



SOMEX

Ballyvourney, Macroom,
Co. Cork, Ireland

Phone: + 353 26 65770
Fax: + 353 26 65780
Email: info@somex.ie
Website: www.somexautomation.com

Technical description:

Delta Hi-E Glass Bottle pressure test machine.

1. BASIC MACHINE FUNCTION AND DESCRIPTION:

The Delta Hi-E is designed to pressure test Glass bottles. Typically used in package testing laboratories, bottling plants or at a Glass bottle manufacturing facilities.

The Delta uses precise state of the art measuring and control systems to reflect accurately the actual pressure of glass specimens. Various ramp and dwell profiles can be created and stored in the machine memory. The control system also holds a calibration routine for pressure. This can be used for periodic machine calibration and is easily done by the user.

The Delta Hi-E operates from a standard 7 Bar compressed air connection; it does not require connection to a high-pressure gas bottle or air intensifier.

2. OTHER OPTIONS AVAILABLE

The Delta is available in 3 formats:

Delta 3000:-	for testing both Glass and PET bottles
Delta Hi-E Glass:-	for testing Glass bottles.
Delta Hi-E PET:-	for testing PET bottles.

3. SUMMARY OF TECHNICAL SPECIFICATION:

Accuracy	< 1% Full Scale
Compliance with International Standard ASTM C147	YES, including 1 minute equivalent.
Maximum pressure capacity	65 bar (943 psi) Note: more if required.
Neck clamping system	Yes
Neck sealing	Self compensating
Neck holder	Insert style, no tooling required.
Finish diameter	Up to 36mm - tooling available for larger.
Max bottle height	400mm
Max bottle diameter	180mm
User Interface:	Touch screen
Cavity correlation	Yes (numeric, automatic or programmable).
Language selection	Yes (to be specified prior to ordering)
Diagnostics	Yes
Remote troubleshooting	Yes (local PC requires internet connection)
Calibration	Built in sequence for user to calibrate.

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Wash down after test	Yes, user selectable
Auto door opening.	Yes – user selectable
Single cullet collector	Yes
Stainless Steel Stand	Yes

4: COMPLIANCE OF DELTA Hi-E WITH REQUIREMENTS OF TEST STANDARD:

The standards most commonly used for performing Glass burst tests are:

Glass

ASTM Standard C147-86 (Internal Pressure Resistance (Hydrostatic): Glass)

The Delta Hi-E complies with all requirements of this standard.

5. THE DELTA CONSISTS OF:

5.1 Cabinet:

The machine is constructed from an heavy duty aluminium frame which supports a stainless steel burst chamber, the electrical and pneumatic components are located on a Stainless Steel frame within the enclosure. The uniquely designed hinged door incorporates a bin which can easily be removed for safe disposal of broken glass. The bin can hold cullet of up to 60 bottles.

The cabinet is supplied with a removable base frame for ease of transport.

5.2 Electrical, Mechanical & Pneumatic Components:

All wiring terminals are tagged and all electrical cables and pneumatic hoses are tagged at either end.

All electrical, mechanical and pneumatic components are sourced from industry proven leading brands.

5.3. Pressure Testing and Control System consists of:

Pressure of the test specimen is measured using an industrial grade pressure transducer with an accuracy of +/- 1% of full scale.

A proportional valve continuously monitors the actual vs. the set pressure.

Leaks at the seal between the bottle and the pressure head are prevented by using pressure multiplication this also ensures excessive stresses are not applied to the neck of the bottle.

