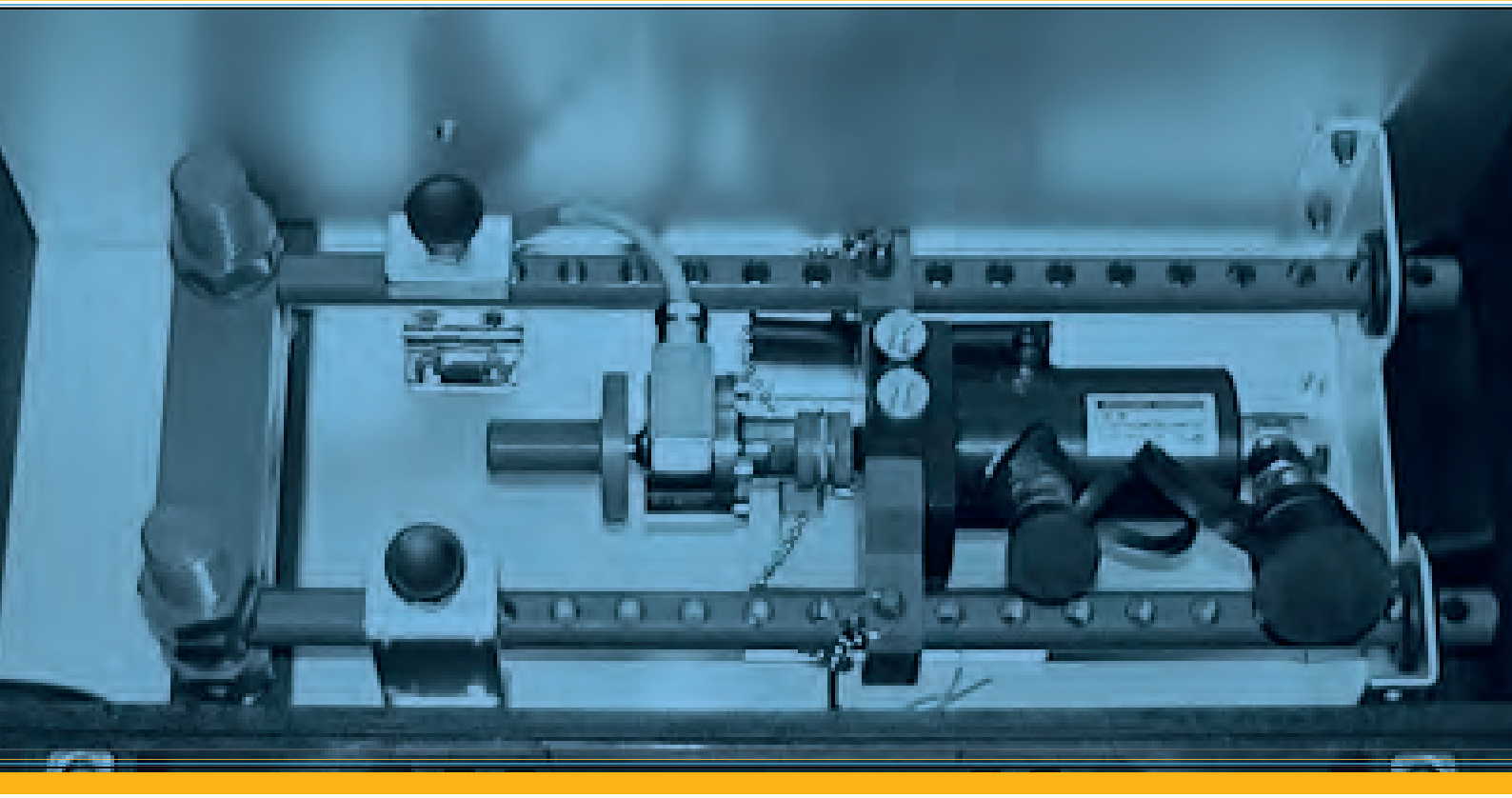
METRUS
Valve Test Bench Excellence

TESON III

The benchmark in online safety valve testing



www.metrus.de

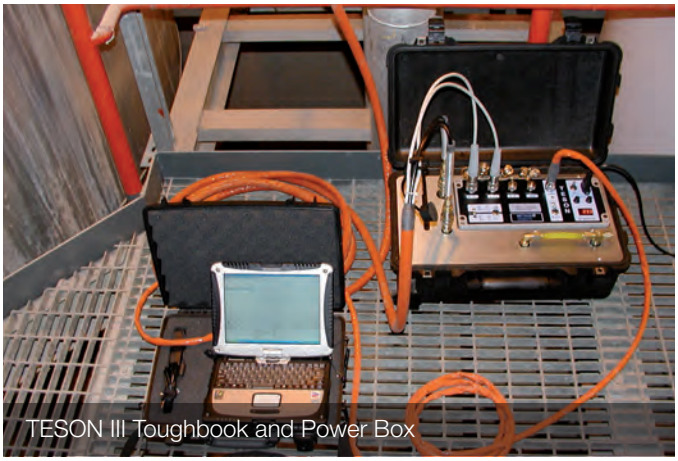
Total test accuracy

The TESON method to identify the set point within the TESON diagram – a lift force diagram - introduced by METRUS with the very first TESON version is the key to an accurate test result. Following a clear set point definition, it makes diagram analysis simple and easy, eliminating the need for years of experience to properly operate other online test systems. Supported by a 0.02% accurate measurement chain, TESON has a proven total test accuracy of less than 3% divergence from the true set pressure point. Various sensor-piston combinations called „bridges“ make sure, that each test is carried out with suitable measurement range and proper force capacity – from 0.1 kN to 50 kN pulling forces with standard equipment. TESON is the only system offering the reliable accuracy you need to use online safety valve testing as a substitute method to test bench testing.

No technician ever had more than 3 net days of training. All of them operate TESON correct and professionally from the first day onward.

Ease of utilisation

TESON is designed to be operated without any experience in online safety valve testing and a minimum of training, enabling you to quickly build up a large group of staff capable to properly operate TESON - with minimum of cost and effort. User friendly software alleviates multiple drop down menus. The Automatic testing feature and a multi level hardware and software safety system control the test process, monitoring all relevant parameters in the background to protect valve and equipment from damage. Uniquely coded plugs and couplings make it impossible to mix up any hydraulic or electrical connection. Extensive documentation is provided to get answers to questions quickly. Several technicians managed to self train themselves on the TESON system, using the available documentation only. TESON takes



