Industrial Training Report

A Report

Submitted to the Raýasthan Technical University

in partial fulfillment of requirements for the award of degree

Bachelor of Technology

in

Mechanical Engineering

by

Praveen Banjara

19ETCME008

DEPARTMENT OF MECHANICAL ENGINEERING

TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY

UDAIPUR, RAJASTHAN

April 2023

DEPARTMENT OF ELECTRICAL ENGINEERING

TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY UDAIPUR,

RAJASTHAN

2021 - 22

CERTIFICATE

This is to certify that the report entitled **Industrial Training** sub- mitted by **Praveen Banjara** (19etcme008), to Department of Mechanical Engineering in partial fulfillment of the B.Tech. Degree in **Mechanical Engineering** is a bonafide record of the seminar work carried out by him under our guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

Mr. Abhishek Sharma
Coordinator
Dept.of ME
Techno India NJR Institute
Of Technology
Udaipur, Rajasthan

CERTIFICATE

Yadav Measurements Pvt Ltd
yadav.measurements@yadavmeasurements.com | www.yadavmeasurements.com

Yadav Measurements

Date: 22nd October 2022

Name: Praveen Banjara

Address: Vill- Khempur, Fatehnagar

Teh.- Mavli, Udaipur (Raj.)-313203

Mob No.: 7976977768

Dear Praveen,

Based on our discussion and your skill set it is our pleasure to offer you the opportunity with our company as Management Intern w.e.f. from 01 Navember 2022 to 30th April 2023. During this period, you will be designated as "Management Intern". You will be posted at

Yadav Measurements Private Limited
Plot No. F- 373-375,
RIICO Bhamashah Industrial Area,
Kaladwas, Udaipur, Rajasthan – 313003

You will be paid Rs. 10,000/- (Rupees Ten thousand only) as stipend during this period. Over and above this, you will be entitled to reimbursement for expenses incurred by you on outstation travel, boarding and lodging whenever the project work assigned to you entails travel, boarding and lodging as per company rules.

Upon successful completion of your training, you will be issued a certificate. You will be required to submit a copy of the detailed report before completion of your training.

Your training period with our Company will entail dealing with important and sensitive information, records and such other matters of the company. You will, therefore, be required to sign a "non-disclosure and restricted use agreement" of our company on the first day of training.

Kindly sign the copy of this letter indicating your acceptance of the above terms and conditions of this offer and return the same to us.

Best Regards,

For Yadav Measurements Private Limited

Authorized Signatory

DECLARATION

I **Praveen Banjara** hereby declare that the report **Industrial Training** submitted for partial fulfillment of the requirements for the award of degree of Bachelor of Technology of the Rajasthan Technical University, Kota, Rajasthan is a bonafide work done by me under supervision of Mr. Abhishek Sharma

This submission represents my ideas in my own words and where ideas or words of others have been included; I have adequately and accurately cited and referenced the original sources.

I also declare that I have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in my submission. I understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not been previously formed the basis for the award of any degree, diploma or similar title of any other University.

Praveen Banjara

Udaipur

17-03-2023

Abstract

Industrial training is an important phase of a student life. A well planned, properly executed and evaluated industrial training helps a lot in developing a professional attitude. It develops an awareness of industrial approach to problem solving, based on a broad understanding of process and mode of operation of organization. The aim and motivation of this industrial training is to receive discipline, skills, teamwork and technical knowledge through a proper training environment, which will help me, as a student in the field of Information Technology, to develop a responsiveness of the self-disciplinary nature of problems in information and communication technology, I converted the company's standard procedure of testing and calibration into simple procedure during six months of training

Acknowledgement

I take this opportunity to express my deepest sense of gratitude and sincere thanks to everyone who helped me to complete this work successfully. I express my sincere thanks to **Mr. Abhishek Sharma**, coordinator of Department, Mechanical Engineering, Techno India NJR Institute of Technology Udaipur for providing me with all the necessary facilities and support.

I would like to express my sincere gratitude to **Ms. Nisha Patel,** department of Mechanical Engineering, Techno India NJR Institute of Technology, Udaipur for their support and co-operation.

I am obliged to the staff members of the YMPL **Mr. Anil Jain**, **Mr. Sandeep Jain**, **Mr. Dinesh Kumar Mewara**, and **Mr. Pankaj Kumawat** for the valuable information provided by them in their respective fields. I am grateful for their corporation provided by them during my training period.

I am thankful to the almighty and my parents for their moral support and my friends with whom I shared my day-to-day experience and received lots of suggestions that improved my quality of work.

Praveen Banjara

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Chapter 1

INTRODUCTION OF COMPANY:

Yadav Measurements is a trusted brand in the electrical testing and electro-technical calibration field. Our portfolio of services is offered both on-site and off-site and has been providing economically viable solutions whilst maintaining the highest standards of measurements and testing since 2004.

World class facilities, experienced manpower and competent processes help the laboratory maintain high quality standards and valid traceability. Our reliable and efficient capabilities have enabled YMPL to achieve national and international accreditations and recognitions, including:

- National Accreditation Board for Testing and Calibration Laboratories (NABL)
- United Kingdom Accreditation Services (the first in India)
- Bureau of Indian Standards (BIS)

Our NABL & UKAS accredited laboratory, specializes in electro technical calibration and electrical testing. World class facilities experienced manpower and competent processes support us to maintain high calibration standards and valid traceability. Our extensive use of IT facilitates an efficient and cost effective service, whilst maintaining the highest standards of measurements and testing.

Yadav measurements is a one stop NABL, UKAS accredited and BIS recognized testing laboratory for testing energy meters as per national and international

Chapter 2

Scope

This European Standard specifies the requirements and tests for the construction, performance, safety and production of class 1,5 diaphragm gas meters (referred to as meters). This applies to meters with co-axial single pipe, or two pipe connections, that are used to measure volumes of fuel gases, which are within the limits of test gases of the 1st, 2nd and 3rd families described in EN 437. The meters have maximum working pressures not exceeding 0,5 bar and maximum actual flow rates not exceeding 160 m3h−1 over a minimum ambient temperature range of −10 °C to 40 °C and a gas temperature range as specified by the manufacturer with a minimum range of 40 K.

This standard applies to meters with and without built-in temperature conversion that are installed in locations with vibration and shocks of low significance (see MID Annex 1 Chapter 1.3.2 (a), class M1). It also applies to meters in:

Closed locations (indoor or outdoor with protection as specified by the manufacturer) both with condensing humidity, and with non-condensing humidity;

Or, if specified by the manufacturer:

Open locations (outdoor without any covering) both with condensing humidity and with non- condensing humidity;

In locations with electromagnetic disturbances corresponding to those likely to be found in residential, commercial and light industrial buildings (see MID Annex 1 Chapter 1.3.3 (a), class E1).

Unless otherwise stated, all pressures given in this document are gauge pressure.

Requirements for electronic indexes, batteries, valves incorporated in the meter and other additional functionalities are given in EN 16314.

Unless otherwise stated in a particular test, the tests are carried out on meters that

Include additional functionality devices intended by the manufacturer.
Clauses 1 to 9 and Annexes B and C are for design and type testing only.
The content of OIML Publication 'International Recommendation R 137' has been taken into account in the drafting of this standard.

If no specific requirements are given for test equipment, the instruments used should be traceable to a national or international reference standard and the uncertainty (2σ) should be better than 1/5 of the maximum value of the parameter to be tested. For differential results the repeatability (2σ)/resolution should be better than 1/5 of the maximum value of the parameter to be tested.

Chapter 3

GAS METER LAB

Testing and Calibration –

3. Error of indication 5.1.2 a test on inotech bench – operator and supervisor

3.1 Errors of indication

Requirements

When tested by the method given in 5.1.2 a) the individual errors of indication of the meter shall be within the initial permissible error (MPE-Initial) limits specified in **Table 2.**

Table 2 — Maximum permissible errors

Flow rate m3h−1	Maximum permissible errors	
	Initial	Subsequent
Qmin ≤ Q < Qt	±3 %	±6 %
Qt ≤ Q ≤ Qmax	±1,5 %	±3 %

The meter, including any additional functionality devices intended by the manufacturer, shall have the error adjusted as close to zero as the adjustments allow, without systematically favoring any party.

After the meter has been subjected to other influences, given in the individual clauses of this standard, the average of the errors of indication of the meter shall either:

Not vary from the average of the initial errors of indication by more than that allowed by those clauses or;

Be within the error limits specified within those clauses;

Whichever is applicable, when tested by the methods given in 5.1.2 b), 5.1.2 c or 5.1.2 d).

3.2. Test procedure — Errors of indication

[3.2.1]

Thermally stabilize the meter to be tested for a minimum of 4 h at the temperature of the test laboratory and carry out the error of indication test using air at laboratory temperature.

Immediately before commencing the test, pass a quantity of air equal to at least 50 cyclic volumes of the meter under test, through the meter under test at a flow rate of Qmax.

Carry out this test six times at each of the flow rates Qmin, 3 Qmin, 0,1 Qmax, 0,2 Qmax, 0,4 Qmax, 0,7 Qmax and Qmax, ensuring that the flow rates between each individual test are different (i.e. it is not permissible to carry out consecutive tests at the same flow rate).

Pass a volume of air, the actual volume of which is measured by a traceable standard, through the meter under test and note the volume indicated by the meter index. The minimum volume of air to be passed through the meter under test is specified by the manufacturer and agreed with the accredited test house.

Calculate the six errors of indication at each of the flow rates using the equation given in 3.1.9. Calculate the mean of each of the six errors of indication and record the results as the meter error curve

[3.2.2]

Thermally stabilize the meter to be tested for a minimum of 4 h at the temperature of the test laboratory and carry out the error of indication test using air at laboratory temperature.

Pass a volume of air, the actual volume of which is measured by a traceable standard, through the meter under test and note the volume indicated by the meter index. The minimum volume of air to be passed through the meter under test is specified by the manufacturer and agreed with the accredited test house.

Carry out this test three times at each of the flow rates Qmin, 3 Qmin, 0,1 Qmax, 0,2

Qmax, 0,4 Qmax, 0,7 Qmax and Qmax; ensure that the flow rates between each individual test are different (i.e. it is not permissible to carry out consecutive tests at the same flow rate).

Calculate the three errors of indication at each of the flow rates using the equation given in 3.1.9. Calculate the mean of the three errors of indication and record the results as the meter error curve.

[3.2.3]

Thermally stabilize the meter to be tested for a minimum of 4 h to the temperature of the test laboratory and carry out the error of indication test using air at laboratory temperature.

Pass a volume of air, the actual volume of which is measured by a traceable standard, through the meter under test and note the volume indicated by the meter index. The minimum volume of air to be passed through the meter under test is specified by the manufacturer and agreed with the accredited test house.

Carry out this test three times at each of the flow rates 0, 1 Qmax, 0,4 Qmax and Qmax, ensuring that the flow rates between each individual test are different (i.e. it is not permissible to carry out consecutive tests at the same flow rate).

Calculate the three errors of indication at each of the flow rates using the equation given in 3.1.9. Calculate the mean of the three errors of indication and record the results as the meter error curve.

[3.2.4]

Thermally stabilize the meter to be tested for a minimum of 4 h to the temperature of the test laboratory and carry out the error of indication test using air at laboratory temperature.

Pass a volume of air, the actual volume of which is measured by a traceable standard, through the meter under test and note the volume indicated by the meter index. The minimum volume of air to be passed through the meter under test is specified by the manufacturer and agreed with the accredited test house.

Carry out this test three times at each of the flow rates Qmin, 0,1 Qmax, 0,4 Qmax and Qmax, ensuring that the flow rates between each individual test are different (i.e. it is not permissible to carry out consecutive tests at the same flow rate).

Calculate the three errors of indication at each of the flow rates using the equation given in 3.1.9. Calculate the mean of the three errors of indication and record the results as the meter error.