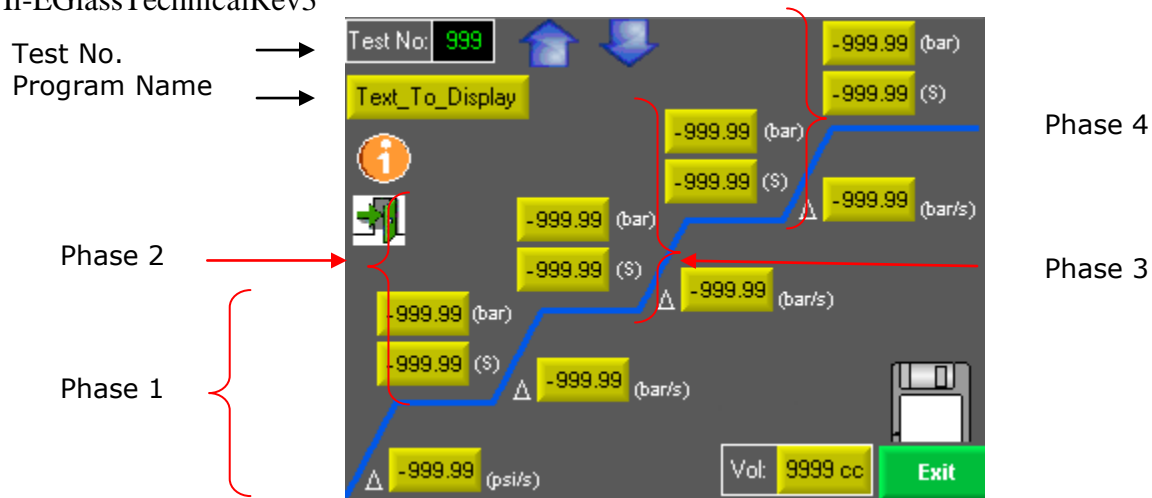
Automatic pre filling of the test specimen with water.

A flow sensor to ensure all air bubbles have been removed from the test circuit prior to pressurization.

5.4 Operator Interface:

A *touch screen* operator interface that is intuitive and easily understood, with the use of symbols rather than text where possible.

Text on Touch Screen can be translated to user language.



6. OPERATION/TEST CYCLE:

6.1 Operation:

An empty glass bottle is loaded by hand into the self-centring neck holder by hand. The interlocked safety door is closed. Using the operator interface load the required recipe. Press start.

6.2 Test Cycle:

The bottle fills to a point where no more air bubbles remain in the circuit. The circuit is sealed and the pressure ramps up to the parameters set in the profile. The pressure is continuously monitored to ensure minimal deviation between the actual and the set pressure.

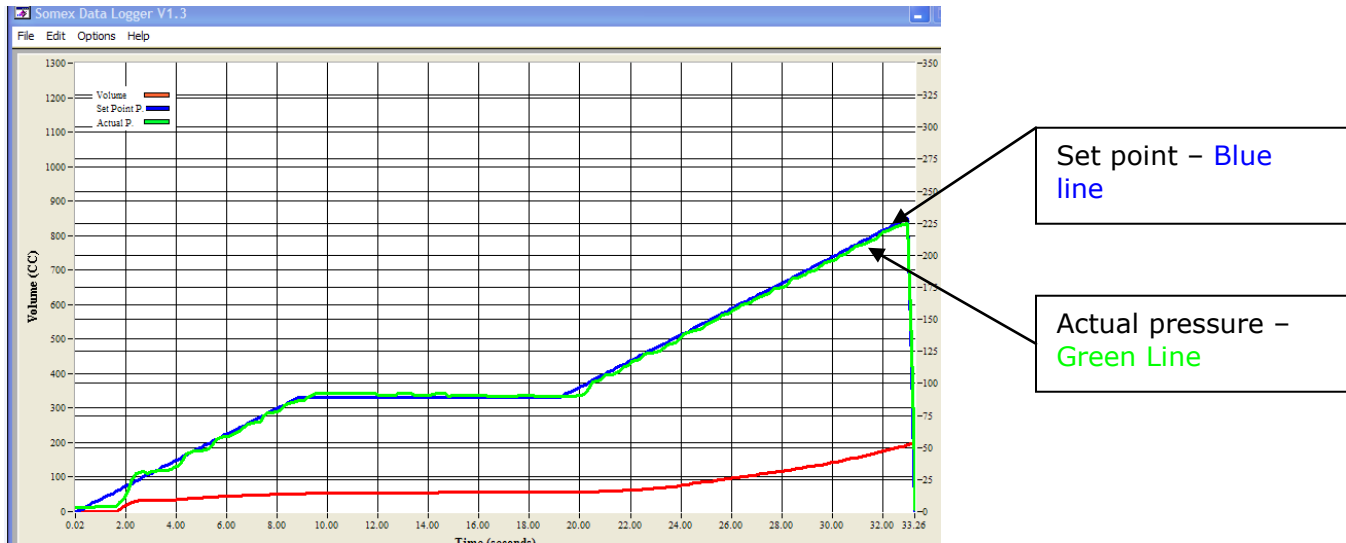
6.3 Results

A graph of actual and programmed pressure is displayed on the operator screen as the test proceeds, the current and previous 10 tests are stored in the machine memory, results are also downloaded to a local PC in .csv and .txt format. Results can also be downloaded using Somex proprietary Data Logging software.