TESON III Toughbook and Power Box

experience out of the technician‘s portfolio, implementing it into the TESON method. You can rely on your technicians to do a correct test when they are out testing with TESON.

Mobility

Since 2003 the TESON test rig and hydraulic pistons are manufactured from light alloy. With 4 kg, the 5 kN test rig set up is the lightest weight equipment on the market, making the test rig easy to handle and the total system easy to move. The equipment is divided into a Power Box (hydraulic power pack) and two rig cases. Each is light enough to be carried by a single person, making transportation to remote sites and high locations easy. Sensor cables and hydraulic hoses are combined to a light and robust rig cable, saving you from winding up several hoses and cables separately. TESON saves time on transport, adding comfort to your work, enabling testing of more safety valves within a working shift.

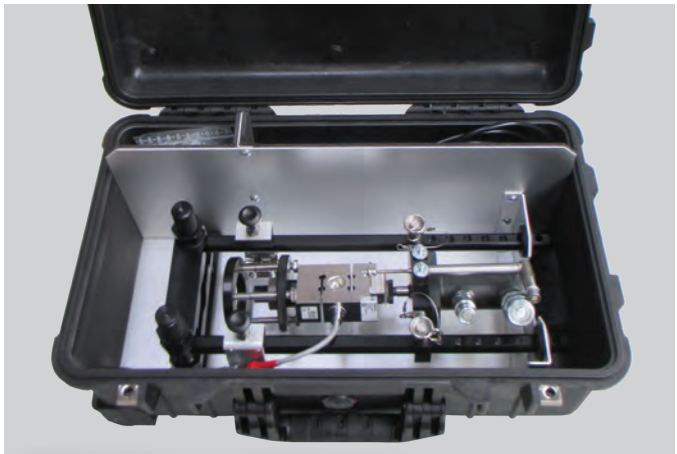
In 2006 Swedens largest nuclear power station Ringhals managed to reduce the spring shut down by 3 days with TESON testing.

Durability

From Scandinavian winters to Middle East dessert summers, from boiler tops to off-shore oil rigs, TESON copes with every environmental challenge and does the job. Being guaranteed by METRUS to work between -20 and 80 °C, the system is built to IP65, making it resistant against water and dust. TESON is designed to be transported, packed, unpacked and moved several times every day the whole year round - to never let you down when you are on site.

