER SOURCE : 440 Volts, 50 Hz, Three Phase AC supply.
- MAINS POWER : 4 – Pole MCB
- TEMPERATURE RANGE : Ambient to 180°C
- TEMPERATURE ACCURACY : $\pm 2^{\circ}\text{C}$ or Better Result
- TEMPERATURE RESOLUTION : 0.1°C
- HEATER : 7.5 KW (3 KW \times 03 Nos.) (Depending on the size of chamber)
- PRESSURE GAUGE : Dial Type (Range – 14 Kg/cm²)
- CONTROL : Microprocessor Based PID – Controller
- SENSOR : PT – 100 (RTD)
- FAN (MOTOR) : Cooling chamber fan

Table 1: Model specifications (For reference purpose only)

Serial Number	Working Size	Accommodates Tiles Size	Power Consumption (kW)	Power Supply
1	250 mm dia x 350 mm depth	8" x 12"	4	230 V, 50 Hz, single phase, AC supply
2	350 mm dia x 450 mm depth	12" x 16"	7.5	440 V, 50 Hz, three phase, AC supply
3	450 mm dia x 550 mm depth	16" x 20"	9	440 V, 50 Hz, three phase, AC supply
4	500 mm dia x 750 mm depth	18" x 28"	9	440 V, 50 Hz, three phase, AC supply

2.1.1 Special Features

- Unit is specially designed for ease of operation with a triple safety system.
- Mainly, pressure is controlled by a pressure switch.
- In case of failure of the pressure switch, a safety valve is also provided.
- For sealing purposes between the cover and tank, (so that there is no heat or pressure loss takes place because of leakage) a Teflon Gasket, made of special silicone rubber is fitted on the groove of the tank.
- ACCESSORIES: Spanner, Instruction Manual and Test sample holder.

	Operation & Maintenance Instruction Manual	
	Equipment Name: Tiles Autoclave	Equipment Serial No.:
	Document Number: EIE/OM/TLSACV/01	Page No.: 7 of 17

3 Delivery and Uncrating of 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 packing slip.
4. 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: Handle with care.**
7. Recycle the packing material. Do not throw it away for environment protection.


3.1 How to Make the Instrument Ready for Use?

- 1) Keep the equipment in well ventilated place.
- 2) Place the equipment on a plain, even and sturdy surface leaving approx. 4"-5" inch space away from the wall.
- 3) Do not use equipment in a corrosive environment. A corrosive environment may lead to poor performance and deterioration of unit.
- 4) Keep instrument away from draft, sunlight, water or near a place of equipment, which emits heat as well as electromagnetic conduction emission.
- 5) Keep the standard operating manual handy while operating on the apparatus.

