



# EIE INSTRUMENTS PVT. LTD.

[www.eieinstruments.com](http://www.eieinstruments.com), [www.eiepharmatest.com](http://www.eiepharmatest.com), [www.eieceratest.com](http://www.eieceratest.com), [www.eiepetrotest.com](http://www.eiepetrotest.com)



Survey No. 1098, Nr. Mahakali Temple, Opp. Primary School, Village Kubadthal, Taluka: Daskroi,  
Ahmedabad – 382430, Gujarat, India

Email : [service@eieinstruments.com](mailto:service@eieinstruments.com) , [kunal@eieinstruments.com](mailto:kunal@eieinstruments.com)

Telephone: +91-79-35208300, +91-9909903582

# 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.**

13th FLOOR, 1301/A, BVR EK, OPP INDER RESIDENCY HOTEL, NR. WESTEND HOTEL, ELLISBRIDGE, AHMEDABAD - 380006, GUJARAT, INDIA.

*has been assessed and found to conform to the requirements of*

## ISO 9001:2015

*for the following scope :*

MANUFACTURER & SUPPLIER OF LABORATORY TESTING INSTRUMENTS.

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

  
**DIRECTOR**  
**ROHS Certification Pvt. Ltd.**  
B-7, 1st Floor, Sector-2 Noida, Gautam Budh Nagar, UP-201301  
e-mail : info@rohs-certification.co.in | website : www.rohs-certification.co.in  
The Registration is not a Product Quality Certificate. \*Subject to successful completion of surveillance audits. Visit for verification on www.rohs-certification.co.in  
Certificate is the property of ROHS and returns when demanded


  
مركز الاعتمادات العالمية  
Emirates International Accreditation Centre  
CB-QMS-035

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	Equipment Name: Bursting Strength Tester	Equipment Serial Number:
	Document Number: EIE/OM/BST/01	Page Number: 2 of 26

# 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 21<sup>st</sup> 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](mailto:service@eieinstruments.com)/[kunal@eieinstruments.com](mailto: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

 EIE INSTRUMENTS PVT. LTD.	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 3 of 26

# Table of Contents

Organization’s ISO 9001:2015 Certificate .....	2
Forward.....	3
Table of Contents.....	4
List of Figures .....	5
List of Tables .....	5
1. Introduction to Packaging Industries and Their Need of Packaging Testing Instruments.....	6
2. What is Burst Test? .....	6
2.1 Determination of Bursting Strength .....	6
2.2 Difference Between Bursting Strength and Bursting Factor .....	8
3. EIE – Bursting Strength Tester Variant(s).....	9
4. Getting Started.....	10
4.1 Packing List.....	10
4.2 Delivery and Uncrating of the Instrument.....	10
4.3 Installation Instructions .....	11
4.4 Safety Instructions .....	11
4.5 Safety Symbols & Significance .....	12
5. Component Diagram of EIE – Bursting Strength Tester.....	12
6. Brief Construction Details .....	13
7. Technical Specification.....	14
7.1 TAPPI (T-403) Design Criteria (For Bursting Test) .....	14
7.2 TAPPI (T-810) Design Criteria (For Corrugated Board Bursting Test) .....	15
7.3 Technical Specifications of Individual Parts/Components.....	15
8. Preparation of the Test Specimen .....	17
9. Pre-run Checks .....	17

 <p><b>EIE INSTRUMENTS PVT. LTD.</b></p>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 4 of 26

10.	Procedure to Fix Lower Clamp to the Hand Wheel Screw Rod .....	17
11.	Standard Operating Procedure .....	18
11.1	Setting of Auto Trip Value.....	21
12.	Calibration Check Procedure with Standard Aluminium Foil (SAF) .....	22
13.	Report .....	23
14.	Direction to Clean the Instrument .....	23
15.	Precaution to be Observed .....	23
16.	Appendix .....	24
	Warranty Certificate .....	25

## List of Figures

FIGURE 1:	CORRUGATED BOX AND THEIR CONTENTS – SINGLE/DOUBLE/TRIPLE WALL.....	7
FIGURE 2:	BASIC PRINCIPLE OF BURSTING TEST .....	8
FIGURE 3:	COMPONENT DIAGRAM .....	13
FIGURE 4:	GRAPHICAL REPRESENTATION OF ASSEMBLING THE HAND WHEEL ASSEMBLY .....	18
FIGURE 5:	DIAPHRAGM .....	20
FIGURE 6:	PEAK VALUE.....	20
FIGURE 7:	MAXIMUM PRESSURE .....	21
FIGURE 8:	TRIP VALUE .....	21

## List of Tables

TABLE 1:	MECHANICAL SPECIFICATIONS OF BURSTING STRENGTH TESTER .....	15
TABLE 2:	ELECTRICAL SPECIFICATIONS OF BURSTING STRENGTH TESTER .....	16
TABLE 3:	STANDARD ALUMINIUM FOIL BURST TEST.....	22

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 5 of 26

## 1. Introduction to Packaging Industries and Their Need of Packaging Testing Instruments

The products we purchase from routine Grocery to consumer goods, Textiles to industrial products, Food packets & packed beverages to electronic components etc. have to be packed and sealed safely to be shipped and delivered. Hence it is essential that, the products, we purchase, are packed in safe & durable material that can withstand variations in temperature, pressure as well as transportation inconsistencies to reach to our doorstep without any damage. The quality of the packaging products has a great importance in global market. Today, corrugated papers & corrugated boxes are one of the most common and most trusted packaging materials used in packaging industries.