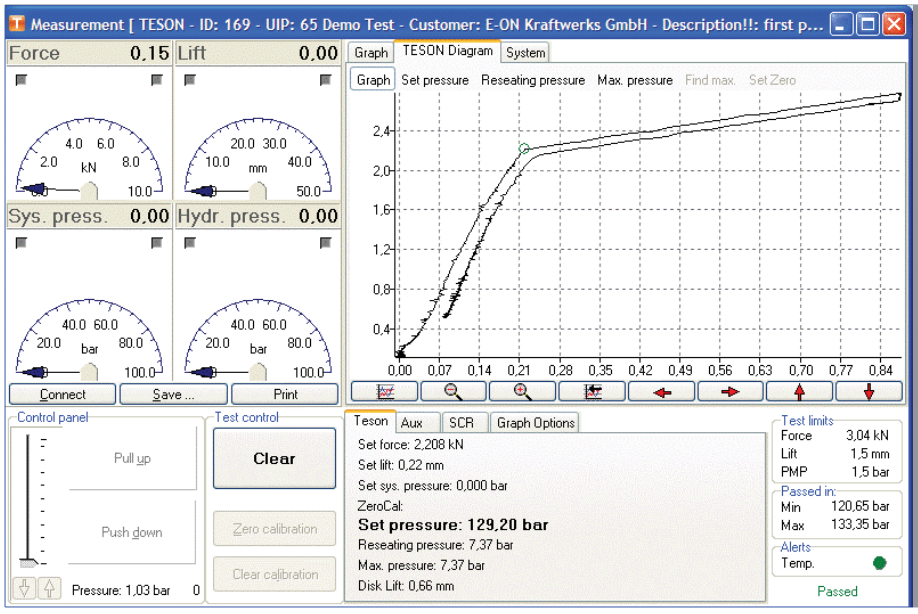
Efficiency

TESON is stored ready to use inside its cases. Within a few minutes TESON is ready for the first test. Within 20 seconds, the test rig is removed for valve adjustment and it only takes half a minute to re install it for the next test. Retooling for a different force capacity is done in less than 3 minutes – relaxed and tool free. When finished, it takes less than 10 minutes to pack everything and move on to the next site. The light integrated rig cable is available up to 50m length, enabling you to easily reach high remote valves on petrochemical reactors and ball tanks.



TESON III Rig case with 5kN test rig

The time required for the online testing is negligible compared to transportation, packing and assembly of rig items. TESON minimizes all preparation work to optimise the test performance – to test more safety valves per day than any other system in the market.



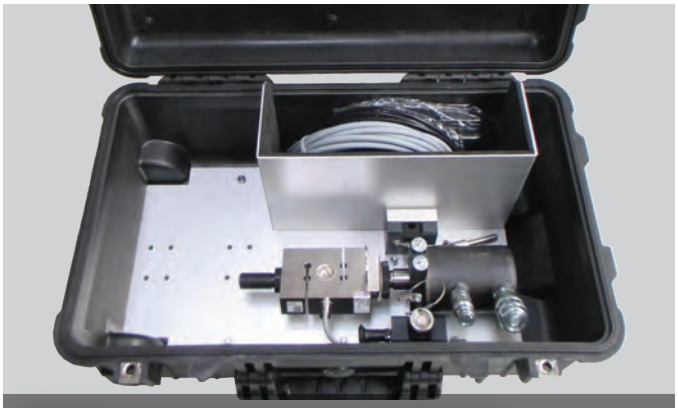
TESON Software - clearly structured - easy to use.

Approval and acceptance

TESON is approved by TÜV Germany and DNV Scandinavia with machine certificates issued to METRUS itself. TESON customers have machine approvals as well as approvals for service provided from Lloyds, Royals & Sunalliance and various local European and Asian inspection authorities. The test rig has an ATEX approval for area 1 when operated with the TSB-TESON safety barriers. By the end of 2006, TESON is operating in many European countries, China, South East Asia and the Middle East.

TESON II incorporates 19 years of experience in our core business – online safety valve testing – with more than 18 years of field experience and in excess of 90 TESON systems sold around the world. The TESON Method and its outstanding accuracy, optimised hardware and software handling in combination with TESON´s high quality and proven robustness delivers the result and performance reliability required to professionally test safety valves online.

TESON II - 20kN Test rig set up on a valve



TESON III Accessories case with 20 kN bridge

METRUS - The leaders´ choice

Supplying to market leading companies, METRUS has an uncompromising commitment to support and consult its customers work, sustaining maximum availability and comprehensive use of our core product TESON on site.

On site support – whenever customers come across a question on site or get stuck, METRUS is only a phone call away to assist hands on.

Consultancy – not every testing task is easy to solve. Special applications require special or customised solutions. METRUS assists customers in solving those questions. From technical tips to complete customised solution development, METRUS will continually support TESON equipment throughout its lifetime.