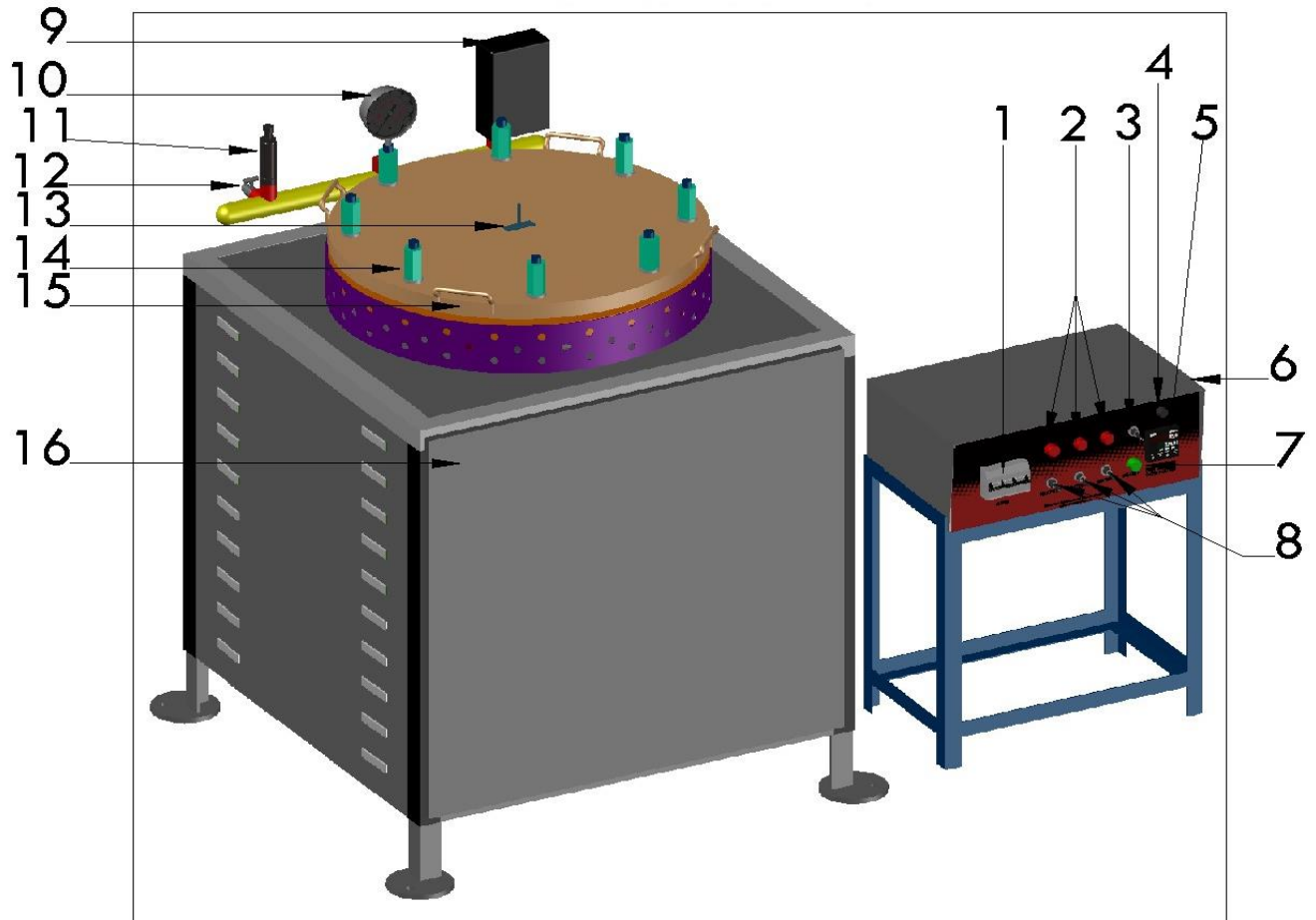
4 Test Report (If Required)

The test report shall contain the following:

- Description of the tile;
- Number of test specimens;
- Number of test specimens showing crazing;
- Description of the crazing (written text, drawing or photograph).


 EIE INSTRUMENTS PVT LTD	Operation & Maintenance Instruction Manual	
	Equipment Name: Tiles Autoclave	Equipment Serial No.:
	Document Number: EIE/OM/TLSACV/01	Page No.: 8 of 17

5 Component Diagram of Tiles Autoclave Apparatus



ID	DISCRIPTION	ID	DISCRIPTION
1	MCB (Mains Switch)	9	Pressure switch
2	Mains supply Indicator	10	Pressure Dial Gauge
3	Fan toggle switch	11	Safety Valve
4	Fuse	12	Release Valve
5	PID Temperature Controller	13	Temperature Sensor
6	Control Panel Body	14	Hex Nut
7	Heater ON/OFF indicator	15	Top Lid Cover
8	Heater Toggle switch	16	Door

Figure 2: Component diagram of the apparatus

 EIE INSTRUMENTS PVT LTD	Operation & Maintenance Instruction Manual	
	Equipment Name: Tiles Autoclave	Equipment Serial No.:
	Document Number: EIE/OM/TLSACV/01	Page No.: 9 of 17