There are various factors which determine the strength & quality of the corrugated boxes used for packaging. Hardness, compressibility, Bursting Factor, Bursting Strength, Tearing Resistance, etc. help us to determine the strength and endurance of the packaging boxes.

## 2. What is Burst Test?

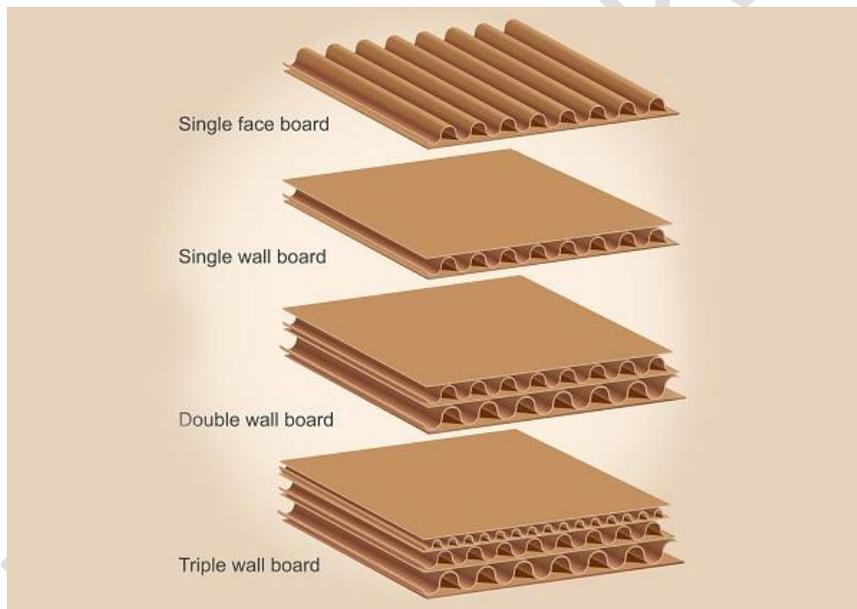
The burst test is frequently used as a general guide to the strength of paper, solid board and corrugated board. The burst test determines the maximum resistance (in kPa or in KG/CM<sup>2</sup>) of a specimen to an increasing pressure. It gives the value of the maximum pressure that can be applied to the packaging materials before it ruptures. Bursting strength is usually quoted in kPa or in KG/CM<sup>2</sup>.

Nearly all specifications for paper include the bursting test, and in some cases this is the only means specified for strength measurement. Generally, bursting strength is determined using a digital hydraulic paper or digital hydraulic board burst tester.

### 2.1 Determination of Bursting Strength

Bursting strength is determined by a Burst tester. Typically, the paper is held between two clamps and pulled tight. This helps to create a uniform pressure throughout the material. The pressure, the paper can hold in this state is the bursting strength. The structure of the paper determines its strength. The quality of fibre, its type, proportion, manufacturing method and use of fillers and additive determine the bursting strength of paper. In case of corrugated boxes, the corrugated or fluted paper improves the durability. In addition to providing cushioning effect, the corrugated paper also increases the strength of the boxes as shown in the figure 1.

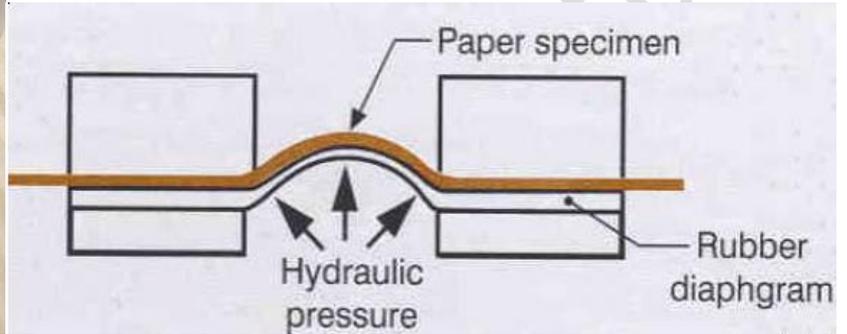
 EIE INSTRUMENTS PVT. LTD.	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 6 of 26



**Figure 1: Corrugated box and their contents – Single/Double/Triple wall**

To perform the test with Bursting Strength Tester, a sample is placed between the clamping assemblies to create pressure on the sample. This pressure is created by the rubber diaphragm with an increasing rate until the sample burst. The reading of pressure, at which the sample burst, is recorded as the Bursting Strength of the materials.

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 7 of 26



*Figure 2: Basic principle of bursting test*

## 2.2 Difference Between Bursting Strength and Bursting Factor

The Bursting Factor of the papers can be calculated by dividing the bursting strength by the weight of the specimen and is expressed in grams/sq. meter. Bursting factor is calculated to determine the amount of pressure that a paper or cardboard can tolerate easily before it collapses. The bursting factor of a paper changes with the change in the weight of the paper. On the other hand, bursting strength is measured by providing maximum hydrostatic pressure to rupture the paper used to produce corrugated boxes. The bursting strength of corrugated box can be calculated efficiently with the help of EIE - “Bursting Strength Tester”.