Qualified training – Although TESON is easy to use, METRUS recommends that all technicians attend a properly structured training course in the safe use of TESON online safety valve testing equipment. METRUS offers comprehensive training

courses to efficiently qualify your staff. METRUS experts conduct training in house or alternatively at site, enabling you to train a maximum number of technicians whilst incurring minimum costs.

Approval assistance – METRUS has assisted many of its customers to achieve local machine approvals from inspection authorities. It starts with providing technical back up details, communication with inspectors up to demonstrations and meetings. METRUS is committed to achieve a broad acceptance of TESON around the world.

Service, rental and calibration – The quality of our product goes far beyond the actual design itself. It is further more measured by the over all availability and related costs of ownership. METRUS offers a comprehensive range of services around TESON to ease your operation and to minimize costs. METRUS will service and/or calibrate TESON systems in minimal time, whenever it suits the customer, eliminating down times caused by ISO 9000 calibration requirements. From special equipment like EEx equipment to complete TESON kits, METRUS offers rental equipment to its customers to minimize investment costs for items required rarely.

Development – Supplying leading technology, METRUS is committed to development and best engineering practices. In a business that is influenced by various opinions, ideas and hopes, METRUS is carefully analysing new ideas and options. New technology is carefully benchmarked and reviewed from all directions prior to its implementation. To make sure that our customers can fully rely on everything we publish to be technically correct.

Always a step ahead - METRUS is the only company in the world clearly focused on online safety valve testing and digital valve testing. Our products are under ongoing development. From the TESON Method, PC driven systems to light alloy test rigs or SCR™ - see it first with a TESON system. As a central source of information METRUS is your first stop for technical information and discussion. The technical knowledge gained is always shared amongst all TESON equipment owners to improve the performance of our products.

TESON III Standard set - ready to go!

TSB - Using TESON in EEx areas

In plant sections where combustible atmosphere might appear any equipment operated has to be EEx approved. Depending on the presence of combustible atmosphere, the so called „EEx area“ is classified as Zone 2 - „infrequently or short period“, Zone 1 - „occasionally“ or Zone 0 „continuously or long-term or frequently“ (94/9/EC).

A typical application for online valve testing in EEx areas is the entire LNG - Liquid Natural Gas industry. No matter if it is exploration, transportation, distribution or storage of LNG, safety valves are used everywhere and all of them are located in smaller or larger sized EEx areas.

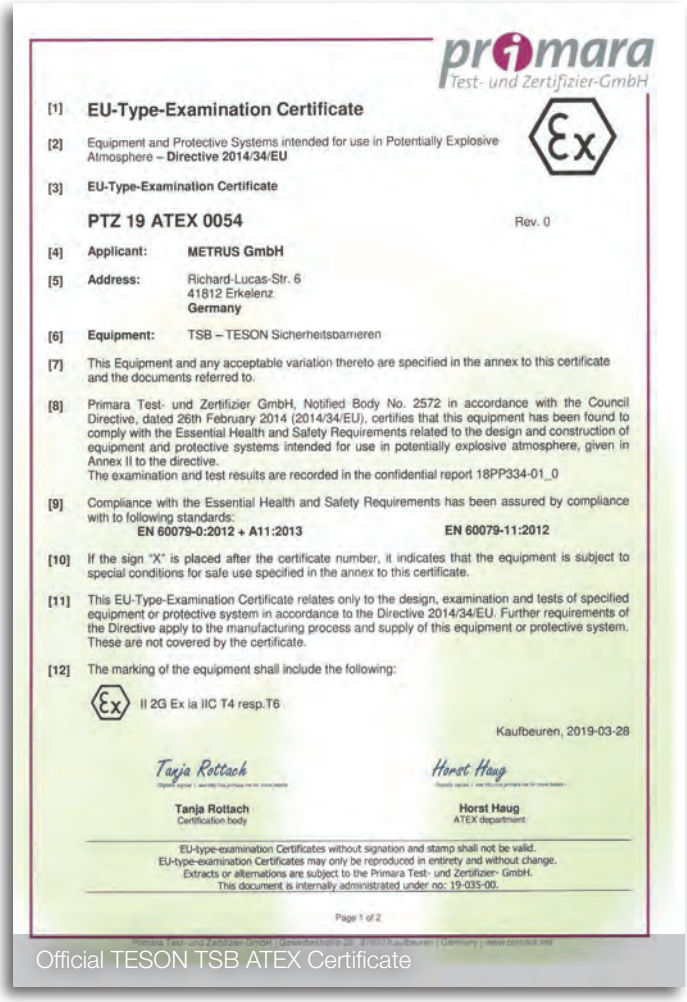
To be able to test safety valves located inside EEx areas METRUS developed the TSB - TESON Safety Barriers in 2002. In 2004 the approval was renewed to meet the new European ATEX standard. The official approval is filed under ZELM 02 ATEX 0100. The classification of the TESON test rig with TSB in use is:

II 2 G EEx ia IIC T4 resp. T6

TESON TSB acts as a line interface plugged between the TESON Power Box and the rig cable, enabling operation of the TESON test rig in EEx Zone 1. The signals covered by the TSB are force, lift and line pressure.