4. Errors of Indication as per Clause 5.1.2 (a) of EN 1359:2017 / BS EN 1359:2017 amend 0

Note: For Respective volume supervisor will update program

4.1 Instrument:-

1. Connector
2. Soap Spray bottle
3. Teflon

Note: For Respective volume supervisor will update program

4.2. Power ON Sonic Nozzles Gas Meter Test Bench by Auxiliary power supply. Push main switch and MCB

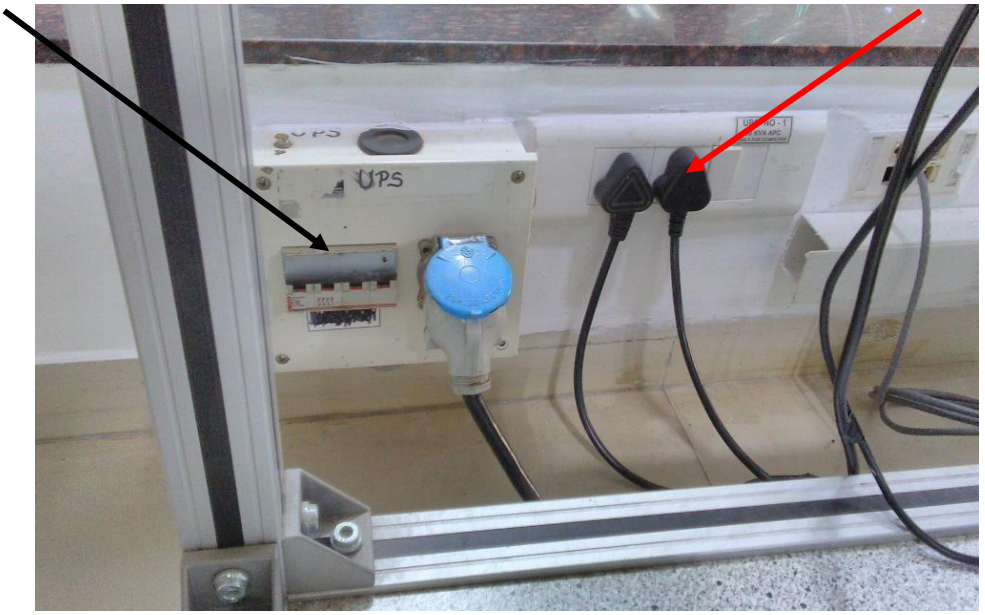

Figure 4.2: Inotch bench on

Turn on both the green switches, then the green light will be indicated, this will start the bench

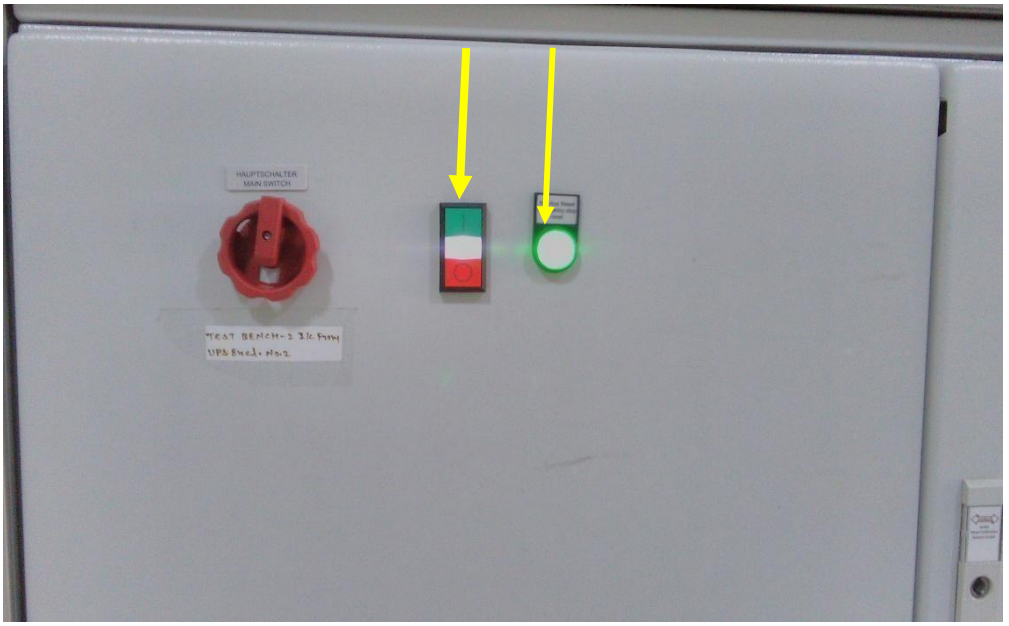

Figure 4.2: Inotech bench on

4.3. Laboratory temperature set at 20°C

Figure 4.3: Temperature

Before starting the bench checks the inlet pressure (4-5 bar) which goes to bench FRL unit {filter (F), regulator (R), and a lubricator (L)}. Ensure that FRL unit having no moisture, if available then clean it (loss it for clean and again tight it) and then start the work (this is to follow before start the bench). (Rotted the clock vice to increases pressure and anti clock vice decreases the pressure)

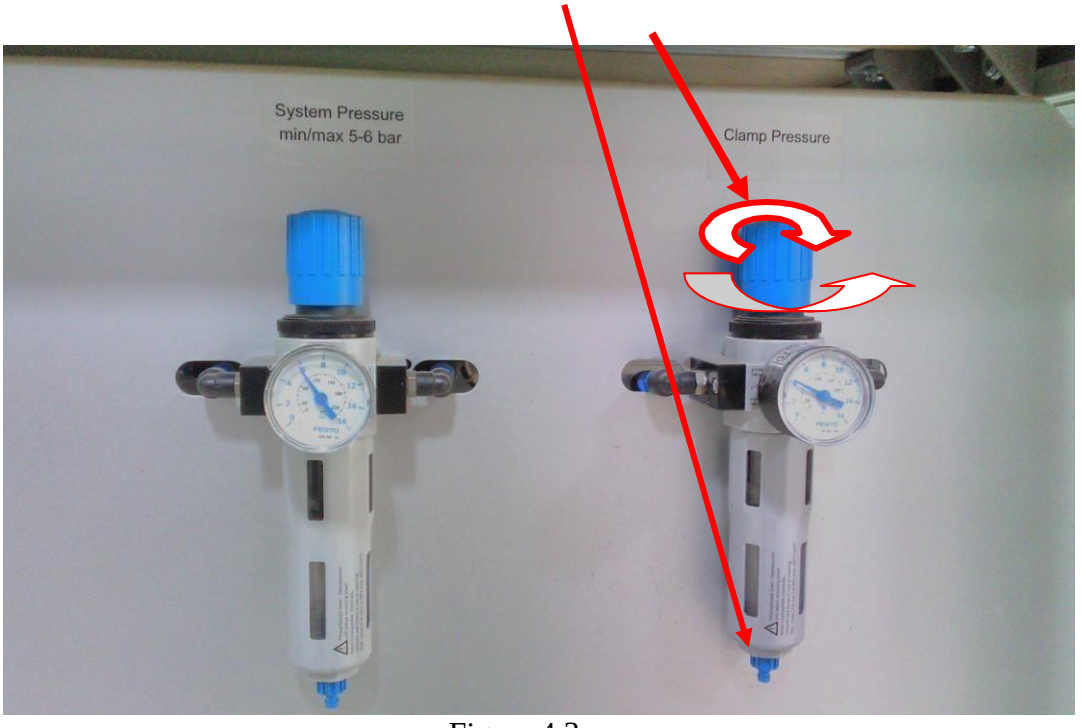

Figure 4.3: pressure

The Sonic Nozzles Gas Meter Test Bench along with its rack should be thermally stabilized between (20±1°C) before start of test.

4.4. The gas meter's match diameter connector is to be fitted on the bench. , the connector of different diameter is not to be fitted, and in this way we fit the connector on the bench.

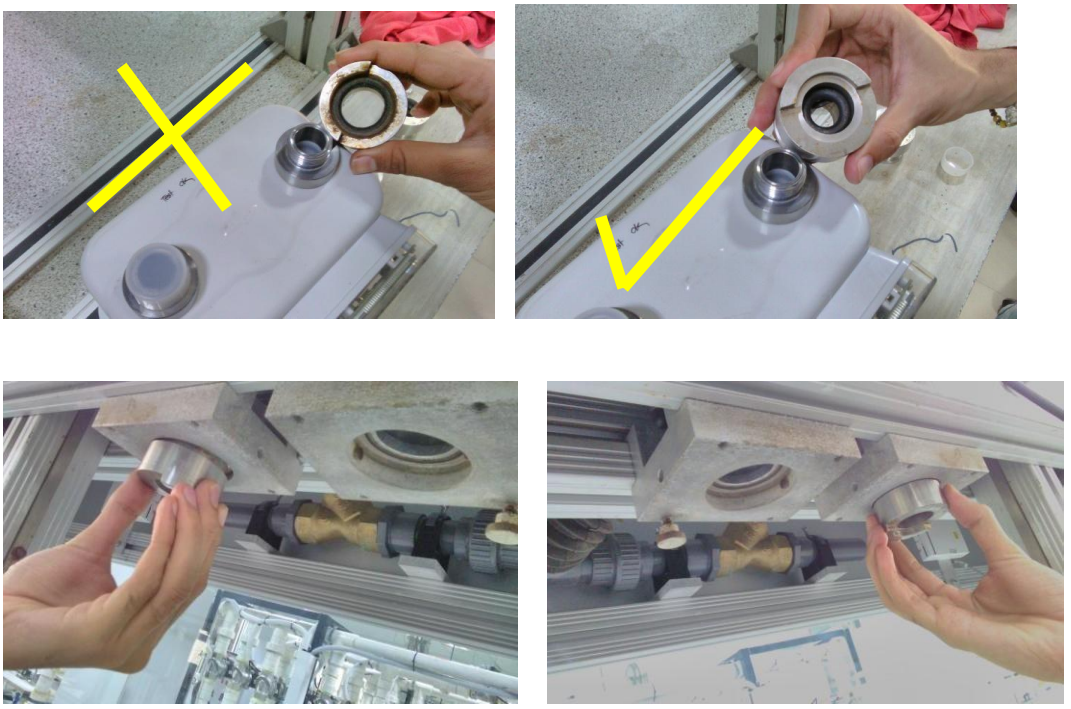

Figure 4.4: Connector and meter fitting

Fit the meter on the bench in this way, while fitting the meter; take care of the fingers that they do not come under the meter.

Figure 4.4: meter fitting

All meters under test should be placed in 20±0.5°C for pre environmental conditioning. The inlet & outlet of gas meters are connected with the air tight connector of test bench. For this 3 push buttons are provided at each of the meter position. Push all 3 buttons together for externally tight the meter (it up lift the meter) & Push 2 buttons are together for release the meters from rack.