6 Electric Circuit Diagram of the Apparatus

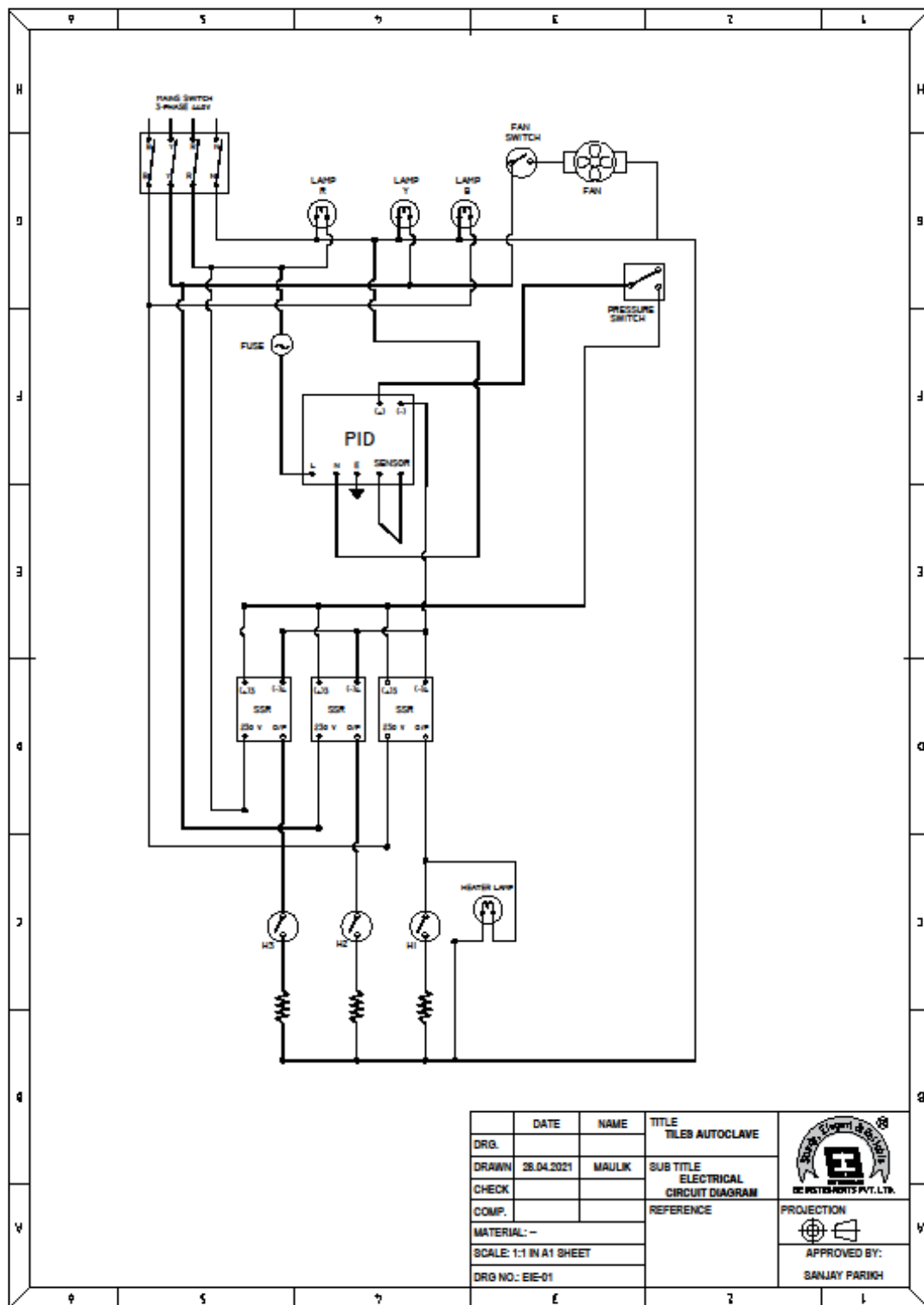


Figure 3: Electric circuit diagram of the apparatus

7 Introduction to the Control Panel



Figure 4: Control panel

MCB switch of 25 or 40 Amps (customized)

To turn ON/OFF the entire unit and it also supplies power to the digital controller, mains indicator is provided to indicate the availability of Mains supply.

R-Y-B Red indicator (For Mains supply)

Mains power indication.

Whenever the MCB is turned ON, the red light glows which indicates that the machine is in operational mode.

Heater Indicator-Green

Heater's ON/OFF indication, as the toggle switches of heaters are turned ON, the green LED glows indicating that the heater is functioning properly.