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 8 of 26

### 3. EIE – Bursting Strength Tester Variant(s)

EIE Manufactures following 4 different kinds of Bursting strength testers as explained below.

Serial No.	Capacity	Model Number
1	Fully automatic Bursting Tester – Capacity 25 kg/cm <sup>2</sup> – (For Corrugated Paper or Corrugated Board Test). Please specify your test application at the time of order so that Bursting strength can be designed as per TAPPI T403 or TAPPI 810 standards.	PT-101SH25 SH = Single Head
2	Fully automatic Bursting Tester – Capacity 50 kg/cm <sup>2</sup> – (For Corrugated Paper or Corrugated Board Test). Please specify your test application at the time of order so that Bursting strength can be designed as per TAPPI T403 or TAPPI 810 standards.	PT-101SH50 SH = Single Head
3	Fully automatic 2-in-1 Bursting Tester – Capacity 25 kg/cm <sup>2</sup> (For Corrugated paper & Corrugated board Test). Bursting tester will be designed complying with both TAPPI T403 & TAPPI T810 Standards. One head will be designed as per T403 Specifications and another head will be designed as per T810 Specifications.	PT-101DH25 DH = Dual Head
4	Fully automatic 2-in-1 Bursting Tester – Capacity 50 kg/cm <sup>2</sup> (For Corrugated paper & Corrugated board Test). Bursting tester will be designed complying with both TAPPI T403 & TAPPI T810 Standards. One head will be designed as per T403 Specifications and another head will be designed as per T810 Specifications.	PT-101DH50 DH = Dual Head

EIE – bursting strength tester is used in conjunction with respective ASTM and TAPPI Standards in research laboratories, Pulp & paper industries, Packaging Industries, Food & beverage industries, Individual Testing Laboratories and other similar places, where Strength of packaging material is critical to determine.

This manual provides important information regarding safety, technical reference and installation requirements, operating conditions, user facility resource requirements, and operating instructions for the Bursting Strength Tester. This manual should also be used in conjunction with applicable published laboratory procedures, ASTM Standard & TAPPI Standards.

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 9 of 26

## 4. 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.

### 4.1 Packing List

- Bursting Strength Machine  $25 \frac{kg}{cm^2}$  Capacity or  $35 \frac{kg}{cm^2}$  or  $50 \frac{kg}{cm^2}$
- C-Shape Spanner to tighten or loosen the lower clamp
- Spare rubber diaphragm
- Standard Aluminium Foil
- Clamp wheel assembly (Factory In-Built)
- Pressure sensor calibration certificate
- Verification certificate of standard aluminium foil
- DQ/IQ/OQ/PQ Documents (Optional – if ordered)
- Instruction manual

### 4.2 Delivery and Uncrating of the Instrument

- 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) 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.

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 10 of 26

### 4.3 Installation Instructions

- 1) Remove packing strip the machine and transit it to a suitable safe place, where it is intended to install.

**Caution: Heavy weight, protect yourself first. Handle with care.**

- 2) Do not install the equipment in a draft, sunlight or near a place of equipment, which emits heat as well as electromagnetic conduction emission.
- 3) Do not install unit in a corrosive environment. A corrosive environment may lead to poor performance and deterioration of unit.
- 4) Allow a minimum 4" clearance on all sides of the instrument for maintenance work.
- 5) Do not stack any items on top of the unit.
- 6) Check the electrical specifications requirement of the instrument and make it available.
- 7) Plug the power cord into a properly grounded outlet.
- 8) Read this instruction manual carefully and abide to its requisites.
- 9) Recycle the packing material.

### 4.4 Safety Instructions

- Anyone working with, on or around this equipment should read this operating manual. Failure to read, understand and follow the instructions given in this documentation may result in the damage to the unit, injury to operating personnel, and/or poor equipment performance.
- Any internal adjustment, modification or maintenance to this equipment must be undertaken only by qualified service personnel.
- The use of any hazardous materials in this equipment must be monitored by an industrial hygienist, safety officer or some other suitably qualified individual. Before the individual process, the operator must thoroughly understand the installation procedures and take note of the environmental and electrical requirements of the equipment.
- In this operating manual, important safety related points will be marked with the symbol. If the equipment is used in a manner not specified by this operating manual, the protection provided by this equipment may be impaired.
- All **EIE** equipment are designed to be operated with the highest level of safety. This standard operating & maintenance manual issues note, caution and warning symbols throughout to draw your attention to provide you the important operational and safety information.

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 11 of 26

#### 4.5 Safety Symbols & Significance



Read and understand all instructions and safety precautions listed in this manual before installing or operating your unit. If you have any questions regarding operation of the unit or instructions in this manual, contact our service department.



Thoroughly understand the safety features and operation of the equipment. This manual will provide operators with safety concerns and general procedures. Be familiar with correct operating principals and use good judgement. Also refer to the appropriate manuals for system component safety instruction manuals.



Obey all national and local electric code requirements.



Dangerous high voltages present. Do not attempt to open the enclosure or gain to areas where you are not instructed to do so. Refer servicing to qualified service personnel only.



Warning about an existing or potential hazard, or a note



Necessity to proceed in a specified way or follow safety measures



Proscription of activities or behaviours specified

#### 5. Component Diagram of EIE – Bursting Strength Tester

Following images represents the 3D Structure View of **EIE-PT-101SH25/EIE-PT-101SH50** BURSTING STRENGTH TESTER:

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 12 of 26

## BURSTING STRENGTH TESTER

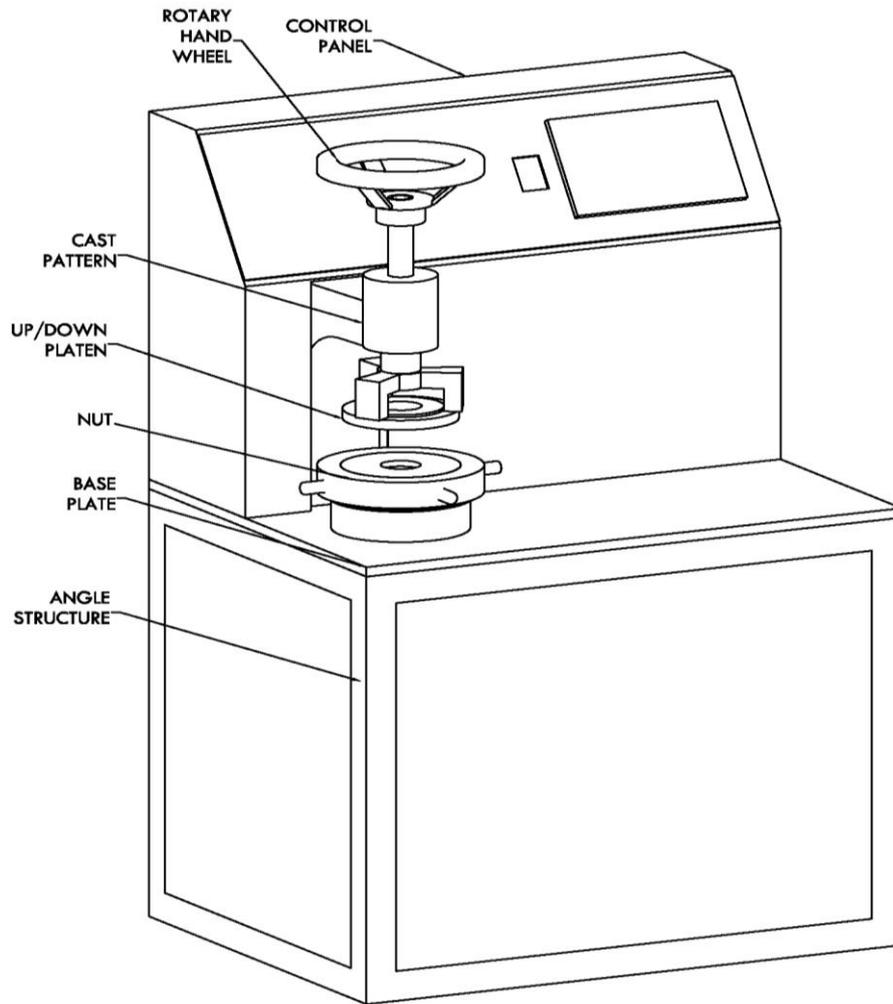


Figure 3: Component diagram

### 6. Brief Construction Details

- 1) **EIE – Bursting strength tester** is especially designed to carry out the test firmly and uniformly securing the test specimen without slippage during the test. The clamp is designed by two annular, grooved, parallel and preferably stainless steel surfaces.
- 2) The upper clamping surface (the clamping ring) has a circular opening  $31.50 \pm 0.03$  mm in diameter. To minimize slippage, the surface which is in contact with the paper during testing has either a continuous spiral or concentric V-grooves in the surface.
- 3) A circular diaphragm of pure gum rubber free of fillers,  $0.85 \pm 0.05$  thick. The diaphragm is clamped between the lower clamping plate and the rest of the apparatus, so that before the diaphragm is stretched by pressure underneath it, the centre of its upper surface is below the plane of the

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 13 of 26

clamping surface. The diaphragm should be inspected frequently for permanent distortion and, if distorted, replace it to maintain accuracy of test result.

- 4) Machine is equipped with Stepper motor with automatic fluid pump.
- 5) Machine is also installed with Digital controller to record Maximum PRESSURE value.

## 7. Technical Specification

### 7.1 TAPPI (T-403) Design Criteria (For Bursting Test)

Attributes	Specifications	
Upper Clamp	<i>Circular Opening</i>	30.50 ± 0.05 mm
	<i>Concentric Grooves</i>	60° V-Groove, 0.25 mm Deep, 0.9 mm apart
	<i>Outer Diameter</i>	At least 48mm. Should not be less than 48 mm
Lower Clamp	<i>Circular Opening</i>	33.10 ± 0.1 mm
	<i>Concentric Grooves</i>	60° V-Groove, 0.30 mm Deep, 0.8 mm apart
	<i>Outer Diameter</i>	At least 48mm. Should not be less than 48 mm
Circular Diaphragm	<i>Material</i>	Synthetic Rubber
	<i>Make</i>	EIE
	<i>Thickness</i>	0.85 ± 0.05 mm
Pressure Transducer	<i>Make</i>	Baumer/Danfoss/Telemecanique (As per customer order)
	<i>Accuracy</i>	± 1% of Measurement
	<i>Range</i>	25 Kg/cm <sup>2</sup> / 35 Kg/cm <sup>2</sup> / 50 Kg/cm <sup>2</sup> (As per customer order)
Recommended Hydraulic Fluid	<i>Fluid</i>	SAE – 140 Gear box oil

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 14 of 26

## 7.2 TAPPI (T-810) Design Criteria (For Corrugated Board Bursting Test)

Attributes	Specifications	
Upper Clamp	<b>Circular Opening</b>	31.50 ± 0.03 mm
	<b>Concentric Grooves</b>	60° V-Groove, 0.25 mm Deep, 0.9 mm apart
	<b>Outer Diameter</b>	Overall outer diameter 95.3 mm
Lower Clamp	<b>Circular Opening</b>	31.50 ± 0.03 mm
	<b>Concentric Grooves</b>	60° V-Groove, 0.25 mm Deep, 0.9 mm apart
	<b>Outer Diameter</b>	Overall outer diameter 95.3 mm
Circular Diaphragm	<b>Material</b>	Pure gum rubber/ Synthetic rubber
	<b>Make</b>	EIE
	<b>Capacity</b>	Should withstand Fluid pressure from 23 – 50 Kg/cm <sup>2</sup>
Pressure Transducer	<b>Make</b>	Baumer/Danfoss / Telemecanique (As per customer order)
	<b>Accuracy</b>	± 1% of Measurement
	<b>Range</b>	25 Kg/cm <sup>2</sup> / 35 Kg/cm <sup>2</sup> / 50 Kg/cm <sup>2</sup> (As per customer order)
Recommended Hydraulic Fluid	<b>Fluid</b>	SAE – 140 Gear box oil

## 7.3 Technical Specifications of Individual Parts/Components

Table 1: Mechanical specifications of bursting strength tester

Mechanical Parameters	Technical Specifications
Type of test	Burst test
Clamp mechanism	Hand wheel – Manual Mechanism
Type of driving mechanism	Electro-Hydraulically operated
Exterior Body	Mild steel material
Paint	Powder coated in attractive shades
Legs	Hard Rubber Legs

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 15 of 26

*Table 2: Electrical specifications of bursting strength tester*

Item	Specifications	
Digital Controller	<i>Make</i>	SWASTIK
	<i>Type</i>	2 – LINE DISPLAY
Pressure Sensor	<i>Make</i>	BAUMER/DANFOSS/Telemecanique (As per customer order)
	<i>Accuracy</i>	± 1% of Measurement
	<i>Range</i>	25 Kg/cm <sup>2</sup> / 35 Kg/cm <sup>2</sup> / 50 Kg/cm <sup>2</sup> (As per customer order)
Diaphragm	<i>Type</i>	Pure Gum Rubber
	<i>Make</i>	EIE
Circuitry Wires	<i>Make</i>	R.R. Cable
Printer (Optional – Can be provided at extra cost)	<i>Type</i>	Dot-Matrix Printer
	<i>Model</i>	M188D
	<i>Column</i>	40 Column (3")
	<i>Make</i>	EPSON TM-U220D
	<i>Serial Interface</i>	RS-232 Serial Port
Mains switch	<i>Size</i>	32 x 24 mm
	<i>Make</i>	Rocker
Motor	<i>Type</i>	Low speed Instant Start-Stop High Torque motor
	<i>Line Amp</i>	450 mA
	<i>RPM</i>	60 RPM @50 Hz
Limit Switch	<i>Make</i>	SALZER

## 8. Preparation of the Test Specimen

- 1) Condition in accordance with TAPPI T 402 "Standard Conditioning and Testing Atmospheres for Paper, Board, Pulp Hand sheets, and Related Products," precondition the test specimens so as to approach the equilibrium moisture content at standard conditions from a drier state and then condition for a minimum of 24 hours.
- 2) If the paper is being tested to evaluate a lot of paper, obtain a sample in accordance with TAPPI T 400 "Sampling and Accepting a Single Lot of Paper, Paperboard, Containerboard, or Related Product." From each test unit take 20 specimens, each at least 62 x 62 mm (2.5 x 2.5 in.). Avoid areas including watermarks, creases, or visible damage. Identify the wire side of the specimens.

## 9. Pre-run Checks

- 1) Ensure proper earthing before switching on.
- 2) Ensure power supply to be 230 V, 50 Hz, Single Phase, AC.
- 3) Also, keep all certificates (**Standard Aluminium Foil Certificate**, **Pressure Transmitter Certificate**) of the equipment within reach before performing the task to cross-verify the yielded results.
- 4) Ensure that the spanner to open or close the Lower Clamp is available, as shown in following picture, to perform the task.