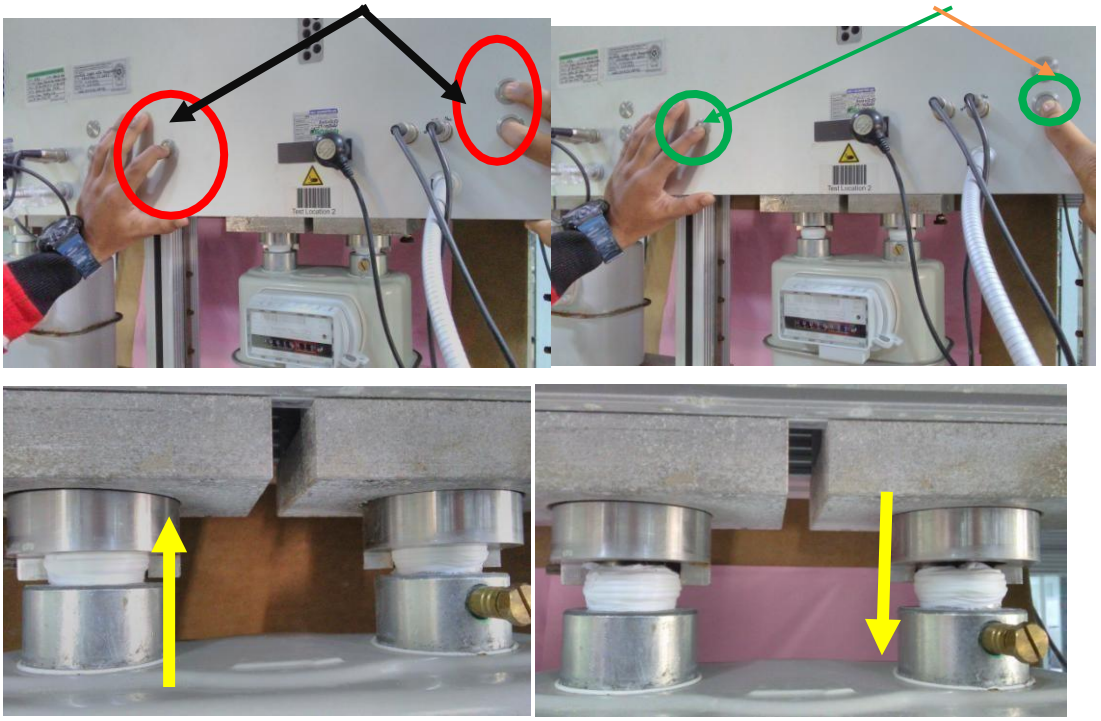

Figure 4.4: Connector

Connect the meter at the test bench at meter position. Ensure that all meter position should be full with meter & no meter position will empty as flow of line is common.

Figure 4.4: meter fitting Connector

If EUC quantity is less than test bench position, meters are for test then fill other position with dummy meter with suitable Qmax gas meters.

4.5. First click the software ‘PS8_editor’ and login as operator the software

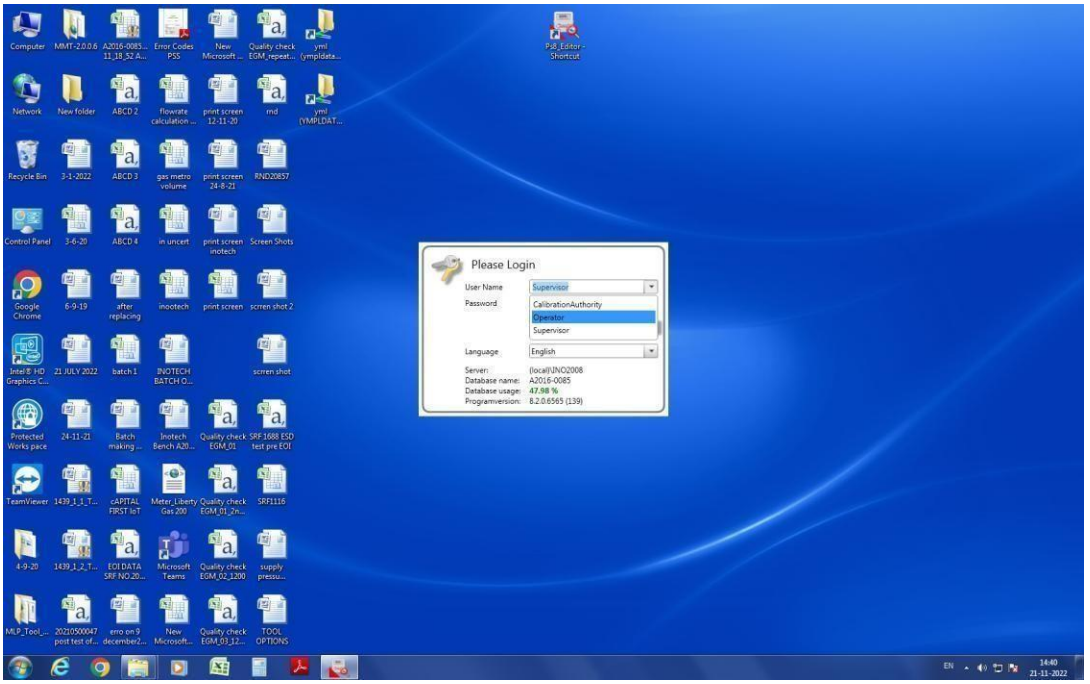

Figure 4.5: Software ‘PS8_editor login

The select testing in software. And choose "Select Order"

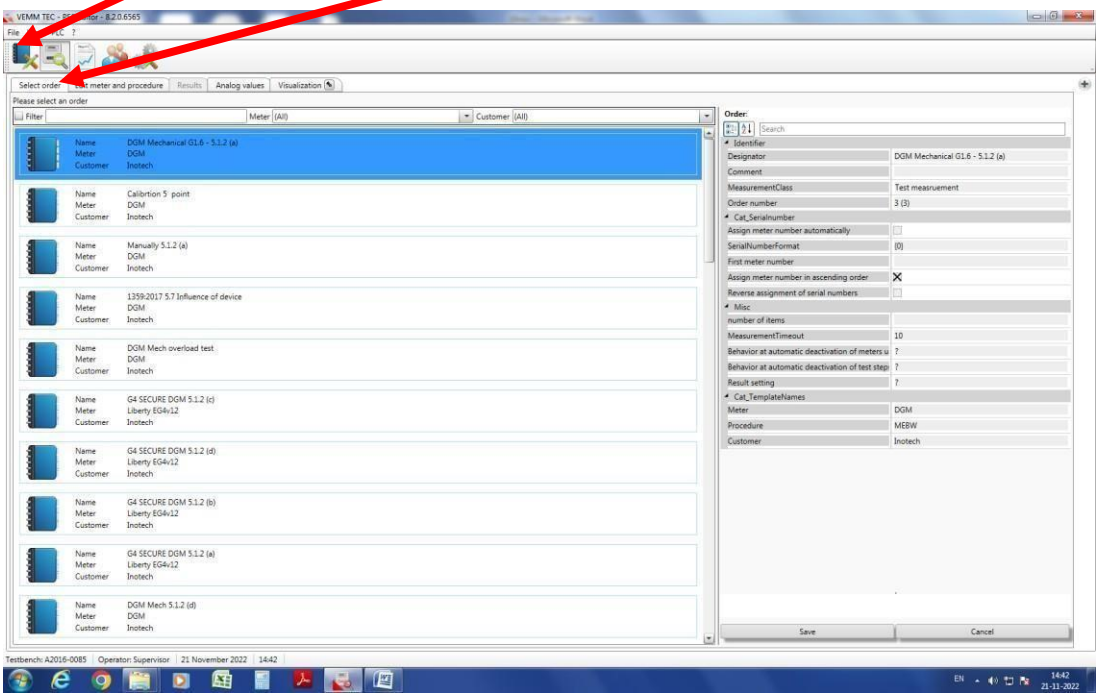

Figure 4.5: Software ‘PS8_editor login

4.6. Select appropriate batch, according to meter type.G1.6 = DGM mechanical G1.6-5.1.2(a)

G2.5 = DGM mechanical G2.5-5.1.2 (a)

G4 = DGM mechanical G4-5.1.2 (a)

G6 = DGM mechanical G6-5.1.2 (a)

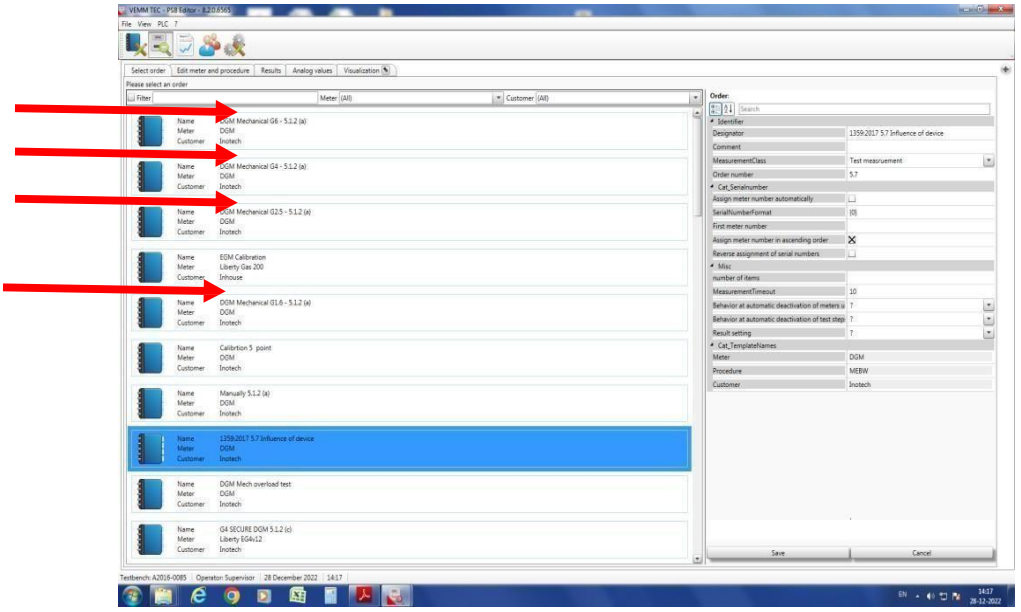

Figure 4.6: Select appropriate batch

Before the start the error test recheck the lab and sonic Nozzle temperature (20±1°C),click the visualization and all 4 point temperature (20±1°C) maintain,