The TESON Power Box and TESON TSB have to stay outside the EEx area. Rig cables of typically 50m length are utilised to connect the Power Box residing outside the EEx area with the test rig mounted on the valve inside the EEx area. Under the approval PTZ 19 ATEX 0054 rig cable length of up to 100m is possible.

Some plant operators provide temporary means to EEx protect the TESON Power Box. Using the EEx approved TESON II Notebook and the built in WLAN option, Power Box and Notebook may be operated inside Zone 2.



primara
Test- und Zertifizier-GmbH

[1] **EU-Type-Examination Certificate**

[2] Equipment and Protective Systems intended for use in Potentially Explosive Atmosphere – **Directive 2014/34/EU**

[3] **EU-Type-Examination Certificate**

PTZ 19 ATEX 0054 Rev. 0

[4] **Applicant:** **METRUS GmbH**

[5] **Address:** Richard-Lucas-Str. 6
41812 Erkelenz
Germany

[6] **Equipment:** TSB – TESON Sicherheitsbarrieren

[7] This Equipment and any acceptable variation thereto are specified in the annex to this certificate and the documents referred to.

[8] Primara Test- und Zertifizier GmbH, Notified Body No. 2572 in accordance with the Council Directive, dated 26th February 2014 (2014/34/EU), certifies that this equipment has been found to comply with the Essential Health and Safety Requirements related to the design and construction of equipment and protective systems intended for use in potentially explosive atmosphere, given in Annex II to the directive.
The examination and test results are recorded in the confidential report 18PP334-01_0

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with to following standards:
EN 60079-0:2012 + A11:2013 **EN 60079-11:2012**

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the annex to this certificate.

[11] This EU-Type-Examination Certificate relates only to the design, examination and tests of specified equipment or protective system in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by the certificate.

[12] The marking of the equipment shall include the following:

Ex II 2G Ex ia IIC T4 resp.T6

Kaufbeuren, 2019-03-28

Tanja Rottach — Horst Haug

Tanja Rottach Certification body — **Horst Haug** ATEX department

EU-type-examination Certificates without signation and stamp shall not be valid.
EU-type-examination Certificates may only be reproduced in entirety and without change.
Extracts or alternations are subject to the Primara Test- und Zertifizier- GmbH.
This document is internally administrated under no: 19-035-00.

Page 1 of 2

Official TESON TSB ATEX Certificate

Like any TESON extension the TESON Safety Barriers are 100 % compatible with any TESON system. Modifications of the standard system are not necessary offering every TESON owner the choice to rent or buy the TESON TSB at any time.

Remark: ATEX approvals are published documents that must be made available to everyone who has an interest. Please contact METRUS to receive a digital copy of the TESON TSB ATEX approval via e-mail.

Technical Data

Power Supply ..... Dual Voltage 115/230V @ 50-60 Hz

Force generation ..... Hydraulic power pack - software controlled.

Data link RS232

Signal inputs ..... Force, Lift, Line pressure, AUX (e.g. Ultrasound)

Accuracy ..... Force 0,02%, Lift 0,2 %, Line pressure 0,25%, TESON electronic 0,02%

Standard test rig ..... Light alloy - with ready to use bridge units - tool free set up

Standard pulling forces .. 5kN and 20 kN with ready to use bridges

Weight of 10 kN set up .. 4 kg

Min req. head space ..... 25 cm (for 5kN and 20 kN test rig)

Available rig cables ..... 10, 15, 20, 30, 40, 50 or 100 meter

EEx Approval ..... II 2 G Eex ia IIC T6 (certificate no. PTZ 19 ATEX 0054)

3rd party approvals ..... TÜV Germany, DNV Sweden

Options

- 50kN Test rig
- 100kN Test rig
- Ultrasound
- EEx equipment - TESON TSB
- Various pressure sensors sets
- Custom solutions for extraordinary low or high forces

METRUS
Valve Test Bench Excellence

METRUS GmbH

Richard-Lucas-Str. 6
41812 Erkelenz
Germany

✉ sales@metrus.de
T. +49 (2431) 94502 0 - we are GMT+1
F. +49 (2431) 94502 18