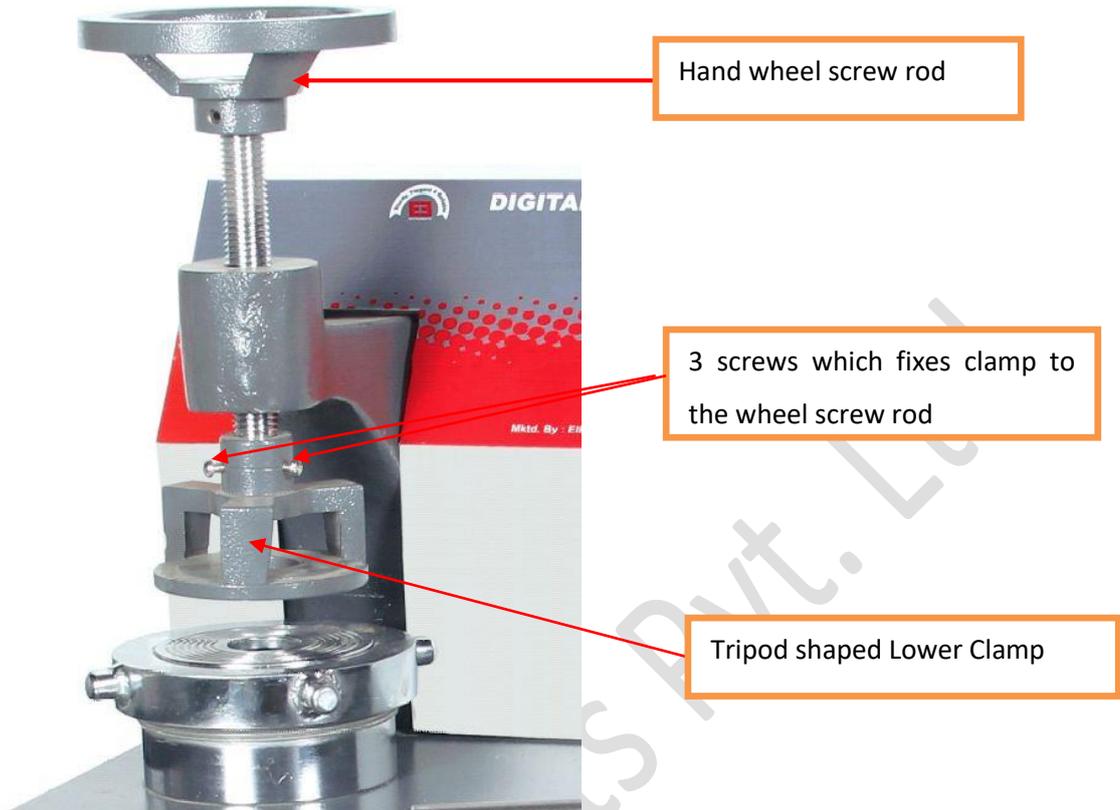


- 5) Ensure that the diaphragm is clamped between the lower clamp and hand wheel assembly, so that before the diaphragm is stretched by pressure underneath it, the Centre of its upper surface is below the plane of the clamping surface.
- 6) Ensure all power switches are easily accessible.

## 10. Procedure to Fix Lower Clamp to the Hand Wheel Screw Rod

- 1) Generally bursting strength tester supplied with Rotating wheel assembly in factory-installed condition. But, by chance, due to any circumstances, if this wheel assembly is not installed or came out from the machine, then follow the following procedure to assemble it.

 EIE INSTRUMENTS PVT. LTD.	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 17 of 26



**Figure 4: Graphical representation of assembling the hand wheel assembly**

- 2) Loosen the 3 screws on all three sides and the clamp & wheel will separate from each other.
- 3) Now, take the wheel screw rod and insert it into the hole of holding mechanism of bursting machine.
- 4) Rotate the wheel screw rod in clockwise direction to lower it down.
- 5) Now, position the tripod shaped lower clamp in its position let the wheel come down further.
- 6) Once, the Wheel screw rod come down, insert it into the whole of clamp assembly and re-tighten the all 3 screws such that, Wheel rod and Clamp assembly stays together.
- 7) This way the clamp is fixed to the wheel rod now.

**Note: Do not over tighten the clamp. The clamp should be fixed to the wheel rod, but should also be free to rotate.**

### 11. Standard Operating Procedure

- 1) First of all, rotate the hand wheel assembly in anti-clockwise direction to open the clamp. Now, place sample between the bottom plate and upper wheel assembly. Rotate the hand wheel assembly in clock-wise direction to close it.

**Note: Do not over tighten. Just apply enough pressure to avoid sample slippage.**

 <p><b>EIE INSTRUMENTS PVT. LTD.</b></p>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 18 of 26

- 2) Turn on the mains switch. The digital controller glows, displaying actual pressure in line 1 and line 2 shows peak value (i.e. 0.00 before starting test as shown in below figure).



**LINE 1** : Displays the actual pressure.

**LINE 2** : Displays the peak value.

**SET** : To enter in Parameter setting window.

**START** : To Start the operation of apparatus while operating test process and also to increase the numeric value as per requirement in setting parameters.

**STOP** : To Stop the operation of apparatus while operating test process and also to decrease the numeric value as per requirement in setting parameters.

**ENT** : To save the entered values of different parameters. It is also used to return back to Home window after setting of different parameters is completed.

**NOTE:** If any error occurs while ongoing test process, press "STOP" to stop the test, after that if user wants to start the test again, press & hold "START" button to start the test.

- 3) Keep an eye on sample surface and see whether it is getting inflated with the influence of underneath PRESSURE DIAPHRAGM or not. Test specimen will be inflated to its maximum limit (Depending on sample property), it will soon lose its resistance and then, it will be burst with excessive pressure.

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 19 of 26

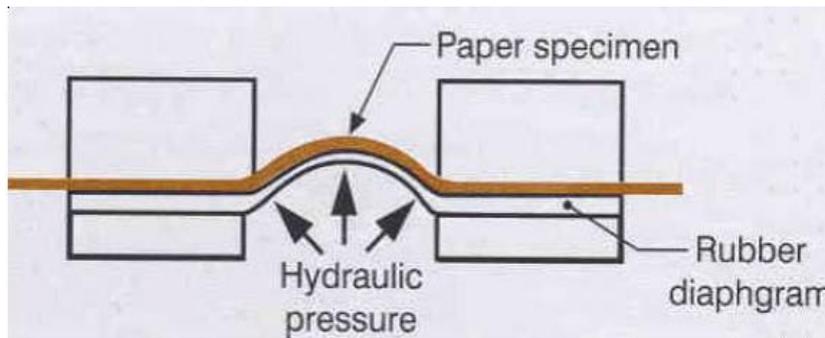
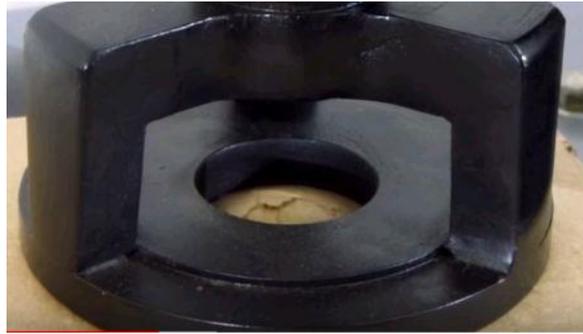


Figure 5: Diaphragm

- 4) Machine will detect this sample failure and electric motor will reverse automatically. Thereby oil flow will be reversed and pressure will be reversed to its initial position  $0 \text{ kg/cm}^2$ .
- 5) If by chance the machine does not stop automatically upon burst, press "STOP" button.
- 6) End of test cycle.
- 7) Open the clamp and remove test sample.
- 8) Now, invert the sample and initiate test on fresh area.
- 9) Make total of 10 burst – 5 on each side of sample.
- 10) Repeat such process for 3-4 times on single sample to make out the average bursting strength value and average bursting factor value.
- 11) To refer previously performed test result press "Enter" button as shown in below figure, displaying peak 1, peak 2, peak 3 peak 4 and peak 5 test results are only saved.



Figure 6: Peak value

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 20 of 26

12) To enter in “SETTING” parameter, press “SET” button and it will prompt to set window as shown in above figure.



Figure 7: Maximum pressure

13) In some cases, such as 7-ply corrugated board, the load increases until pre-defined/Specified Load Limit (force) is reached. In such case, after the defined load limit of 25kg/cm<sup>2</sup> will be reached, machine will stop without bursting the test specimen. An operator should opt for 50kg/cm<sup>2</sup> bursting machine in this type of case.

**NOTE: A USB port is provided on the controller for connecting the USB and data transfer.**

### 11.1 Setting of Auto Trip Value



Figure 8: Trip value

14) Enter “AUTOTRIP VALUE” value in the SETTINGS screen. As shown in above screen, user just need to enter “FALL-BACK PRESSURE/DEAD PRESSURE” to cause the machine to Auto-Reverse as soon as the test sample breaks. User should enter “AUTOTRIP VALUE” in KG/CM<sup>2</sup>, i.e., Generally, the user should enter the “DEAD PRESSURE” value as 1.00kg/cm<sup>2</sup>, which will be common for all the test specimens including papers & corrugated boxes.

*Note: FALL BACK PRESSURE/DEAD PRESSURE is nothing, but the précised indication of smallest decline in the PEAK PRESSURE/BREAK PRESSURE value. We can see the sample burst and can even hear the sound. But the machine cannot hear/see. Hence, it relies on the pressure drop (at bust) to detect failure of sample.*

15) Set the value accordingly, then press “ENTER” button to save the entered value.

16) Setup of “AUTO TRIP VALUE” is completed now.

17) After this, come back to home window, again by pressing “ENTER” button.

**NOTE: Do not change the factory set parameters as it may affect the test result.**

 <p><b>EIE INSTRUMENTS PVT. LTD.</b></p>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 21 of 26

## 12. Calibration Check Procedure with Standard Aluminium Foil (SAF)

- 1) Insert the Standard Aluminium Foil sample between the fixed plate and the clamping plate.
- 2) Rotate the Wheel Clamp clockwise to grip the sample firmly.

**NOTE: The clamping force should not be very high.**

- 3) The clamps should be tight enough to avoid slippage of sample during testing, but at the same time should not crush the foil or cause wrinkles in the central test area.

**NOTE: With practice, you will know how to maintain an optimum pressure.**

- 4) Press & hold "START" button at the same time once. The machine will start pressurizing.
- 5) As soon as the sample bursts, the machine will automatically reverse itself and pressure will drop to zero kg/cm<sup>2</sup> value.
- 6) The peak pressure/Maximum bursting value will be displayed on the controller.
- 7) Now, Rotate Wheel Clamp anti-clockwise to open the clamp.
- 8) Remove the tested sample and insert a new sample.
- 9) Test at least 5 samples in the above manner and record your readings in the table below.

*Table 3: Standard aluminium foil burst test*

Standard Aluminium Foil Burst Test				
Sr. No.	Bursting Strength Deviation		Deviation (B-A)	Remarks
	Actual Readings (A)	Certified Readings (B)		
1				
2				
3				
4				
5				
<b>Average</b>				

If the average of 5 readings falls within the certified range or if the deviation is marginal, you may continue to use the machine. If the average is outside the desired range and the deviation is unacceptable, then RECALIBRATE the entire instrument.

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 22 of 26

### 13. Report

Report the following points in the test report for documentation purpose.

- Bursting values in KG/cm<sup>2</sup>/PSI
- Number of specimens tested
- Minimum/Maximum values of accepted tests
- Deviation in generated results in KG/cm<sup>2</sup>/PSI
- Type of bursting apparatus – Digital Indication or Gauge indication
- Compliance statement including pre-conditioning or that the method was used with certain specific exceptions.

### 14. Direction to Clean the Instrument

- 1) Disconnect from power supply prior to cleaning.
- 2) The wheel assembly and lower clamp of the unit should be periodically wiped out with soft cloth.
- 3) Exterior body of the instrument should be cleaned periodically with mint cream to maintain its finish & shine.
- 4) Wear gloves while cleaning the equipment, so no finger prints can spoil the body of the equipment.
- 5) Never use benzene or paint thinner for cleaning.
- 6) Do not use an abrasive or alkaline solution.

### 15. Precaution to be Observed

- 1) Always disconnect from power supply prior to maintenance & servicing.
- 2) Do not open the lower covers to clean the electrical components until & unless it is too critical. Never disturb the pressure sensor while cleaning the internal circuitry and electrical components, installed beneath the testing platform, otherwise results will be erroneous and the re-calibration of the pressure sensor will be needed.
- 3) Ensure that the specimen is placed centrally on the lower plate. Also, apply enough clamping pressure to ensure that the specimen do not slip during experiment, otherwise *Significant errors may result. Also, extensive damage to the diaphragm may occur, if utmost care is not taken.*
- 4) Samples may never be placed / removed at any instance during the operation.
- 5) Always connect the instrument to 230 volts, 50 Hz, 1-phase, AC supply via UPS of specified ratings.

 EIE INSTRUMENTS PVT. LTD.	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 23 of 26

- 6) To avoid electrical shock, this equipment must always use a properly grounded electrical outlet with the correct voltage and current handling.
- 7) Take all the appropriate safety precautions when using and maintaining this equipment – including wearing appropriate safety apparel and using appropriate tools.
- 8) Use only original replacement parts for properly maintaining the equipment.
- 9) Only qualified and trained personnel should perform all the work as required by the local codes and regulations.
- 10) Never leave the instrument connected to mains after completion of operation.
- 11) 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.
- 12) Disassembly of this equipment is strictly limited to the qualified personnel and licensed engineers only.
- 13) In case of any difficulty, please do not try to repair without consulting the manufacturer, especially when the instrument is under the warranty period.

## 16. Appendix

- **FALL BACK LOAD/DEAD LOAD:** *FALL BACK PRESSURE/DEAD PRESSURE is nothing, but the précised indication of smallest decline in the PEAK PRESSURE/BREAK PRESSURE value. We can see the sample burst and can even hear the sound. But the machine cannot hear/see. Hence, it relies on the pressure drop (at bust) to detect failure of sample.*
- **LOAD LIMIT:** Indicates the maximum capacity of the machine, after which, machine will be stopped automatically.
- **SET PRESSURE:** “SET PRESSURE” is the actual calibrated value for pressure sensor inside the system. “SET PRESSURE” indicates the actual oil pressure available inside the system at that specific instance. Please contact EIE-representative, if this value is disturbed or if your sample readings are coming higher/lower.

 <p><b>EIE INSTRUMENTS PVT. LTD.</b></p>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 24 of 26

# 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.

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 25 of 26

## – End of Document –

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
Paper & Packaging Testing Instruments	Geotextile Testing Instruments
Ceramic Tiles Testing Instruments	ISO 17025 Accredited Calibration Lab

[www.eieinstruments.com](http://www.eieinstruments.com) | [www.eiepharmatest.com](http://www.eiepharmatest.com) | [www.eiepetrotest.com](http://www.eiepetrotest.com) | [www.eieceratest.com](http://www.eieceratest.com)

#### Corporate Office

##### **EIE INSTRUMENTS PVT. LTD.**

A-1301, BVR EK BUILDING, Gujarat College Road,  
Opp. Inder Residency, Ellis bridge, Ahmedabad, Gujarat-380006, India

**Website:** [www.eieinstruments.com](http://www.eieinstruments.com)

**Phone Number:** +91-79-66211234,

**Email Address:** [info@eieinstruments.com](mailto:info@eieinstruments.com)

#### Calibration Laboratory

##### **EIE INSTRUMENTS PVT. LTD.**

Survey No. 1098, Nr. Mahakali Temple, Opp. Primary  
School, Village Kubadthal, Taluka: Daskroi,  
Ahmedabad, Gujarat - 382430, India

**Phone Number:** +91-79-35208300,

**Website:** [www.eieinstruments.com](http://www.eieinstruments.com)

 <b>EIE INSTRUMENTS PVT. LTD.</b>	<b>Operation &amp; Maintenance Instruction Manual</b>	
	<b>Equipment Name:</b> Bursting Strength Tester	<b>Equipment Serial Number:</b>
	<b>Document Number:</b> EIE/OM/BST/01	<b>Page Number:</b> 26 of 26