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Serial No	Cavity Number	Date	Time	Volume(CC)	Expansion (%)	Max Pressure	Burst Pressure
3	20	30/08/2010	10:48:26	500 61.25	216.97 215.74	288.21 296.38	126
4	24	30/08/2010	10:58:26	2000 48.35	276 266.01	1287.6 1281.3	127

Somex pressure & volume performance graph



Upon completion of the test.

The neck seal will release and flush to remove any debris at the neck seal, which may have resulted from a fail.

The specimen or remains of, will automatically release from the neck grip, (this feature can be turned on/off)

Automatic flush down neck grip area to remove any shards, (this feature can be turned on/off)

7. OFFSET

For certain tests on Glass Bottles, it may be desirable to accelerate the time taken for a test.

This is achieved, for example, as described in ASTM standard C147-86 section 8.1.5

For example, using the values described in ASTM C147-86 as an example:

$$A = 1.38$$

$$B = 25.9$$

$$\text{Actual Pressure} = (\text{Offset Pressure} \times A) + B$$

$$\text{Actual Pressure} = (\text{Offset Pressure} \times 1.38) + 25.9$$

Example when Offset is "On",

A Burst Pressure of 250 psi - this means the Actual Pressure exerted on the bottle at the moment of burst was 370.9 psi.

8. SAFETY CIRCUIT:

There are several features to ensure access is denied to a specimen under pressure.

The pressure chamber is vented to ensure quick release of residual pressure from a failed bottle.

The neck seal is interlocked, once engaged with a bottle to create a sealed circuit the chamber door cannot be opened.

The door is double interlocked to ensure the cycle cannot begin with the door in the open position.

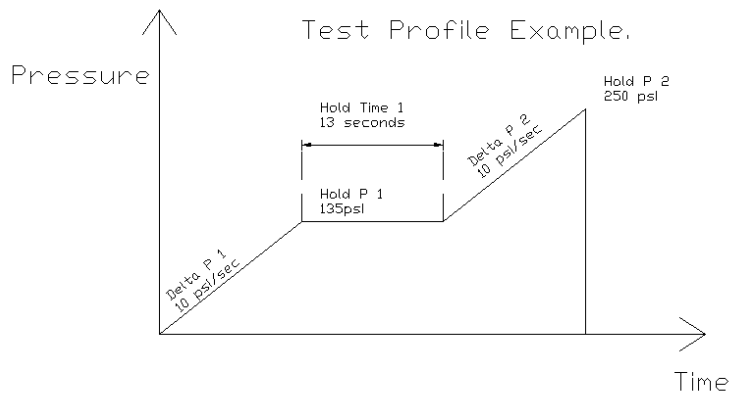
The double interlock also ensures the latch on the door is not released until the pressure head is in 'home' position.

9. UNIQUE FEATURES:

- Used for both Glass and PET bottles.
- Operates from a standard 7 Bar compressed air connection, it does not require connection to a high pressure gas bottle or air intensifier.
- Self compensating neck seal.

10. ACCURACY:

A typical pressure profile consists of RAMP (Bar/sec), PRESSURE SET POINT (Bar), HOLD (sec.) – repeat. Close monitoring by the control system ensures the actual pressure follows the set pressure profile. The controller will not progress to the next set point until the previous set point has been reached.



Note: it is important feature of pressure testing equipment to ensure the PRESSURE SET POINTS are being reached before beginning HOLD or moving to the next phase.

Installation requirements:

Dimensions:	770 x 670 x 1750 mm
Net Weight:	220 Kg's
Compressed Air:	7.0 – 9.0 Bar, flow rate 500L/min, 12mm hose connection
Electrical Power supply:	<5A, 110V (60Hz) or 230V (50Hz)
Water Supply:	2.5 – 4.5 Bar Treated water, (Hardness < 250ppm calcium carbonate)
Waste water outlet:	1 ¼"