Lamp of heater: To indicate the On/Off cycle of the heater for set I, II and III.

Toggle switch

- Individual toggle switches are provided to turn ON/OFF each heater separately.
- Fan switch: Used to turn ON / OFF the fan motor for cooling the working chamber mounted at the bottom section of the unit.

Microcontroller based PID controller

It incorporates the PID temperature controller to monitor and maintain the set- temperature value inside the chamber. 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

 EIE INSTRUMENTS PVT LTD	Operation & Maintenance Instruction Manual	
	Equipment Name: Tiles Autoclave	Equipment Serial No.:
	Document Number: EIE/OM/TLSACV/01	Page No.: 11 of 17

temperature value and a desired set-point value. The controller attempts to minimize this error by adjusting the process control inputs.

7.1 Other Important functioning accessories

Pressure Switch

Pressure switch is used to control the pressure inside the working chamber, with the help of the knob provided, user can control and maintain the working pressure accordingly.

Accuracy of the working pressure depends on the setting of the pressure switch, user can set the pressure on the pressure switch with help of white knob provided on the top, by rotating it clockwise and anti-clockwise movement (According to the scale of the pressure given on the screen).

Safety Valve

It is provided for safety. It is mounted on the left top corner of the autoclave. The principle of the device is used to prevent overpressure in the chamber for safety. The safety valve operates by releasing a volume of fluid from within the chamber when a predetermined maximum pressure is reached, thereby reducing the excess pressure in a safe manner.

User can set the safety valve with help of the bolt which is provided on the top of the safety valve.

For setting the working pressure, user have to take out the top nut, tighten the screw provided in clockwise or anti clock wise direction according to requirement of Increasing or decreasing respectively.

As the pressure goes beyond the set point on the safety valve, it will come in action and releases the excess steam and maintains the pressure as per set pressure value.

For safety, set the pressure on the safety valve approximately 10°C or 1 kg above the set pressure on the pressure switch.

Steam Release Valve

It is used for releasing the pressure inside the chamber.

It is provided on the left hand side of the pressure switch.


At the starting stage you have to remove steam with the help of this steam release valve for removing air present inside the chamber.

Pressure Dial Gauge

It is mounted just beside the pressure switch assembly of the autoclave.

It shows the working pressure of the chamber of the autoclave.

Pressure gauge is calibrated and calibration certificate is provided separately.

 EIE INSTRUMENTS PVT LTD	Operation & Maintenance Instruction Manual	
	Equipment Name: Tiles Autoclave	Equipment Serial No.:
	Document Number: EIE/OM/TLSACV/01	Page No.: 12 of 17

8 Operating Instruction

8.1 How to set the Temperature in the controller?



Figure 5: Controller

PV-For Process value (White display)

SV-For set value (Green display)

There are four tactile keys provided on the front panel for configuring the controller and setting up the parameter values.


SET KEY : Press to set the temperature value and start the process.

DOWN KEY : Press to decrease the Temperature value.

UP KEY : Press to increase the Temperature value.

To set the temperature for heating of the sample, press UP (Arrow key) to increase the temperature value as per desired set point is increased then release the key at that point, set value will be auto saved and repeat the same process to decrease the value.

NOTE: The controller is factory set and it does not require any settings except required temperature.

 EIE INSTRUMENTS PVT LTD	Operation & Maintenance Instruction Manual	
	Equipment Name: Tiles Autoclave	Equipment Serial No.:
	Document Number: EIE/OM/TLSACV/01	Page No.: 13 of 17

8.2 General Procedure 1

- 1) Pour the water in to the chamber up to the level of the stand.
- 2) Place the sample tiles on the stand provided. (figure: 6)
- 3) Place the lid cover on the chamber and tighten the nuts in clockwise direction gently.
- 4) Do not over tight the nuts.
- 5) Connect the Autoclave with 440 V, 3 phase connection. Turn on the MAINS MCB switch and all the heater switches. Keep the steam release valve opened.