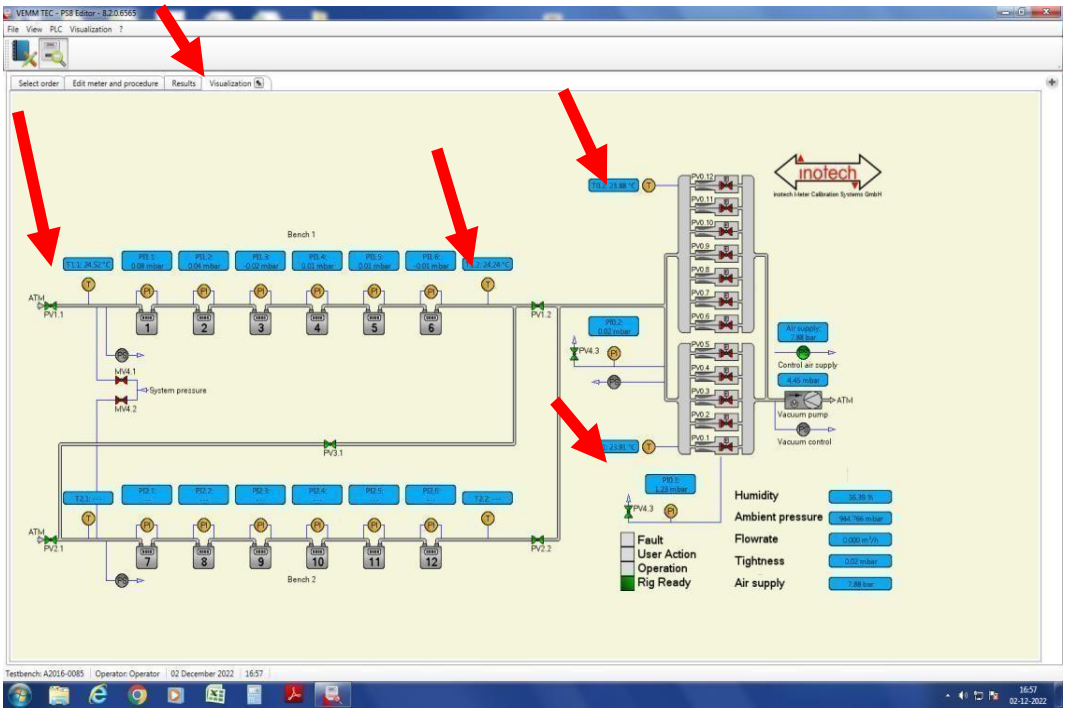

Figure 4.6: Select appropriate batch

4.7. Select “start order” by Right click.

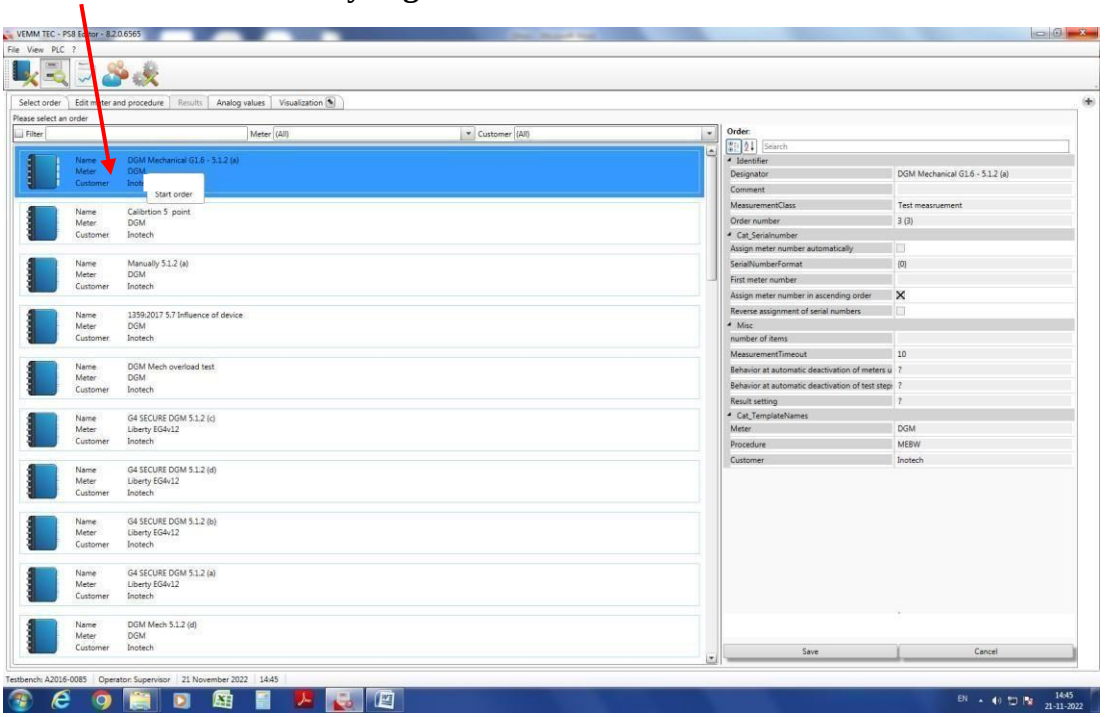

Figure 4.7: Starts check connection tart order

. Shows connecting in events windows.

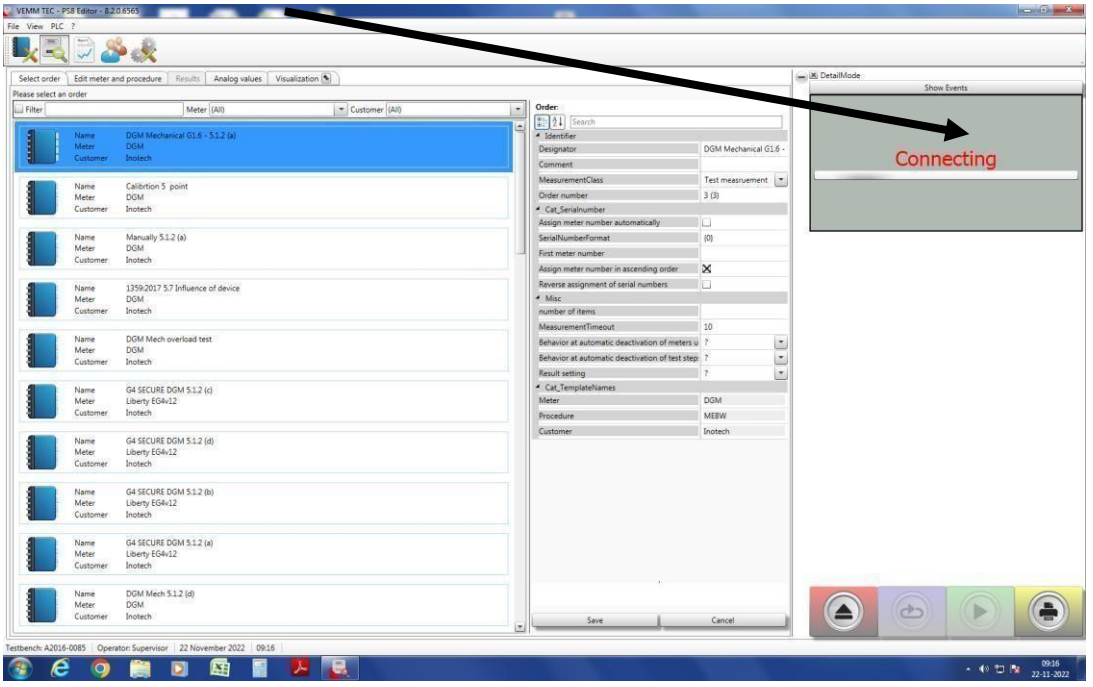

Figure 4.7: Starts check connection tart order

4.8. It starts check connection

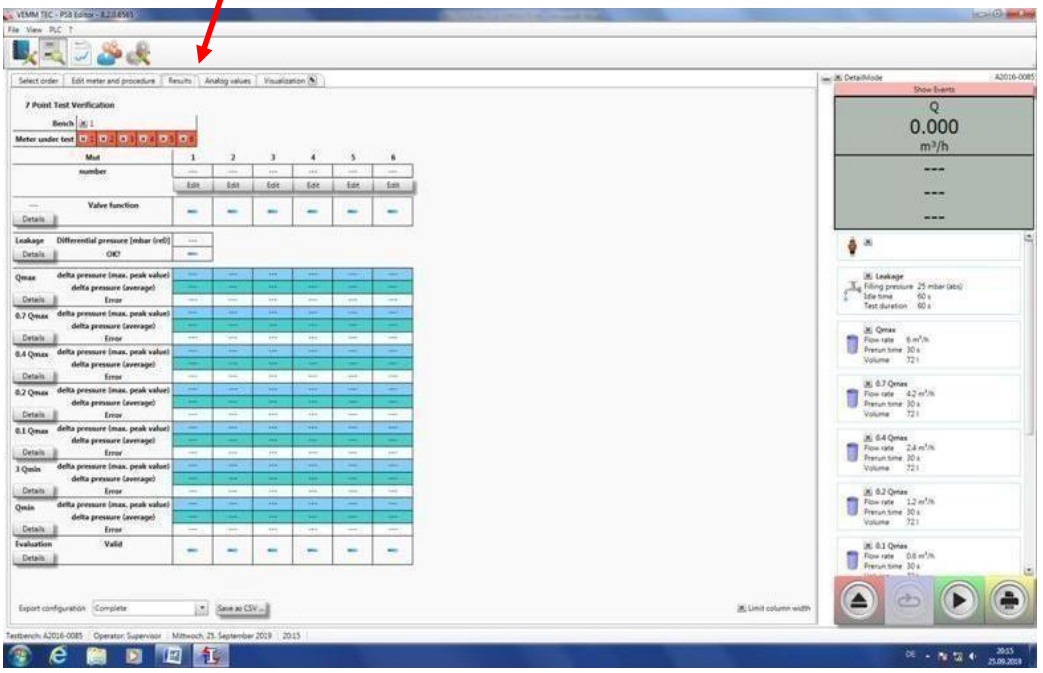

Figure 4.8: Starts check connection

4.9. Select position “Meter under test” by cross ×in blocks

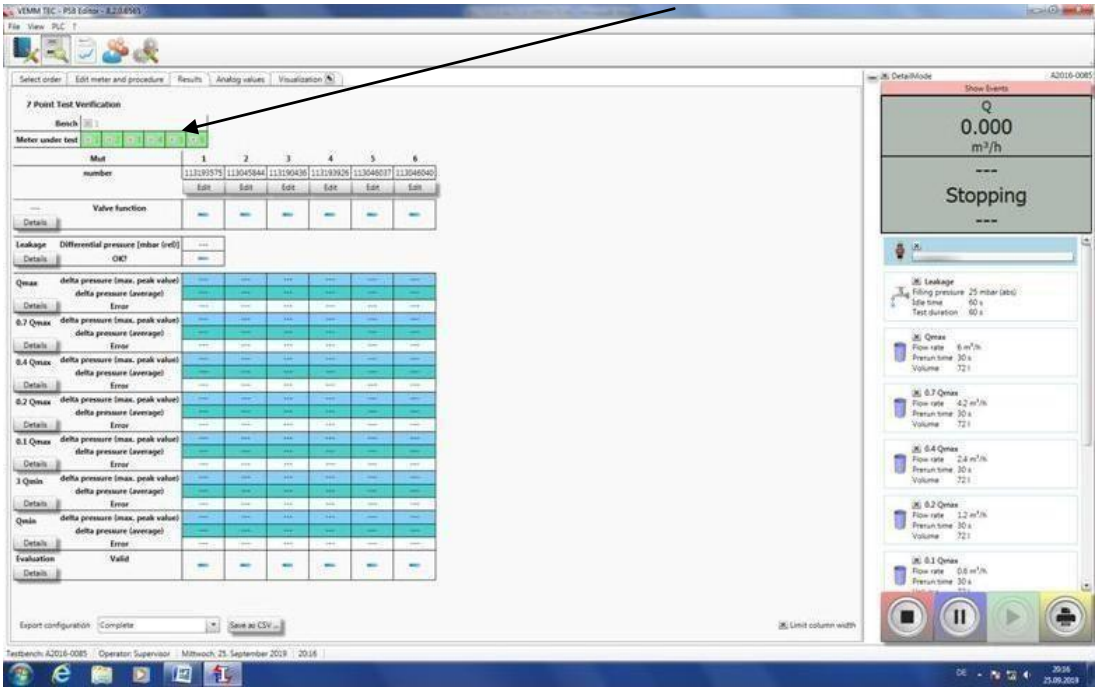

Figure 4.9: Select position “Meter under test”

4.10. Start the test it will start with “Running leaktest”.

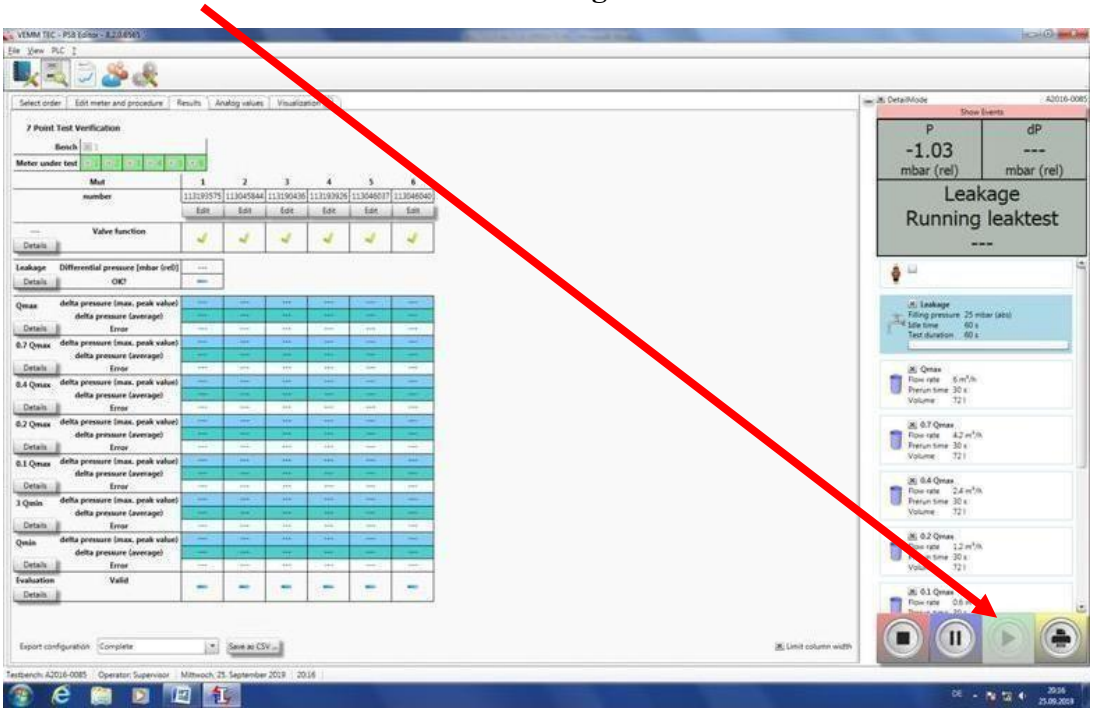

Figure 4.10: start the test

4.11. In leakage test first air is filling in meters.

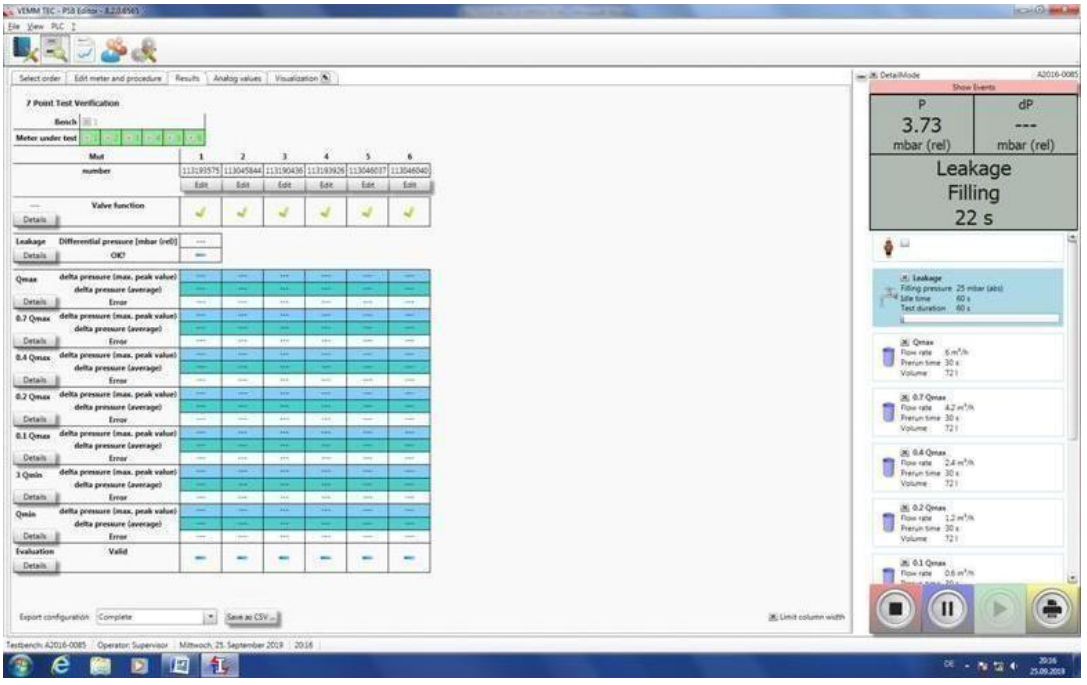

Figure 4.11: leakage test

4.12. Then this air is stabilized in path of meters.

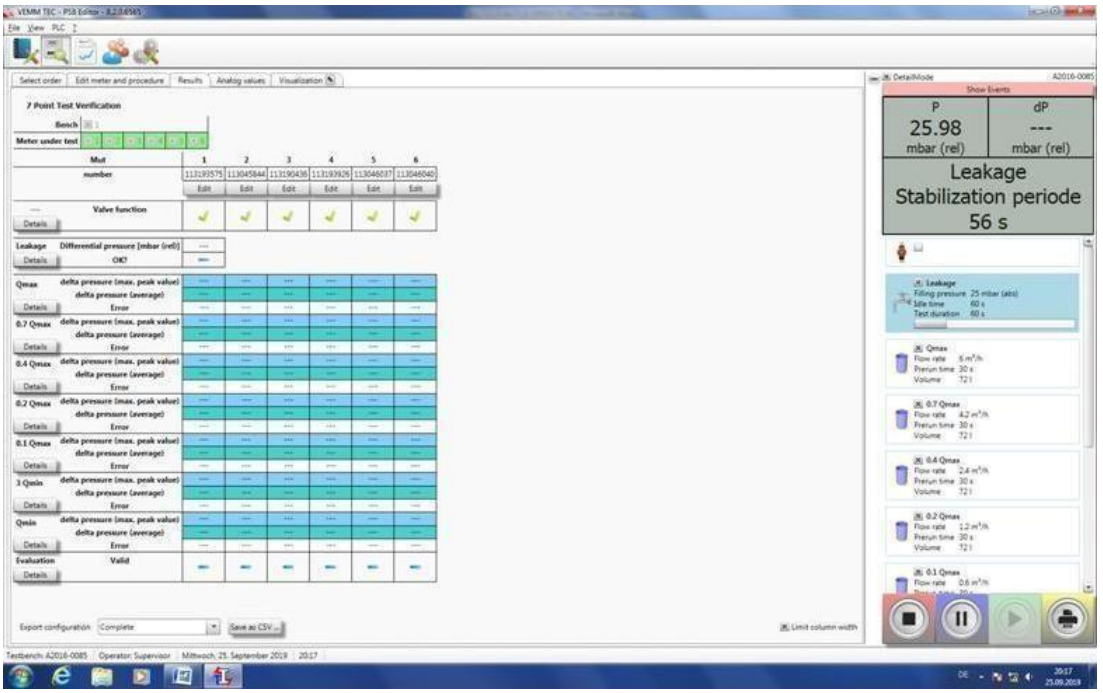

Figure 4.12: Stabilized in path

. After stabilization of air, leakage test is started by showing "running leak test" as shown.

Note: In case of any leakage observed, follow the instruction and act accordingly (for ex. If giving leak of software to restart leaktest and see the leak by spraying shop solution

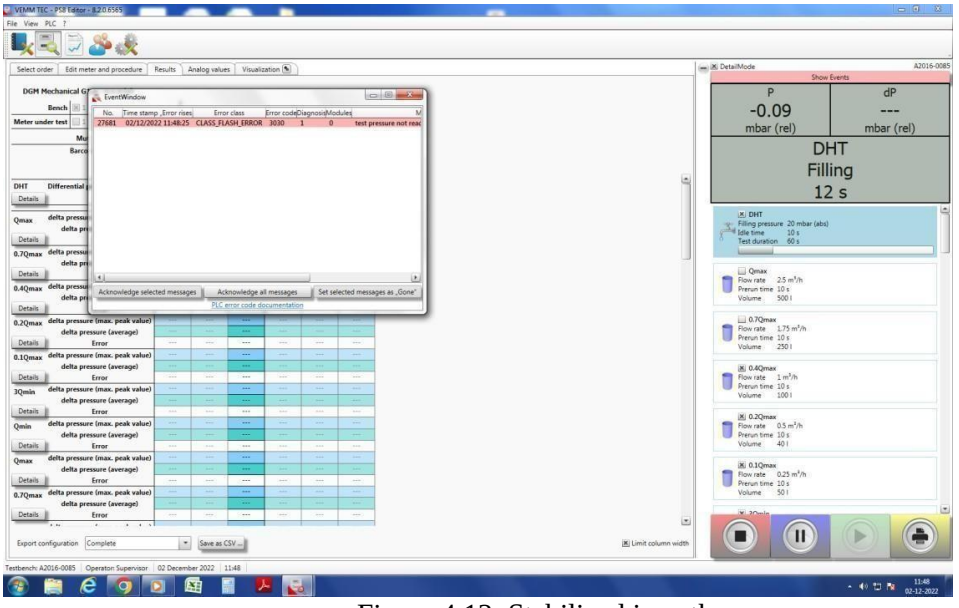

Figure 4.12: Stabilized in path

4.13. When the software indicate the leak and the check the leak with the use of spray bottle.

Figure 4.13: Software indicates the leak

. Open the leak meter and using Teflon tap on it to close the leak and fit the meter again, repeat the process if leakage is still there.

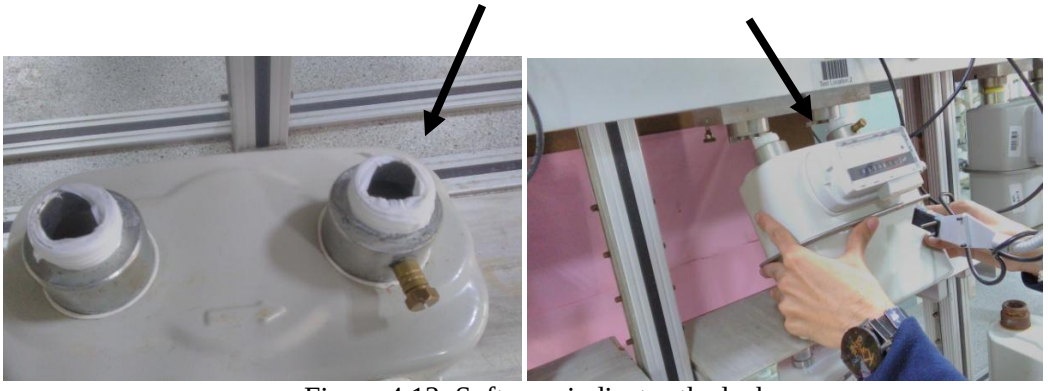

Figure 4.13: Software indicates the leak

4.14. After leakage pass programme auto start for draining of leakage.

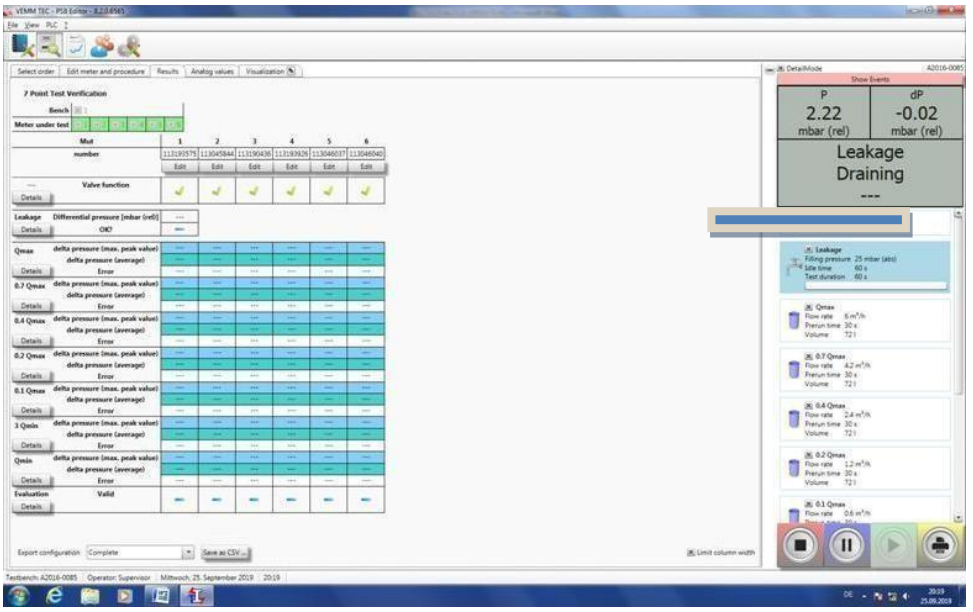

Figure 4.14: Start for draining of leakage

. If differential pressure of leakage is within limit (< = -0.2 mbar) then it is shown by "OK" with "green tick" mark as follows. After leakage next checked flowrate is initiated as shown "Prerun init". Here flow rate is Qmax for example.