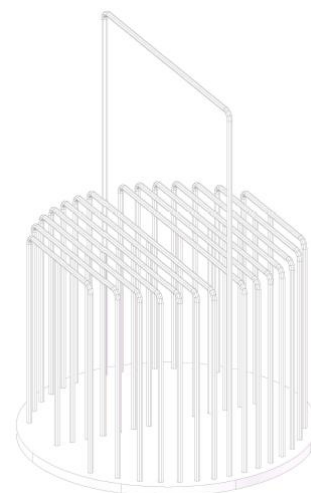


Figure 6: Sample holding stand

- 6) As soon as steam starts coming out side, close the release valve.
- 7) Now slowly and gradually pressure will be generated and as soon as required pressure is attained, heater will be automatically cut off. Now if pressure goes below set value, heater will be turned ON automatically.


Note:

- **IN CASE THE CONTROLLER FAILS, PRESSURE SWITCH WILL COME IN TO ACTION.**
- **IN CASE THE PRESSURE SWITCH FAILS; SAFETY VALVE WILL COME IN TO ACTION.**

- 8) After attaining pressure, maintains the same for required time period and then switch off the heater and Turn ON the fan for rapid cooling purpose of chamber.
- 9) After completion of test, release the pressure using release valve completely.

8.3 General Procedure 2

- First, examine the tiles for visible defects by viewing them with the naked eye (with the aid of spectacles if usually worn). All test specimens should be free from crazes at the commencement of the test.
- Place the test specimens in the autoclave in such way that there is air space between them. (Always place the sample in the stand provided.)
- Raise the pressure of the autoclave gradually for a period of 1h until it reaches 750 ± 20 kPa and set the temperature in the controller as per the standard ($168^{\circ}\text{C} \pm 1^{\circ}\text{C}$ recommended). These values of temperature and pressure are to be maintained for 2h. Then turn off the heat supply, and allow

 EIE INSTRUMENTS PVT LTD	Operation & Maintenance Instruction Manual	
	Equipment Name: Tiles Autoclave	Equipment Serial No.:
	Document Number: EIE/OM/TLSACV/01	Page No.: 14 of 17

the pressure to fall as rapidly as possible to atmospheric and cool the test specimens in the autoclave for 30 min.


- Remove test specimens to the laboratory atmosphere; place them separately on a flat surface and allow them to cool for a further period of 30 min.
- Brush a suitable stain, such as 1 percent aqueous solution of methylene blue containing a small quantity of wetting agent, on to the glazed surface of the test specimens. After 1 min wipe off the stain with a damp cloth.
- Examine the test specimens for crazes taking care to avoid confusing crazes with scratches and ignoring cracks.

IMPORTANT Notes

- 1) Autoclave is made with all care for safety purpose.
- 2) To operate it, a skilled operator must be appointed.
- 3) Routine maintenance and close supervision of all control is must for trouble free performance.
- 4) Autoclave should be installed in a separate room/space and away from working staff.

9 Precautions to be Followed

- i. Maintain proper hygiene of the instrument.
- ii. Please ensure proper earthing is provided to the instrument before powering up.
- iii. Use of voltage stabiliser is recommended in case of power fluctuations.
- iv. While cleaning, take care that the small/sensitive parts which should not be get damaged.
- v. 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.
- vi. Disassembly of this equipment is strictly limited to the qualified persons and licensed engineers.
- vii. In case of any difficulty, please do not try to repair without consulting the manufacturer, especially when the instrument is under the warranty period.


 EIE INSTRUMENTS PVT LTD	Operation & Maintenance Instruction Manual	
	Equipment Name: Tiles Autoclave	Equipment Serial No.:
	Document Number: EIE/OM/TLSACV/01	Page No.: 15 of 17

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.

 EIE INSTRUMENTS PVT LTD	Operation & Maintenance Instruction Manual	
	Equipment Name: Tiles Autoclave	Equipment Serial No.:
	Document Number: EIE/OM/TLSACV/01	Page No.: 16 of 17

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 EIE INSTRUMENTS PVT LTD	Operation & Maintenance Instruction Manual	
	Equipment Name: Tiles Autoclave	Equipment Serial No.:
	Document Number: EIE/OM/TLSACV/01	Page No.: 17 of 17