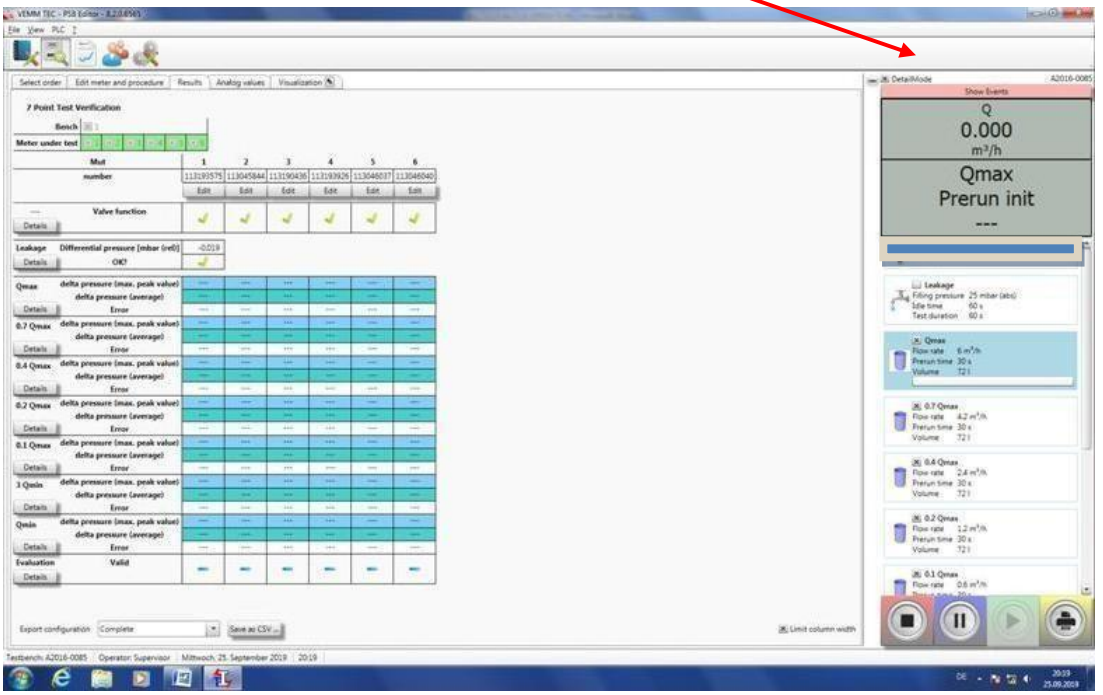

Figure 4.14: Start for draining of leakage

. Prerun is started for set time in batch.

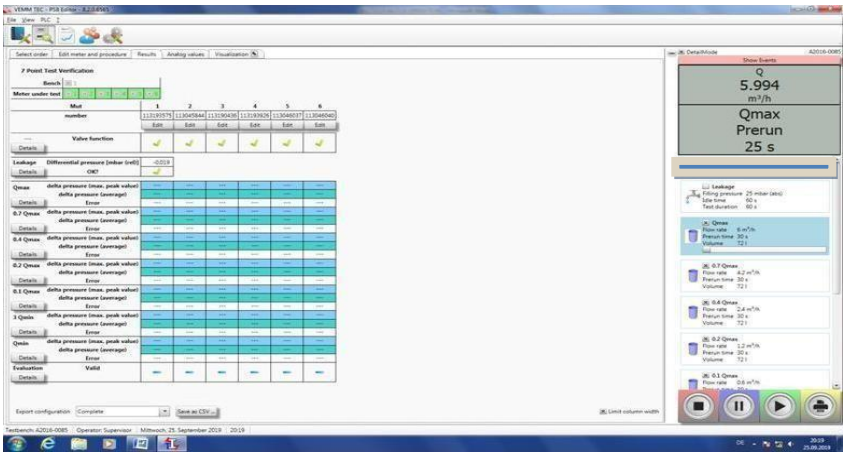

Figure 4.14: Pre-run

4.15. We set the sensor, that sensor; we place the reflector on the resolution inside the index of the meter. When the sensor is set on the reflector, red light will appear in the sensor and the number on the digital meter will be less.

Figure 4.15: Set sensor

. If sensor is not set in Qmax then "stop by single click" and run Qmax back and set sensor in it

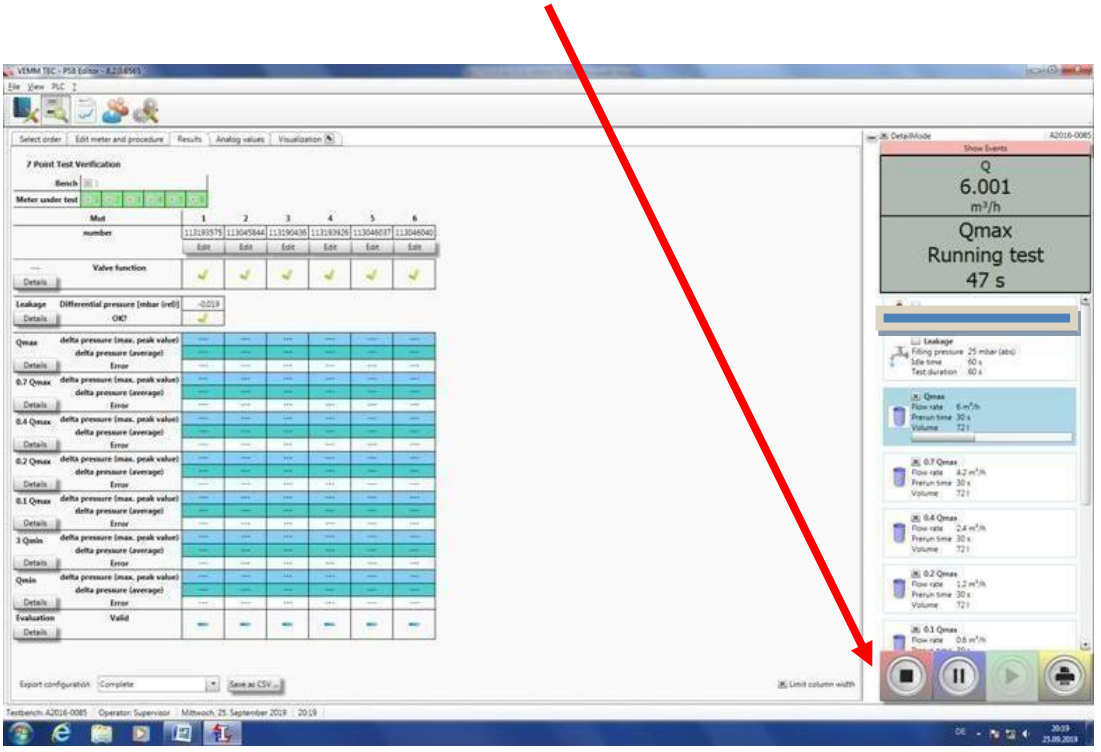

Figure 4.15: Set sensor

4.16. After pre-run error test is running & shown by “running test” for set time in batch.

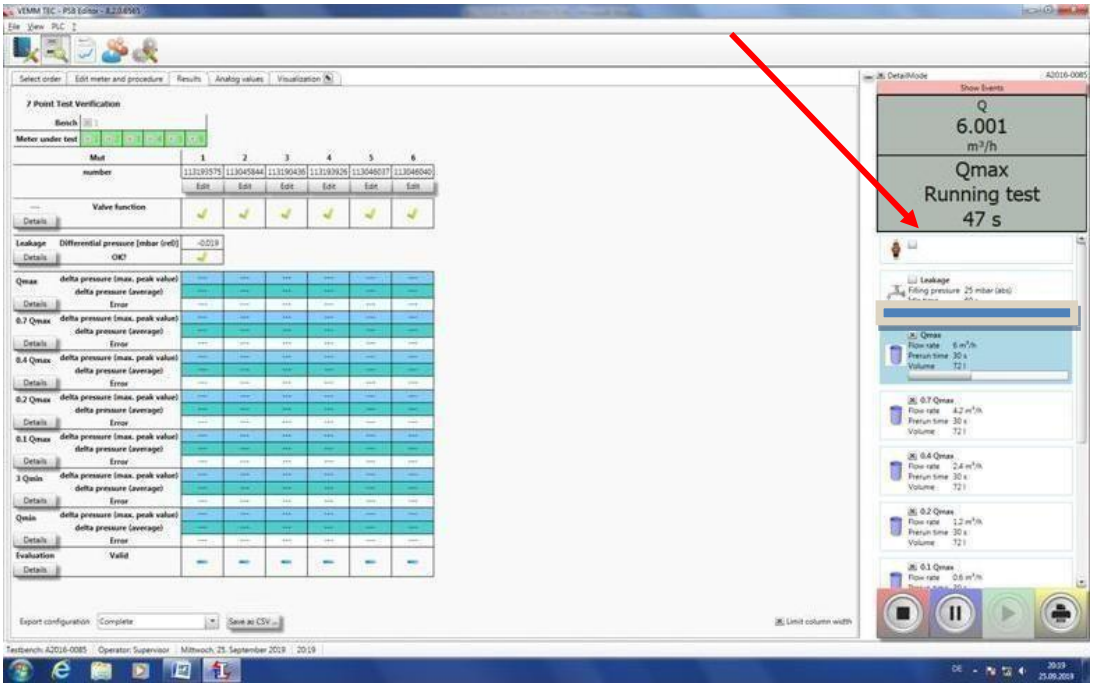

Figure 4.16: Pre-run errors

4.17. After test programme analyses the result of this flow rate.

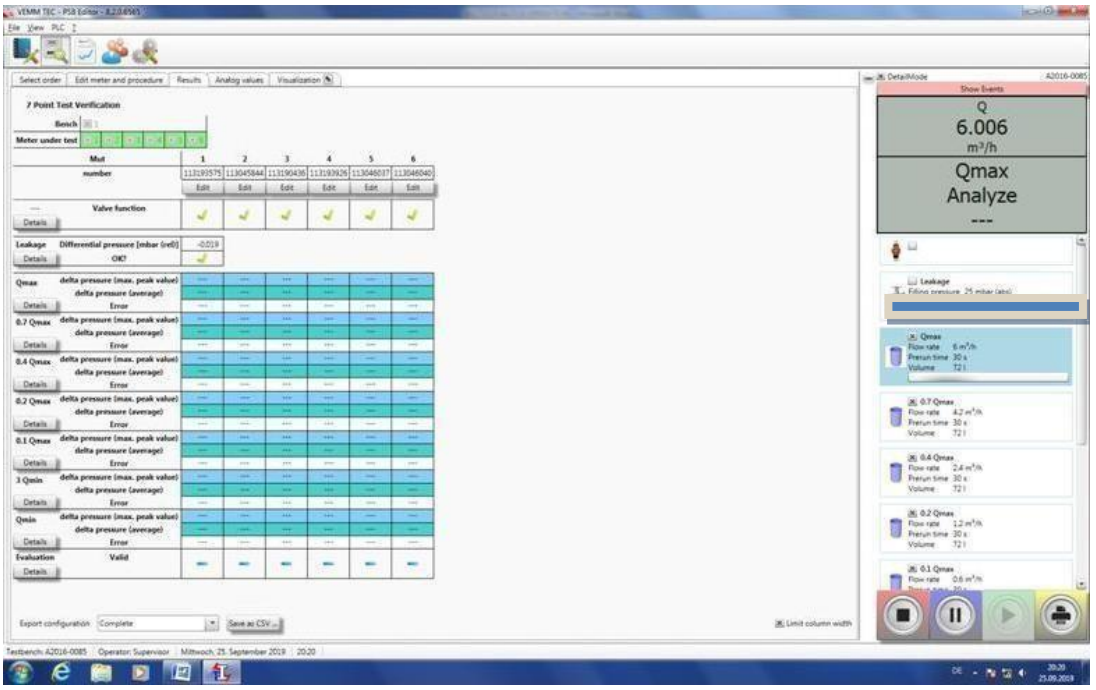

Figure 4.17: Programme analyses the result

. After analyzing the errors are shown in front of flow rate & next selected flow rate (here 0.7 Qmax for example) will ready for pre run as shown. This process will continue to go on, automatic selection will be done one after the other.

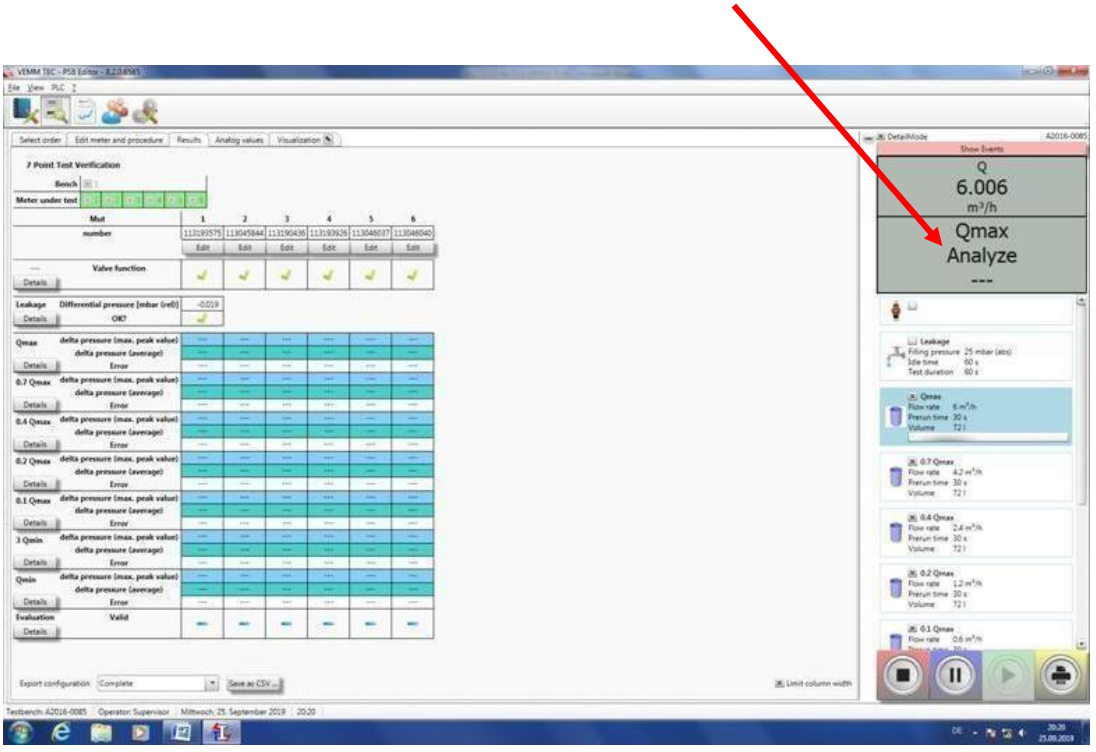

Figure 4.17: Programme analyses

4.18. Same as above at this flow rate error test test running as below for set time in batch.

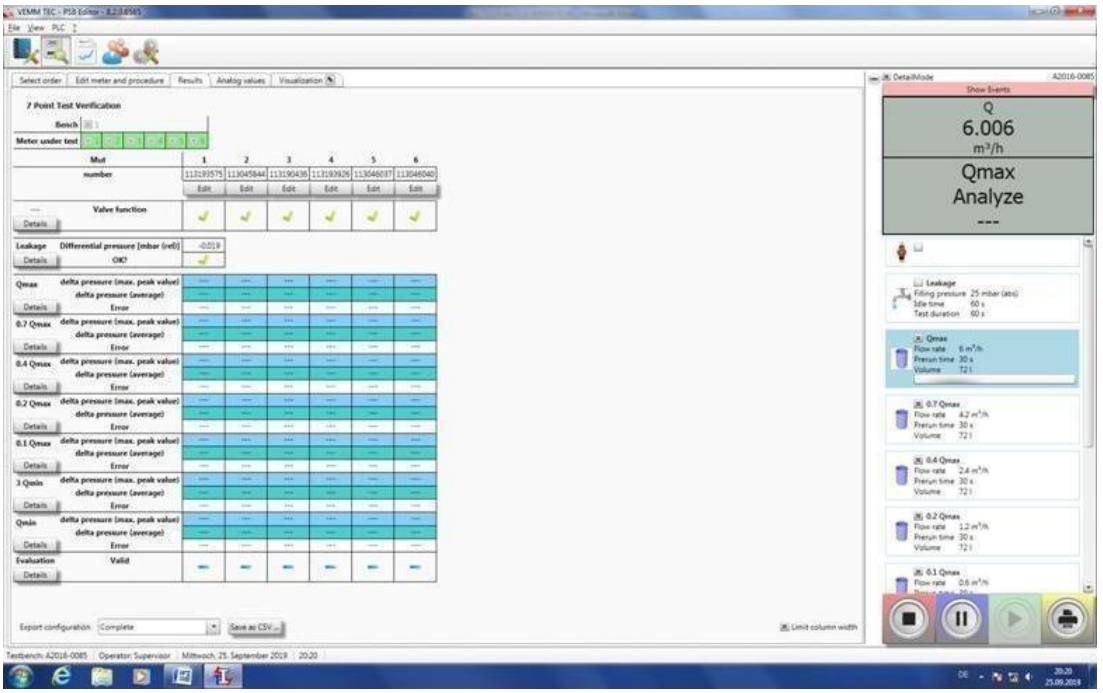

Figure 4.18: Flow rate error test ,test running

. Software automatic analyse its data.

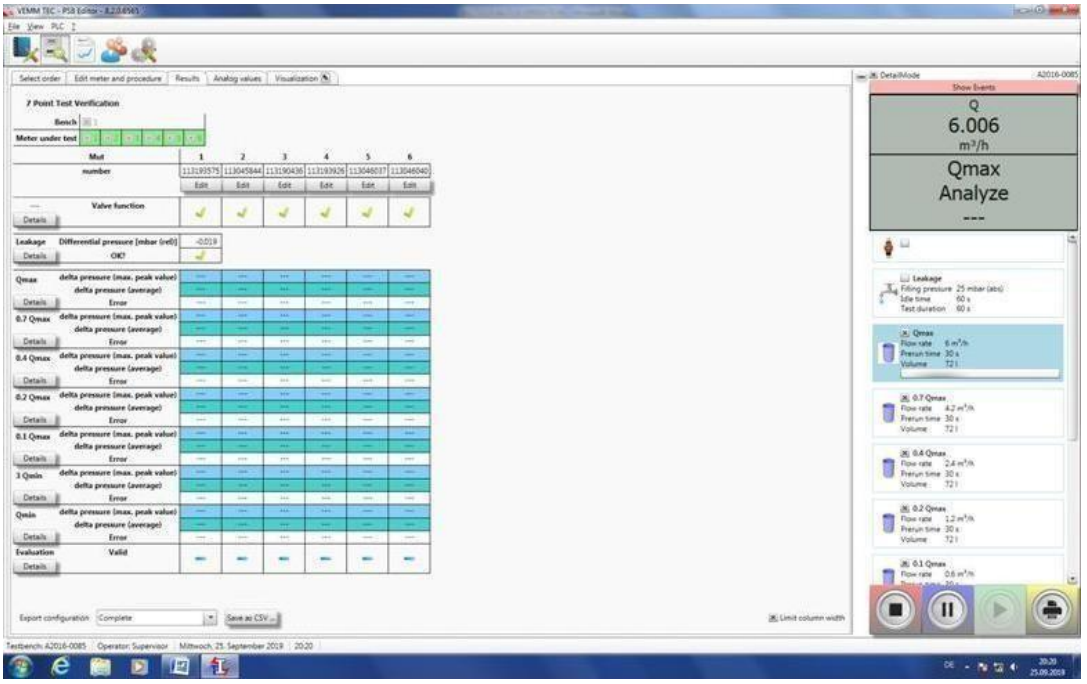

Figure 4.18: Flow rate error test ,test running

4.19. After complete batch running results are shown as follows. And if all results are within limit as per standard then in "evaluation" green tick marks are shown as follows.

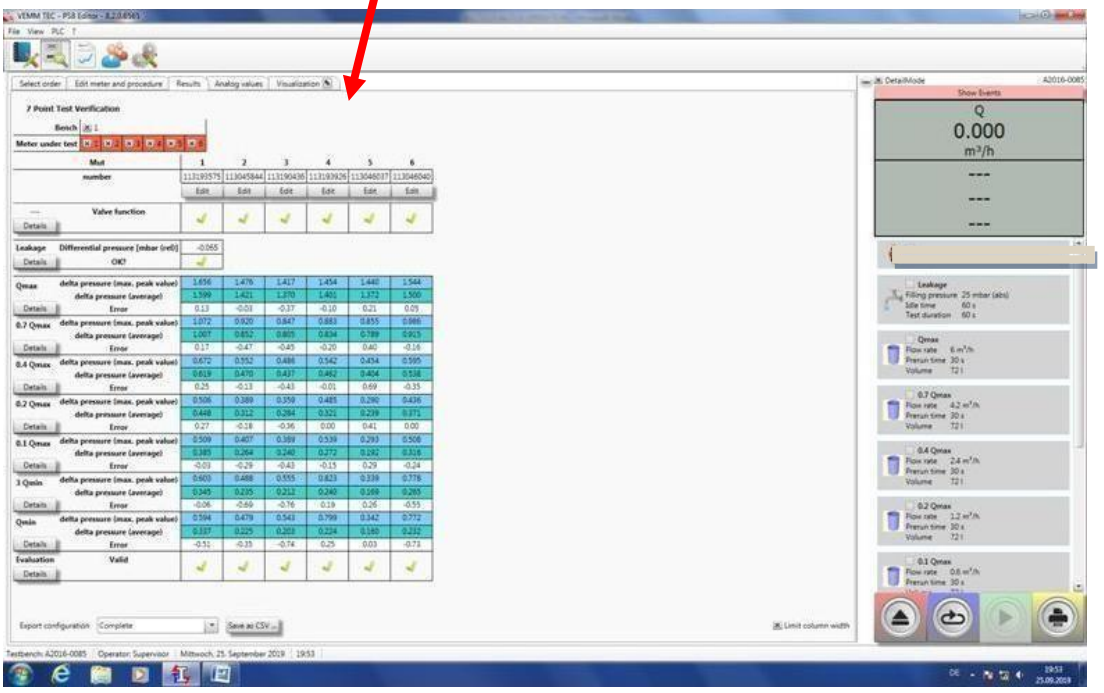

Figure 4.19: Running results

. Data will be shown for the meters we select for the test, the rest will be empty.

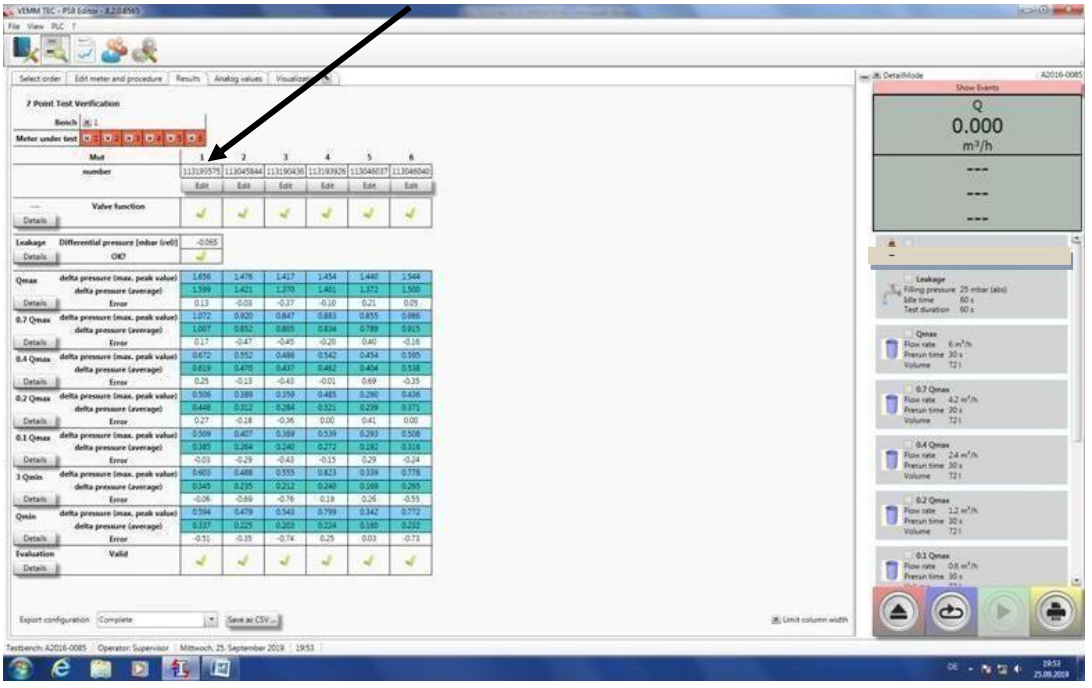

Figure 4.19: Running results

4.20. Save the results then there is button for with named “save as CSV”. Click it & give path for results with file name “SRF xxx meter sr. x1, x2, x3, x4, x5, x6”.

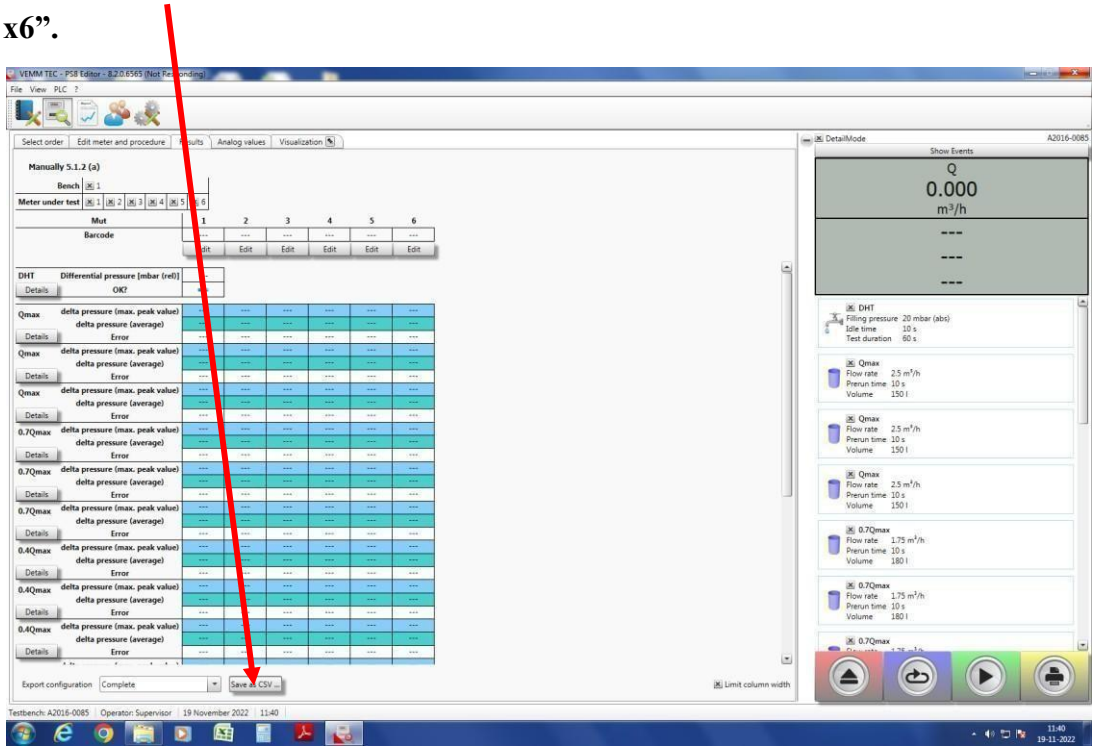

Figure 4.19: Save as csv

.” Save as csv” click and give the report name and save

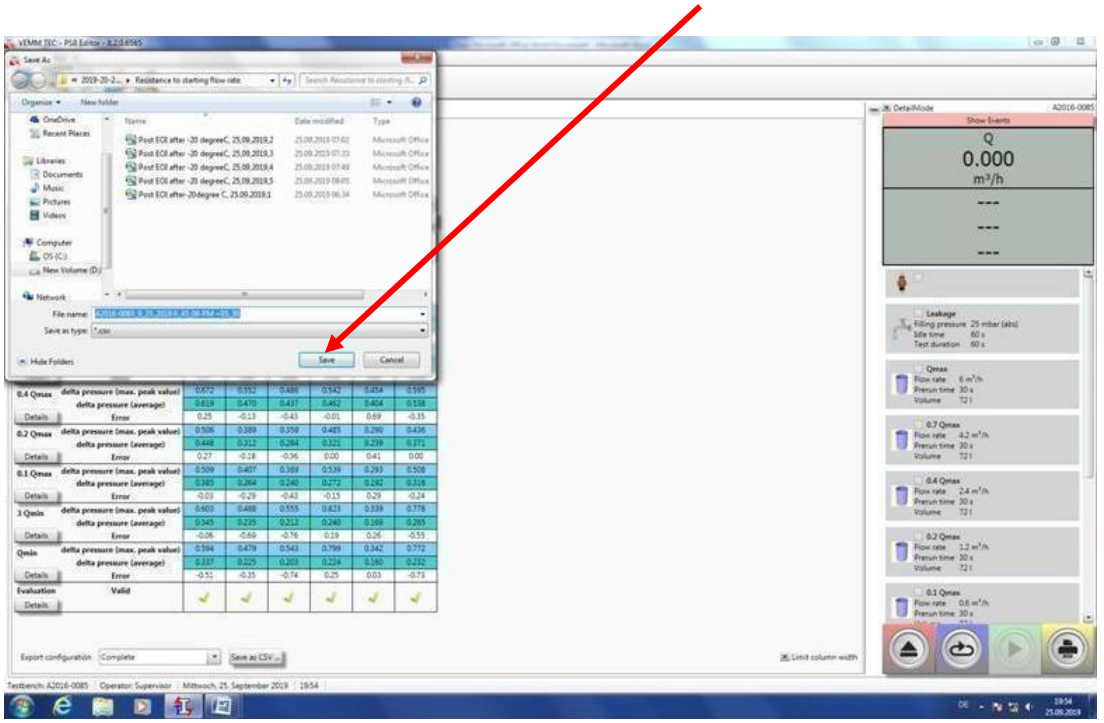

Figure 4.19: Save as csv

. the initial and subsequent error limits of the meter are not as per the table, the meter fails and If the initial and subsequent error limits of the meter are as per the table, the meter pass,

Flow rate **m3h−1**	**Maximum permissible errors**	
	Initial	**Subsequent**
Qmin ≤ Q < Qt	**±3 %**	**±6 %**
Qt ≤ Q ≤ Qmax	**±1,5 %**	**±3 %**

Chapter 5

Terms and definitions

For the purposes of this document, the following terms and definitions apply.

5.1.1

Air

Air of density approximately 1, 2 kgm−3

5.1.2

Gas volume meter

Instrument designed to measure, memorize and display the volume of a fuel gas that has passed through it

5.1.3

Diaphragm gas meter

gas volume meter in which the gas volume is measured by means of measuring chambers with deformable walls

5.1.4

Actual flow rate

Flow rate at the gas pressure and gas temperature conditions prevailing in the gas distribution line in which the meter is fitted, at the meter inlet

5.1.5

Working pressure

Difference between the pressure of the gas at the inlet of the meter and the atmospheric pressure

5.1.6

Maximum working pressure

Upper limit of the working pressure for which the meter has been designed, as declared by the manufacturer and marked on the meter data plate

5.1.7

Pressure absorption

Difference between the pressures measured at the inlet and outlet connections of the meter whilst the meter is operating

5.1.8

External leak tightness

Leak tightness of the gas carrying components of the gas meter with respect to the atmosphere

5.1.9

Error of indication

Value that shows the relationship in percentage terms of the difference between the volume indicated by the meter and the volume that has actually passed through the meter, to the latter volume

5.2.1

Normal condition of use

Condition referring to the meter operating:

At a pressure up to the maximum working pressure (with or without a flow of gas);

within the range of flow rates;

Within the ambient and gas temperature range;

with the distributed gas

5.2.2

Base condition

Fixed condition (temperature and pressure) to which a volume of gas is converted

5.2.3

Cyclic volume

Volume of gas corresponding to the working cycle of the gas meter

Note 1 to entry: This means that all the moving components, except for the indicating device and the intermediate transmissions, resume for the first time the position they occupied at the beginning of the cycle.

5.2.4

Distributed gas

Gas locally available

5.2.5

Metering conditions

Condition of the gas at the point of measurement

Note 1 to entry: E.g. temperature and pressure of the measured gas.

Chapter 6
Normative References

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 549, Rubber materials for seals and diaphragms for gas appliances and gas equipment

EN 16314:2013, Gas meters - Additional functionalities

EN 60730-1:2011, Automatic electrical controls for household and similar use - Part 1: General requirements (IEC 60730-1:2011)

EN ISO 228-1, Pipe threads where pressure-tight joints are not made on the threads - Part 1: Dimensions, tolerances and designation (ISO 228-1)

EN ISO 1518-1, Paints and varnishes - Determination of scratch resistance - Part 1: Constant-loading method (ISO 1518-1)

EN ISO 2409, Paints and varnishes - Cross-cut test (ISO 2409)

EN ISO 2812-1:2007, Paints and varnishes - Determination of resistance to liquids - Part 1: Immersion in liquids other than water (ISO 2812-1:2007)

EN ISO 4628-2, Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 2: Assessment of degree of blistering (ISO 4628-2)

EN ISO 4628-3:2016, Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 3: Assessment of degree of rusting (ISO 4628-3:2016)

EN ISO 4892-2:2013, Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc lamps (ISO 4892-2:2013)

EN ISO 6270-1, Paints and varnishes - Determination of resistance to humidity - Part 1: Continuous condensation (ISO 6270-1)

EN ISO 6272-2, Paints and varnishes - Rapid-deformation (impact resistance) tests - Part 2: Falling-weight test, small-area indenter (ISO 6272-2)

EN ISO 9227:2012, Corrosion tests in artificial atmospheres — Salt spray tests (ISO 9227)

EN ISO 11664-4, Colorimetry - Part 4: CIE 1976 L*a*b* Colour space (ISO11664-4)

ISO 834-1, Fire-resistance tests — Elements of building construction — Part 1: General requirements

ISO 5168, Measurement of fluid flow — Procedures for the evaluation of uncertainties

ISO 7005-1:2011, Pipe flanges — Part 1: Steel flanges for industrial and general service piping systems

ASTM D1003, Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics