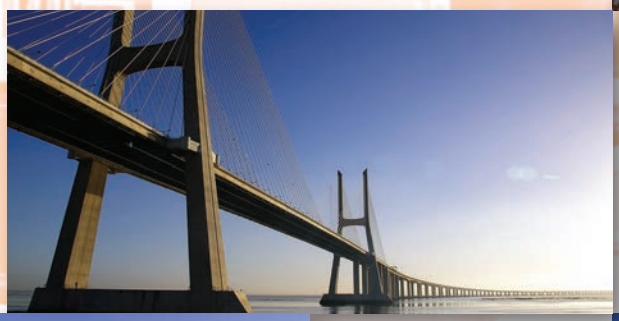
walter+bai

Building Materials Testing Systems

3rd Edition

w+b



Welcome to the walter+bai
Products Catalogue

Dear Customer

walter+bai is pleased to publish the new Products Catalogue.
Mechanical testing plays a major role in research and education, product development & design and quality control. In this publication you will find the wide range of our building materials testing machines on which engineers and scientists relay globally to achieve better results. With us you will benefit from our extensive experience in producing material testing systems and equipment to meet the wide range of applications.
If you can not find exactly what you are looking for then keep in mind that due to our considerable engineering capabilities we are able to offer also customized solutions or complete installations for physical testing laboratories world-wide.

Within this new catalogue you will find:

- Cement and Concrete Testing Machines
- Asphalt and Bituminous Materials, Rock Mechanics, Wood and Timber Testing Systems
- Accessories like digital controller and read-outs, application software, extensometer, testing devices a.s.o.
- General information and List of Services

Our prior goal is to supply advanced testing equipment designed for hard and long term use. To ensure that you obtain the maximum rewards from your investment, our accredited calibration laboratory guaranties that excellent after-sale service and verification facilities are available for your installation. Our world-wide network of experienced representatives with qualified engineers provides you an optimum after sale support so that you will be sure to reap the maximum benefit of your system throughout their entire life cycle.

Please do not hesitate to let us know how we can make this catalogue better for you in the future. Feedback and suggestions can be send to patrick.walter@walterbai.com.

Sincerely,

Ralph Walter
Managing Director, walter + bai ag

Content

walter+bai ag Testing Machines

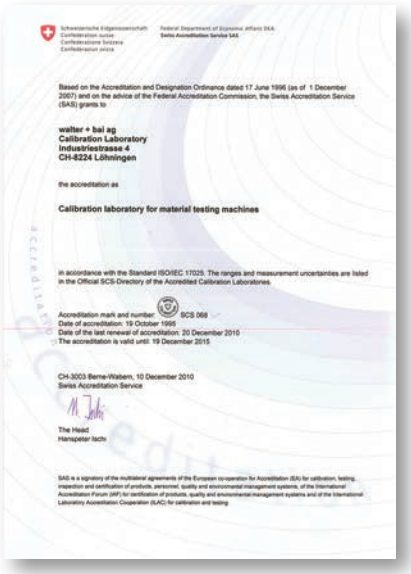
w+b company building with manufacturing hall and office building in Löhningen, Switzerland.

walter+bai ag Testing Machines supplies a wide range of material testing machines and systems for the safety and quality of materials, industrial products and buildings.
Mechanical testing is carried out in many industrial sectors, such as the automotive and aircraft industry, metal industry, plastic and rubber industry, the chemical industry, construction industry, bio mechanics as well as institutes and universities. Serving these industries for more than 40 years, w+b benefits from the company's extensive experience in producing material testing systems and equipment to meet this wide range of applications. Due to our considerable engineering capabilities we are able to offer not only standard testing machines but also customized solutions or complete installations for physical testing laboratories world-wide. To ensure you obtain the maximum rewards from your investment, our accredited calibration laboratory guaranties that excellent after-sale service and verification facilities are available for your installation.

Profile

We are renowned for the production of high quality systems. Due to our continuous research and development policy as well as actively collaborating with our customers and suppliers we have always maintained the very high product standard ever since the company was founded in 1970 by Armin Walter and Alfred Bai in Löhningen - Switzerland. The sales, design and manufacturing divisions associated with testing machines has grown due to the constant interaction with a multitude of clients and the systematic realisation of their requirements. Our product range has been steadily expanded and our service sector activities extended to meet growing demands. The unique position of w+b in the field of material testing machines can be attributed to the fact that their specialised know-how related to materials testing is being constantly updated whilst offering custom designed products and services. A well qualified and highly motivated staff coupled with an efficient organisational structure forms the backbone of w+b upon which you can depend for know-how, competence and reliable performance.
To pace with the great demand of high quality testing machines we increased 2008 our manufacturing facility and office space to 1300 m².

w+b Calibration and ISO 9001:2000 Certificates can be downloaded on www.walterbai.com.



Based on the Accreditation and Designation Ordinance dated 17 June 1996 (as of 1 December 2007) and on the advice of the Federal Accreditation Commission, the Swiss Accreditation Service (SAS) grants to

walter + bai ag
Calibration Laboratory
Industriestrasse 4
CH-8224 Löhningen

the accreditation as

Calibration laboratory for material testing machines

in accordance with the Standard ISO/IEC 17025. The ranges and measurement uncertainties are listed in the Official SCS-Directory of the Accredited Calibration Laboratories.

Accreditation mark and number: SCS 068
Date of accreditation: 19 October 1996
Date of the last renewal of accreditation: 20 December 2010
The accreditation is valid until: 19 December 2015

CH-3003 Berne-Wabern, 10 December 2010
Swiss Accreditation Service

The Head
Hanspeter Iachi

SAS is a signatory of the multilateral agreements of the European co-operation for Accreditation (EA) for calibration, testing, inspection and certification of products, personnel, quality and environmental management systems, of the International Accreditation Forum (IAF) for certification of products, quality and environmental management systems and of the International Laboratory Accreditation Cooperation (ILAC) for calibration and testing

swiss TS

ZERTIFIKAT ◆ CERTIFICATE ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE

The certification body of Swiss TS Technical Services AG
hereby confirms that the company

walter+bai ag - **Testing Machines**

CH – 8224 Löhningen – Switzerland

has introduced and applies a management system for

DESIGN, MANUFACTURE, INSTALLATION, CALIBRATION AND AFTER SALE SERVICE OF MATERIAL TESTING MACHINES AND SYSTEMS INCLUDING ASSOCIATED ACCESSORIES AND LABORATORY TESTING EQUIPMENT

according to:

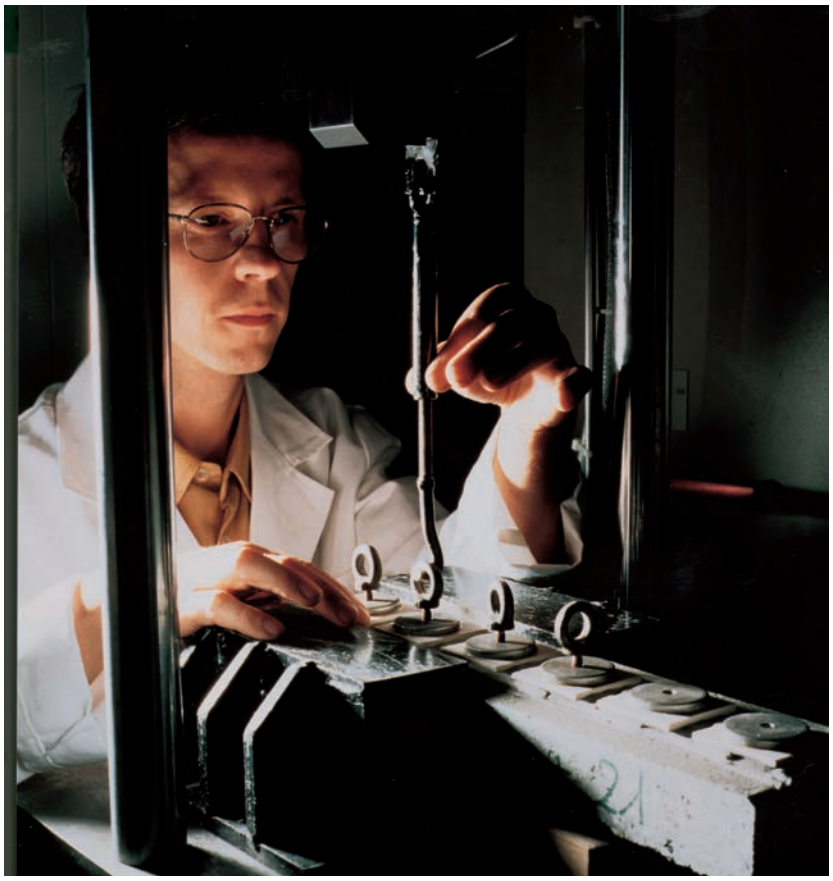
ISO 9001:2008 **Quality management**

Registration number: **01-400-164**
Initial certification: **07.05.1997**
Recertification: **28.05.2014**
Valid until: **30.03.2017**

Heinrich A. Bieler
Head of the certification body

Wallisellen, 11.06.2014
The certification body of Swiss TS Technical Services AG is a SVTI and TÜV SÜD company

SCESm013



From product development and manufacturing, up to the final inspection, we are committed to highest quality standards. Therefore our products are characterised by minimal maintenance and trouble-free performance.

- Maintenance and calibration of material testing machines
- Project management and technical consultancy

«Specific testing tasks demand appropriate testing equipment!»

This is our motto. Therefore, besides our standard range of testing machines, we have developed a number of customized testing machines for static and dynamic material and component testing.
w+b Testing Machines are the pacemaker for trendsetting technologies. They are a prerequisite for the safety and quality of materials, industrial products and buildings.

Our Products and Services

- Manufacturing of materials testing machines and systems
- Customer specific testing systems
- Servohydraulic and electromechanical, static and dynamic testing machines
- Digital measuring and control systems and testing software
- Hydraulic power packs
- Static and dynamic single actuators testing systems
- Clamping arrays for component testing
- Testing machines for construction materials
- Modernisation of existing testing machines in a modular way

Accreditated Calibration Laboratory according to ISO / IEC 17025

Our accreditated calibration laboratory allows a recognised calibration of testing machines according to international standards and to issue official calibration certificates.

Quality Management System according to ISO 9001:2000

Our certified business management system shows our commitment to quality also in processes and management.

The inside of the newly added w+b manufacturing hall.

The design and developing department with our experienced and qualified staff.

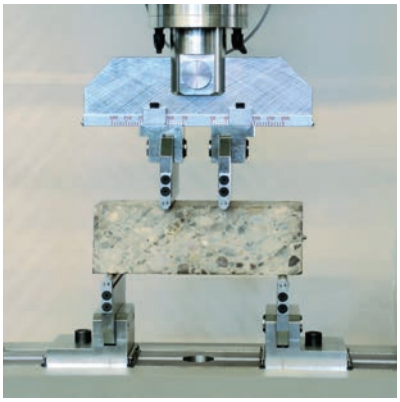
Concrete
Testing Systems

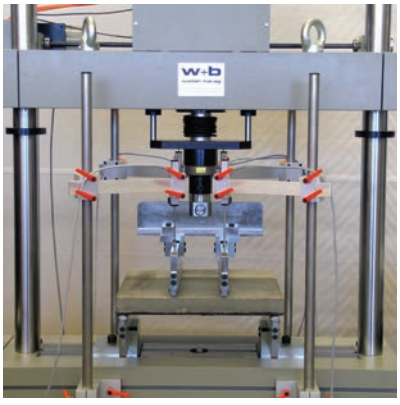
Concrete Testing
in accordance with Relevant International Standards

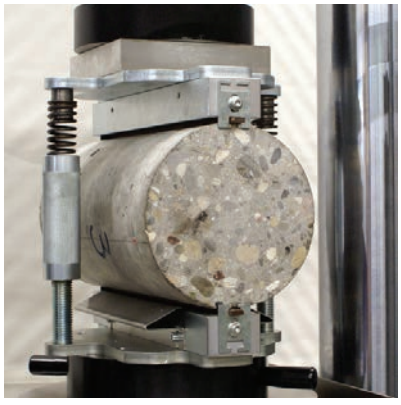
w+b offers a wide range of testing machines for different concrete tests. Each system can be individually configured according to your testing needs for an optimal solution.

Concrete is a construction material composed of cement as well as other cementitious materials such as fly ashes and slag cement, aggregates made from crushed rocks such as limestone or granite, plus a fine aggregate such as sand, water and chemical admixtures.
Concrete solidifies and hardens after mixing with water and placement due to a chemical process known as hydration. The water reacts with the cement, which bonds the other components together, eventually creating a stone-like material. Concrete is used to make pavements, pipe, architectural structures, foundations, motorways/roads, bridges/overpasses, parking structures, brick/block walls and footings for gates, fences and poles.

In this section you find a wide range of testing machines for the determination of the strength of concrete.
In addition we offer a wide range of testing equipment for the determination of workability, consistency, setting time, volumic mass, air content, linear variations as well as for the sample prepatation a.s.o.
All testing machines and equipment conforms to the relevant international standards as EN, ISO, ASTM and other corresponding national standards.



CONTENT SECTION D

Relevant International Standards for Concrete Testing

The European Standards are dividend into two subgroups:

- Fresh Concrete Testing
- Hardened Concrete Testing

The following tables show the single parts of the European Standard in more detail and additionally the corresponding ASTM standards.

Fresh Concrete Testing

EN Standard	Title	ASTM Standards
EN 12350 - 1	Part 1 - Sampling	
EN 12350 - 2	Part 2 - Slump Test	ASTM C143
EN 12350 - 3	Part 3 - Vebé Test	
EN 12350 - 4	Part 4 - Degree of Compactability	
EN 12350 - 5	Part 5 - Flow Table Test	
EN 12350 - 6	Part 6 - Density of Fresh Concrete	ASTM C29, C138
EN 12350 - 7	Part 7 - Air Content of Fresh Concrete - Pressure Methods	ASTM C231

Hardened Concrete Testing

EN Standard	Title	ASTM Standards
EN 12390 - 1	Part 1 - Shape, dimensions and other requirements for test specimens and moulds	
EN 12390 - 2	Part 2 - Making and curing specimens for strength tests	ASTM C31, C192, C511
EN 12390 - 3	Part 3 - Compressive strength of test specimens	
EN 12390 - 4	Part 4 - Compressive strength - Specification for compression testing machines	ASTM C39
EN 12390 - 5	Part 5 - Flexural strength of test specimens	ASTM C78, C293
EN 12390 - 6	Part 6 - Tensile splitting strength of test specimens	
EN 12390 - 7	Part 7 - Density of hardened concrete	
EN 12390 - 8	Part 8 - Depth of penetration of water under pressure	
EN 12390 - 9	Part 9 - Freeze-thaw resistance - scaling	
EN 12390 - 10	Part 10 - Determination of the relative carbonation resistance of concrete	
EN 12390 - 11	Part 11 - Determination of chloride resistance of concrete - unidirectional diffusion	

EN Standard	Title	ASTM Standards
EN 12504 - 1	Part 1 - Cored specimens - taking, examining and testing in compression	
EN 12504 - 2	Part 2 - Non destructive testing- Determination of rebound number	ASTM C805
EN 12504 - 3	Part 3 - Determination of pull-out force	ASTM C900

Control, Data Acquisition, Evaluation and other Options
for Concrete Testing Machines

All the servohydraulic testing machines are available with different control options and need to be connected to a hydraulic power pack.

Options for Machine Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **2000/3000** — **Type DIGICON**
- Manual controlled test procedure with loading and unloading valves and digital read-out — **Type DIGICON 1000**

Optional PC running Building Material Testing Software PROTEUS-MT

for automatic test procedure, test data acquisition and evaluation as well as printout of test reports.

Options for Hydraulic Power Supply

- Control Console with Measuring and Weighing System — **Series SP - W-MS**
- 19" Control Console — **Series NS 19 - PA**
- Separate Hydraulic Power Pack — **Series PAC**
- Different Testing Machine with Integrated Hydraulic Power Supply

Accessories

- Testing Devices
- Extensometers
- Testing Equipment

Overview
Concrete Testing Machines

Compression Testing Machines

Type	Capacity	Standards	Accuracy	Sample Sizes		Page
D5	**1200 kN** **2000 kN** **3000 kN**	EN 12390-4, ASTM C39	Class 1	Cylinders: Cubes:	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200[1] mm	48
C	**1500 kN** **2000 kN** **3000 kN**	ASTM C39	Class 1	Cylinders: Cubes:	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200 mm	50
DC	**2000 kN** **3000 kN**	EN 12390-4, ASTM C39	Class 1	Cylinders: Cubes:	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200 mm	52
D	**3000 kN** **4000 kN** **5000 kN** **6000 kN**	EN 12390-4, ASTM C39	Class 1 Class 0.5	Cylinders: Cubes:	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200 mm	54
D - S	**4000 kN**	EN 772-1	Class 1			56
DV	**1000 kN** **2000 kN** **3000 kN** **4000 kN** **5000 kN**	EN 12390-4, ASTM C39	Class 1 Class 0.5	Cylinders: Cubes: or as requested!	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200 mm	58

Flexural Testing Machines

Type	Capacity	Standards	Accuracy	Sample Sizes		Page
DBZ - 2S	**100 kN** **150 kN** **200 kN** **300 kN**	EN 12390-5, ASTM C78, C293	Class 0.5	Beams:	100 x 100 x 400 / 500 mm 150 x 150 x 400 / 500 mm 200 x 200 x 700 mm	60
DBZ - 4S	**100 kN** **150 kN** **200 kN** **300 kN** **600 kN** **1000 kN**	EN 12390-5, ASTM C78, C293	Class 0.5	Beams:	100 x 100 x 400 / 500 mm 150 x 150 x 400 / 500 mm 200 x 200 x 700 mm	62
DBZ - E	**20 kN** **50 kN** **100 kN** **150 kN**	EN 12390-5, ASTM C78, C293	Class 0.5	Beams:	100 x 100 x 400 / 500 mm 150 x 150 x 400 / 500 mm 200 x 200 x 700 mm	64

Combined Testing Machines

Type	Capacities		Standards	Accuracy	Sample Sizes		Page
DBC	**2000 kN** **3000 kN** **4000 kN**	**100 kN** **150 kN** **200 kN** **300 kN**	EN 12390-4, ASTM C39 EN 12390-5, ASTM C78, C293	Class 1 Class 0.5	Cylinders: Cubes: Beams:	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200 mm 100 x 100 x 400 / 500, 150 x 150 x 400 / 500 mm	66
DB	**2000 kN** **3000 kN** **4000 kN**	**100 kN** **150 kN** **200 kN** **300 kN**	EN 12390-4, ASTM C39 EN 12390-5, ASTM C78, C293	Class 1 Class 0.5	Cylinders: Cubes: Beams:	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200[1] mm 100 x 100 x 400 / 500, 150 x 150 x 400 / 500 mm	68
DB - H	**10 kN** **20 kN**	**400 kN** **600 kN** **1000 kN**	EN 12390-4, ASTM C39 EN 196 - 1	Grade 1 Grade 0.5	Cylinders: Cubes: Prisms:	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200 mm 40 x 40 x 160 mm	70

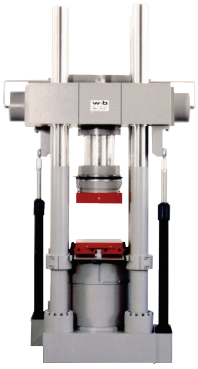
Series D5

Series C

Series DC

Series D

Series D - S



Series DV

Series DBZ - 2S

Series DBZ - 4S

Series DBZ - E

Series DBC

Series DB

Series DB - H

Basic Compression Concrete Testing Machines

Series D5 1200 - 3000 kN

Very basic stand-alone model with integrated hydraulic power pack in the lower part and digital controller or display in the upper part.

Standards and Tests

- **Compressive Strength**
  EN 12390 - 4
  ASTM C39

Samples

- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
  Ø 160 x 320 mm
  4"x 8", 6"x 12"
- **Cubes** 100, 150, 200[1] mm

Frame

- High stiffness 4-column construction
- Single acting ram
- Hydraulic power pack with oil-air cooling system is integrated on the side
- Digital controller or display and optional paper roll printer are integrated in the upper part
- Lower compression platen with surface engraving for centring of specimens
- Hardness > 55 HRC
- 3 intermediate platens Ø 227 x 50 mm to reduce test chamber height to 280 / 230 / 180 mm
- Protection device around testing space

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**

Accessories / Options

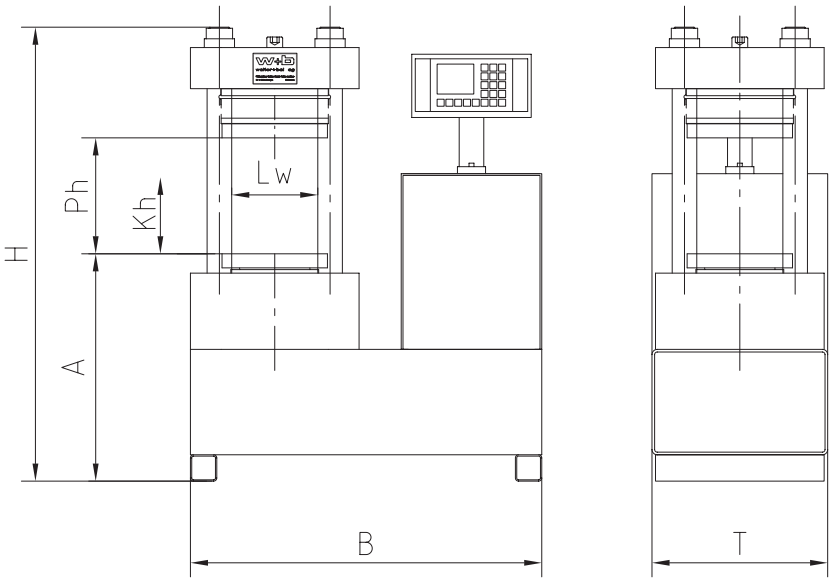
- Upper spherically seated compression platen for cylinder test conformity
- Test chamber height 210 mm
- Paper roll printer
- Testing devices
- Extensometers

[1] 3000 kN models only

Specifications

Models	Series D5 - A Series D5 - D	Servo controlled with **DIGICON 2000/3000** Manual controlled with **DIGICON 1000**
Force Capacities	Compression:	1200 kN, 2000 kN, 3000 kN
Accuracy	In accordance with ISO 7500-1, Grade 1.	
Colour	Light Grey RAL 7035. Others upon request.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

Technical Data Type D5		1200	2000	3000
Compression Capacity	kN	1200	2000	3000
Accuracy Range	kN	10 - 1200	20 - 2000	30 - 3000
Test Chamber Height (Ph)	mm	330	330	330
Horizontal Daylight (Lw)	mm	240 x 120	230 x 175	230 x 175
Upper Compression Platen Ø	mm	300	300	300
Lower Compression Platen W x D	mm	210 x 210	210 x 210	210 x 210
Piston Stroke (Kh)	mm	50	50	50
System Oil Pressure	bar	597	408	612
Overall Width (B)	mm	1000	1000	1000
Overall Depth (T)	mm	600	600	600
Overall Height (H)	mm	1220	1350	1350
Working Height (A)	mm	625	670	670
Weight	kg	690	890	890
Load Frame Stiffness	kN/mm	3000	3500	3500



Low-Cost Compression Concrete Testing Machines

Series C 1500 - 3000 kN

Very basic and low cost compression testing machines available as stand-alone execution or for the connection to an existing testing system.

Standards and Tests

- **Compressive Strength**
  EN 13290 - 4
  ASTM C39

Samples

- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
  Ø 160 x 320 mm
  4"x 8", 6"x 12"
- **Cubes** 100, 150, 200[1] mm

Frame

- High stiffness 4-column construction
- Single acting ram
- Upper and lower fixed compression platen with hardness > 55 HRC
- Distance platen 210 x 210 x 110 mm to reduce test chamber height to 220 mm
- Protection device around testing space

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be used as stand-alone machine or can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Different testing machine with integrated hydraulic power supply

Accessories / Options

- Distance platens to reduce the test chamber height
- Machines[2] with compression platens 510 x 310 mm
- Testing devices
- Extensometers

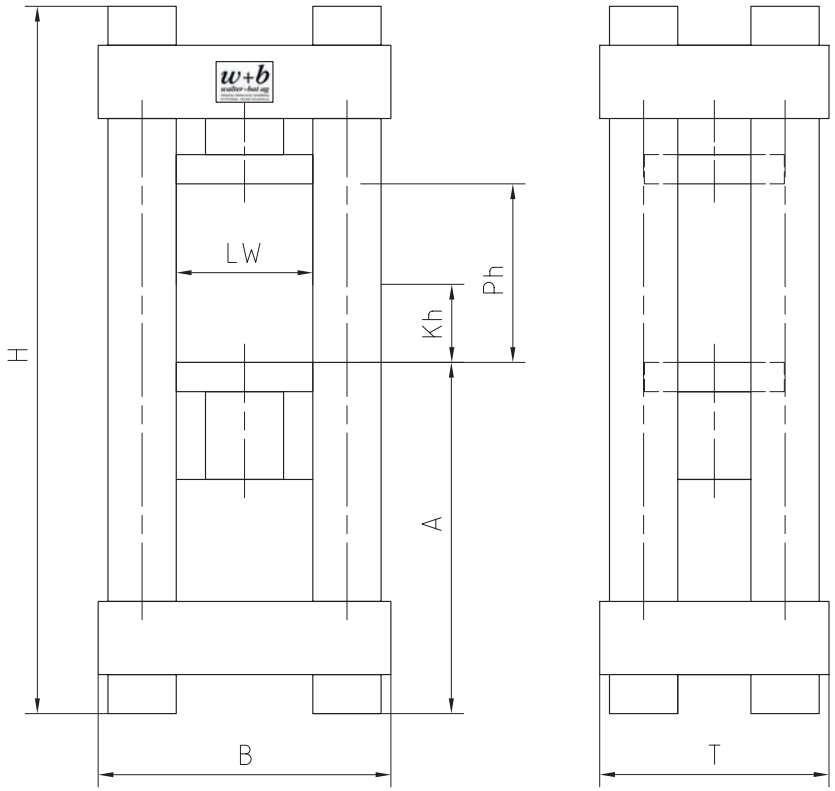
[1] 3000 kN model only

[2] 2000 and 3000 kN models only

Specifications

Models	Series C - A Series C - D	Servo controlled with **DIGICON 2000/3000** Manual controlled with **DIGICON 1000**
Force Capacities	Compression:	1500 kN, 2000 kN, 3000 kN
Accuracy	In accordance with ISO 7500-1, Grade 1.	
Colour	Light Grey RAL 7035. Others upon request.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

Technical Data Type C		1500	2000	3000
Compression Capacity	kN	1500	2000	3000
Accuracy Range	kN	15 - 1500	20 - 2000	30 - 3000
Test Chamber Height (Ph)	mm	330	330	330
Horizontal Daylight (Lw)	mm	210x100	256x150	272x200
Upper Compression Platen Ø	mm	216	216	287
Lower Compression Platen Ø	mm	216	216	287
Piston Stroke (Kh)	mm	55	55	55
System Oil Pressure	bar	590	629	611
Frame Width (B)	mm	370	430	600
Frame Depth (T)	mm	350	400	470
Frame Height (H)	mm	1260	1320	1450
Working Height (A)	mm	720	720	720
Weight	kg	580	700	1120
Load Frame Stiffness	kN/mm	2210	2800	3550



Compact Compression Concrete Testing Machines

Series DC 2000 - 3000 kN

Stand-alone compact compression testing machine with integrated hydraulic power pack in the lower part and digital controller or display in the upper part.

Standards and Tests

- **Compressive Strength**
  EN 12390 - 4
  ASTM C39

Samples

- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
  Ø 160 x 320 mm
  4"x 8", 6"x 12"
- **Cubes** 100, 150, 200[1] mm

Frame

- High stiffness 4-column construction for superior axial and lateral stiffness
- Single acting ram
- Hydraulic power pack with oil-air cooling system is integrated on the side
- Digital display and optional paper roll printer are integrated in the upper part
- Upper spherically seated compression platen for cylinder test conformity
- Lower fixed compression platen surrounded with sheets on three sides for easy cleaning and centring device for distance platens. Surface engraving for centring of specimens.
- Platens Hardness > 55 HRC
- Distance platen 210 x 210 x 110 mm to reduce test chamber height to 230 mm
- Protection device around testing space

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**

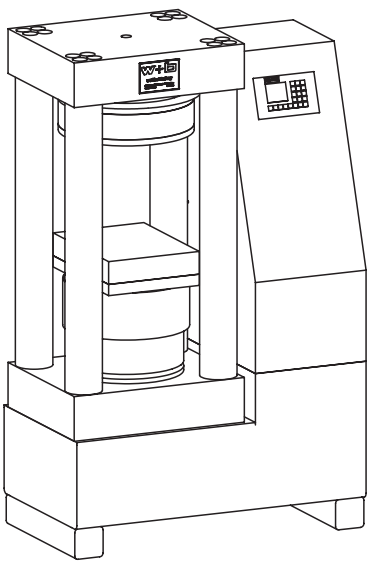
Accessories / Options

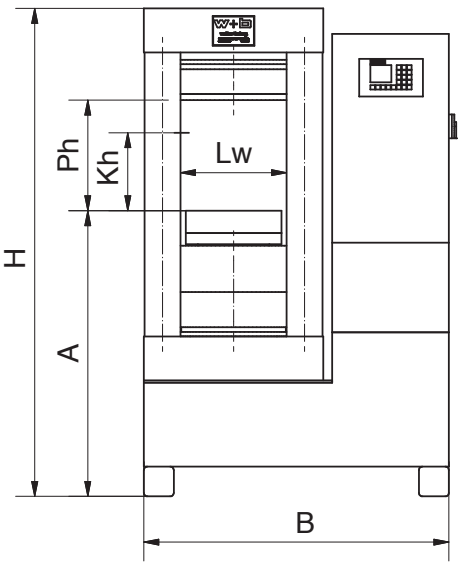
- Paper roll printer
- Displacement transducers
- Testing devices and extensometers

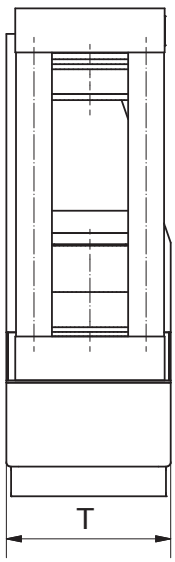
Specifications

Models	Series DC - A Series DC - D	Servo controlled with **DIGICON 2000/3000** Manual controlled with **DIGICON 1000**
Force Capacities	Compression:	2000 kN, 3000 kN
Accuracy	In accordance with ISO 7500-1, Grade 1.	
Colour	Light Grey RAL 7035. Others upon request.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

Technical Data Type DC		2000	3000
Compression Capacity	kN	2000	3000
Accuracy Range	kN	20 - 2000	30 - 3000
Test Chamber Height (Ph)	mm	340	340
Horizontal Daylight (Lw)	mm	355 x 355	355 x 255
Upper Compression Platen Ø	mm	320	320
Lower Compression Platen W x D	mm	320 x 320	320 x 320
Piston Stroke (Kh)	mm	100	100
System Oil Pressure	bar	408	398
Frame Width (B)	mm	1020	1020
Frame Depth (T)	mm	550	550
Frame Height (H)	mm	1600	1600
Working Height (A)	mm	956	1120
Weight	kg	1500	1800
Load Frame Stiffness	kN/mm	3260	3260







Compression Concrete Testing Machines

Series D 3000 - 6000 kN

Standard high stiffness compression frame for compression tests. The frame is designed to be connected to a 19" control console or separate hydraulic power pack.

Standards and Tests

- **Compressive Strength**
  EN 12390 - 4
  ASTM C39

Samples

- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
  Ø 160 x 320 mm
  4"x 8", 6"x 12"
- **Cubes** 100, 150, 200 mm

Frame

- High stiffness 4-column construction
- Single acting ram
- Upper spherically seated compression platen for cylinder test conformity
- Lower fixed compression platen
- Hardness > 55 HRC
- Distance platen 210 x 210 x 110 mm to reduce test chamber height to 230 mm
- Protection device around testing space

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS19 - PA
  - Separate hydraulic power pack PAC
  - Control console with measuring and weighing system SP - W-MS
  - Different testing machine with integrated hydraulic power supply

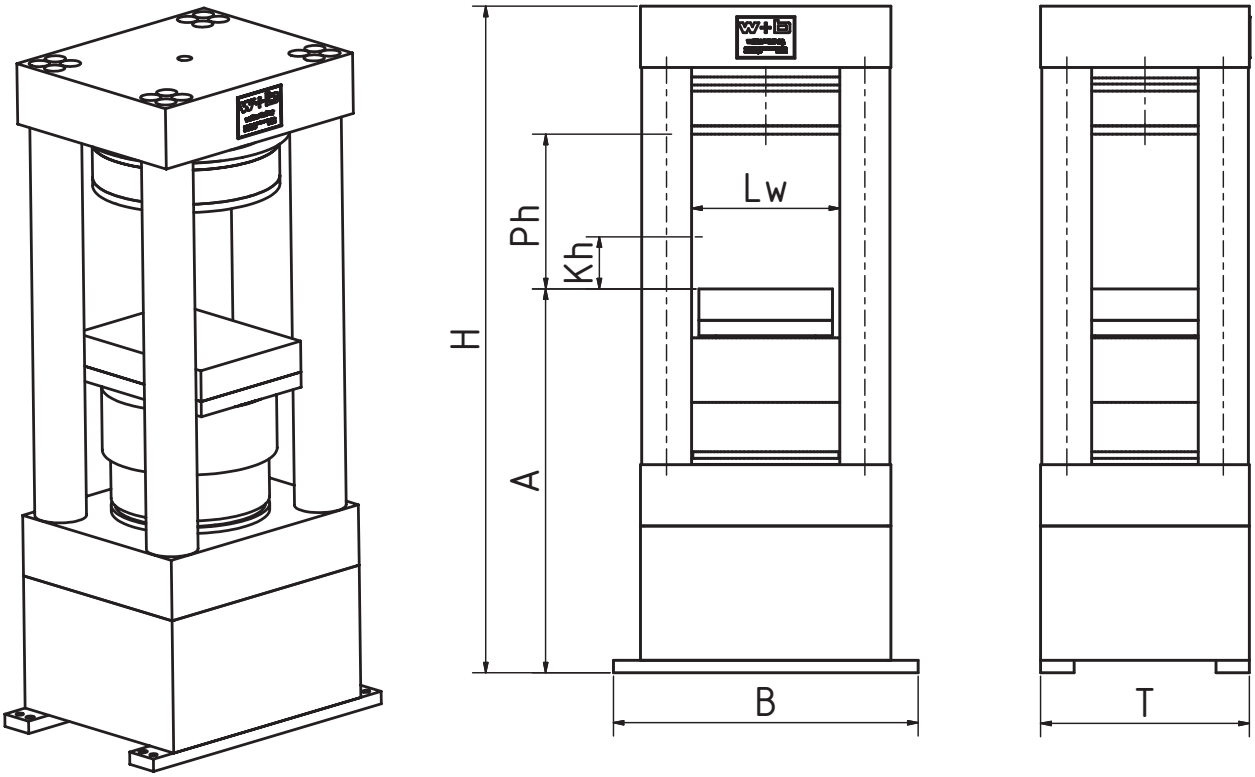
Accessories / Options

- Compression platens 320 x 520 mm
- Precision load cell for grade 0.5
- Displacement transducer
- Testing devices and extensometers

Specifications

Force Capacities	Compression:	3000 kN, 4000 kN, 5000 kN, 6000 kN
Accuracy	In accordance with ISO 7500-1, Grade 1. Optional with precision load cell Grade 0.5.	
Colour	Light Grey RAL 7035. Others upon request.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

Technical Data Type D		1000	3000	4000	4000 HS	5000	6000
Compression Capacity	kN	1000	3000	4000	4000	5000	6000
Accuracy Range	kN	20 - 1000	30 - 3000	40 - 4000	40 - 4000	50 - 5000	60 - 6000
Test Chamber Height (Ph)	mm	340	340	340	340	340	340
Horizontal Daylight (Lw)	mm	355 x 255	355 x 255	450 x 450	450 x 450	450 x 450	450 x 450
Upper Compression Platen	mm	Ø 320	Ø 320	Ø 415	Ø 415	Ø 415	Ø 415
Lower Compression Platen	mm	320 x 320	320 x 320	415 x 415	415 x 415	415 x 415	415 x 415
Piston Stroke (Kh)	mm	200	100	100	100	100	100
System Oil Pressure	bar	204	398	373	373	379	362
Frame Width (B)	mm	600	730	760	960	760	805
Frame Depth (T)	mm	550	500	760	960	760	805
Frame Height (H)	mm	1750	1600	1685	1903	1773	1858
Working Height (A)	mm	920	920	920	1020	949	1014
Weight	kg	1550	1800	4240	7400	4390	5250
Load Frame Stiffness	kN/mm	2950	3500	4200	16000	5490	6100



High Strength Compression Brittle Materials Testing Machines

Series D - S 4000 kN

Specially designed for high strength brittle materials in accordance with EN 772 - 1 with special strengthened upper platen assembly for durable testing.

Standards and Tests

- **Compressive Strength**
  EN 772 - 1

High / Ultra Strength Samples

- Concrete
- Masonry units
- Bricks
- Clay blocks
- Rocks

Frame

- Very high stiffness
  4-column construction
- Upper compression platen assembly is specially strengthened
  - 4 bearings at the upper platen
  - 4 bearings at the upper crosshead
  - 4 shock absorbing elements
- Single acting ram
- Lower platens screwed to the piston
- Hardness > 55 HRC
- Protection device around testing space

Control

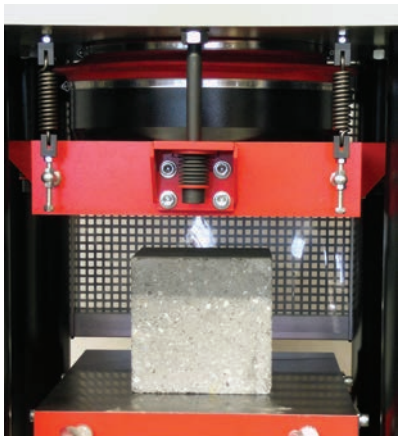
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Different testing machine with integrated hydraulic power supply

Accessories / Options

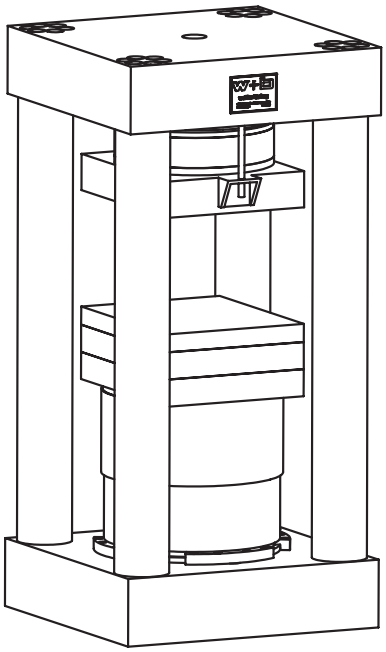
- Distance platens to reduce the test chamber height
- Displacement transducer
- Testing devices
- Extensometers

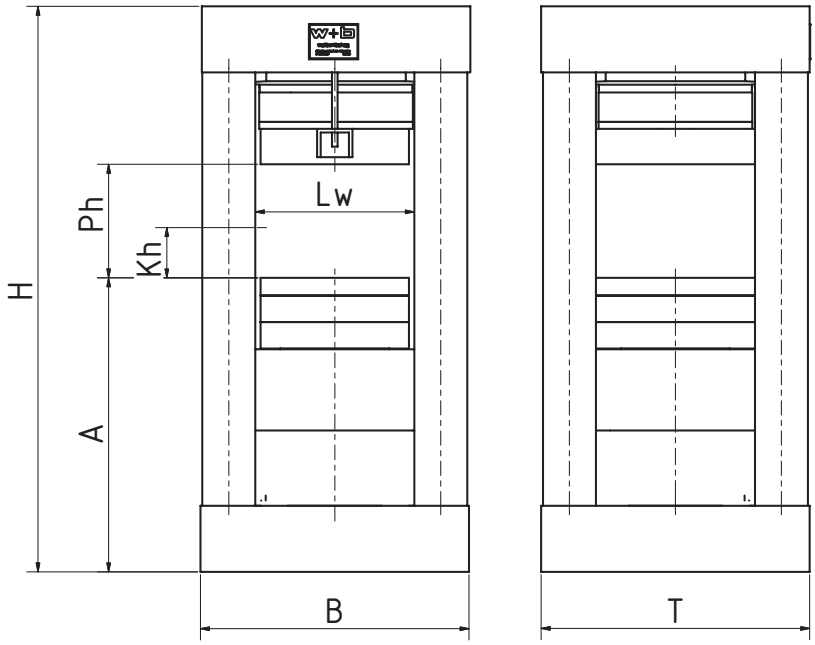
Specifications

Force Capacities	Compression: 4000 kN
Accuracy	In accordance with ISO 7500-1, Grade 1.
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	3 x 400 V, 50 Hz. Others upon request.



Technical Data Type D - S		4000
Compression Capacity	kN	4000
Accuracy Range	kN	40 - 400
Test Chamber Height (Ph)	mm	265
Horizontal Daylight (Lw)	mm	450 x 450
Upper Compression Platen W x D	mm	420 x 520
Lower Compression Platen W x D	mm	420 x 520
Piston Stroke (Kh)	mm	100
System Oil Pressure	bar	400
Frame Width (B)	mm	760
Frame Depth (T)	mm	760
Frame Height (H)	mm	1610
Working Height (A)	mm	920
Weight	kg	3680
Load Frame Stiffness	kN/mm	4100





Compression Concrete Testing Machines

Series DV 1000 - 10 000 kN

Hydraulic movable upper crosshead for easy and accurate positioning. Test set-up for different sample sizes is made very efficient with this feature.

Standards and Tests

- **Compressive Strength**
  EN 12390 - 4, ASTM C39

Samples

- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
  Ø 160 x 320 mm
  4"x 8", 6"x 12"
- **Cubes** 100, 150, 200 mm

Frame

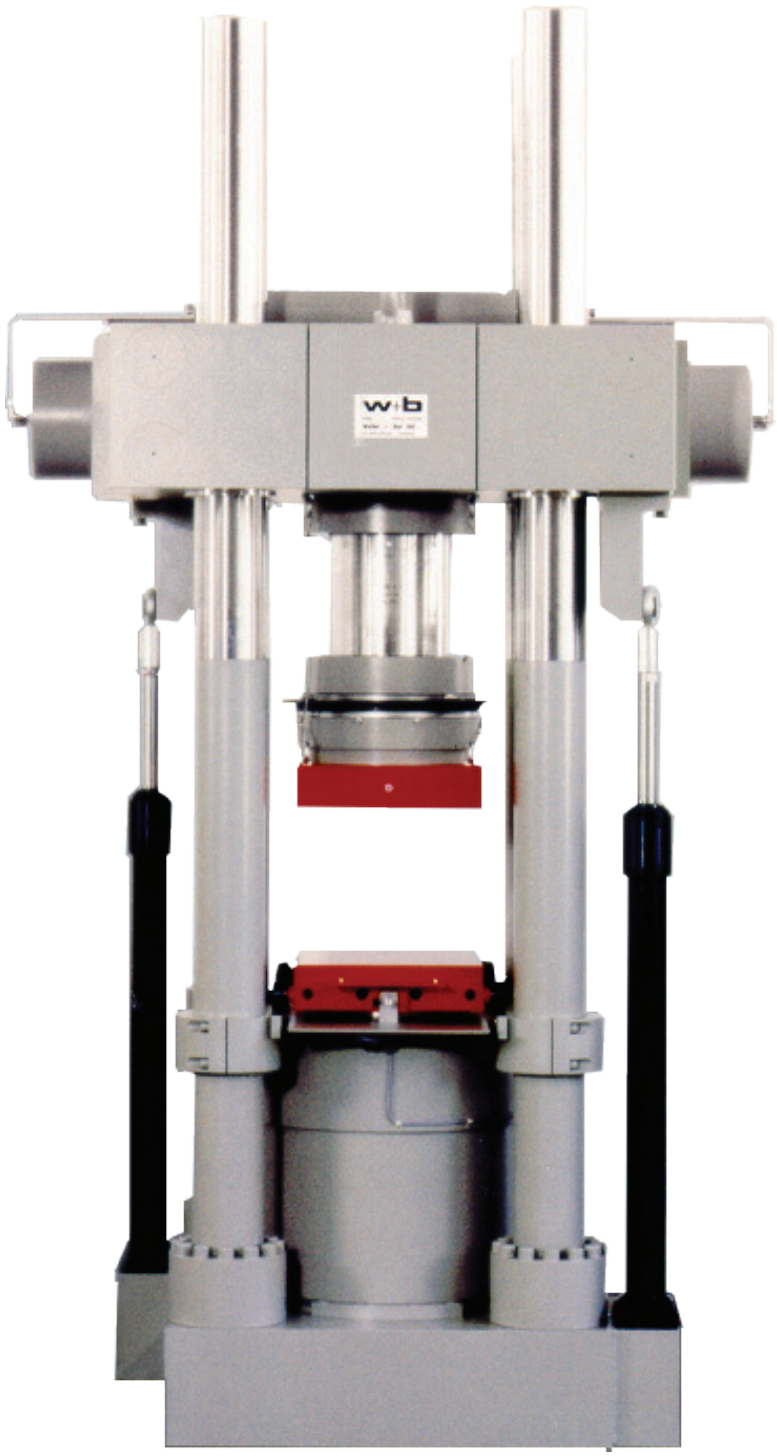
- High stiffness 4-column construction
- Hydraulically movable upper crosshead by two long stroke actuators and passive clamping system onto the columns
- Single acting ram with anti-rotation system to prevent the natural tendency to rotate.
- Upper spherically seated compression platen for cylinder test conformity
- Lower fixed compression platen
- Platens Hardness > 55 HRC
- Protection device around testing space

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Control console with measuring and weighing system SP - W-MS

Accessories / Options

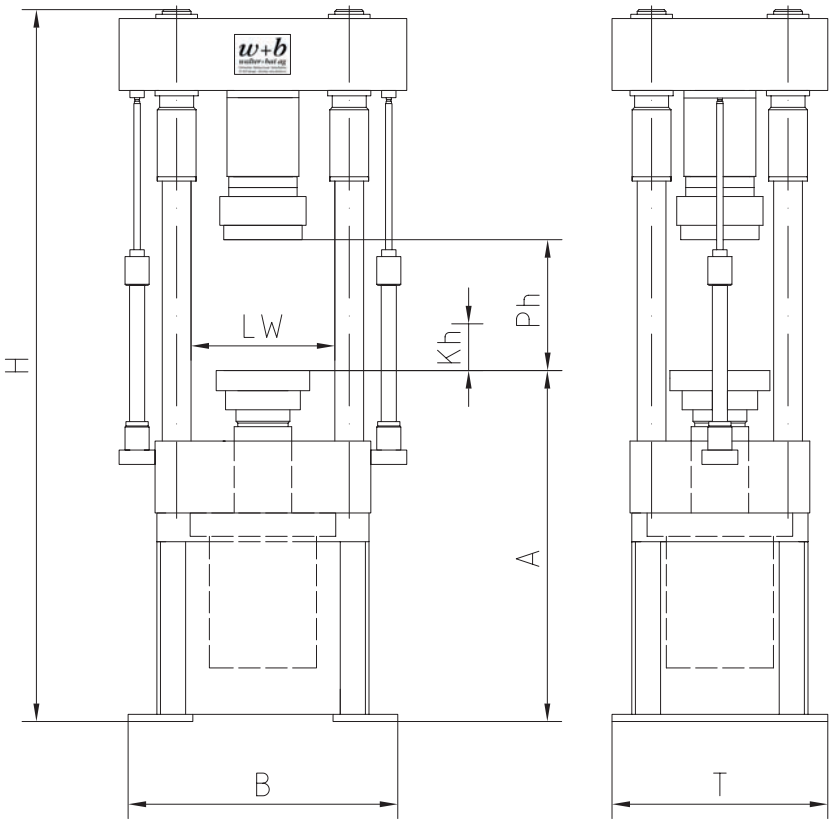
- Increased test chamber height
- Precision load cell for grade 0.5
- Displacement transducer
- Testing devices
- Extensometers



Specifications

Force Capacities	Compression:	1000 kN, 3000 kN, 5000 kN, 10 000 kN
Accuracy		In accordance with ISO 7500-1, Grade 1. Optional with precision load cell Grade 0.5.
Colour		Light Grey RAL 7035. Others upon request.
Power Requirements		3 x 400 V, 50 Hz. Others upon request.

Technical Data Type DV		1000	3000	5000	10 000
Compression Capacity	kN	1000	3000	5000	10 000
Accuracy Range	kN	10 - 1000	30 - 3000	50 - 5000	Upon request!
Test Chamber Height (Ph)	mm	max. 360	max. 800	max. 150	
Horizontal Daylight (Lw)	mm	400 x 300	450 x 450	550 x 510	
Upper Compression Platen W x D	mm	220 x 220	420 x 420	420 x 520	
Lower Compression Platen W x D	mm	260 x 260	420 x 420	420 x 520	
Piston Stroke (Kh)	mm	100	100	100	
System Oil Pressure	bar	290	360	310	
Frame Width (B)	mm	840	1100	1330	
Frame Depth (T)	mm	600	1040	1180	
Frame Height (H)	mm	2000	2800	3300	
Working Height (A)	mm	1000	1000	1070	
Weight	kg	2200	5200	13500	
Load Frame Stiffness	kN/mm	1150	-	-	



Universal Concrete Testing Machines

Series DBZ - 2S 100 - 300 kN

Very versatile testing machines. This machine is configured for 3- and 4-point-bending tests, but allows to execute various other tests due to the construction.

Frame

- Rigid 2-column construction
- Double acting actuator with long piston stroke. With anti-rotation system to prevent the natural tendency to rotate.
- Machine can also be used for tensile tests with 60% of flexural capacity.
- Precision flat load cell mounted between piston rod and bending edge to reach Grade 0.5 acc. EN 7500-1.
- Bending table with T-slots and accurate scale and marks. For easy adjustment of the bending distance, one swivelling and one fix bending support. The upper central support is also swivelling as requested by standards with easy rotating of the support for changing of 3- to 4-point tests.
- Ergonomic working height with excellent access to the testing chamber for efficient and easy testing.

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Different testing machine with integrated hydraulic power supply

Accessories / Options

- Options for upper crosshead adjustment:
  - no adjustment
  - manual clamping and adjustment
  - hydraulic clamping and adjustment
- Protection device around testing space
- Displacement transducer
- Testing devices
- Extensometers
- Deflection measuring systems

Standards and Tests

- **Flexural Strength 3- and 4-Point**
  EN 12390 - 5
  ASTM C78, C293
  EN 1338, EN 1339, EN 1340,
  EN 10834, EN 14488

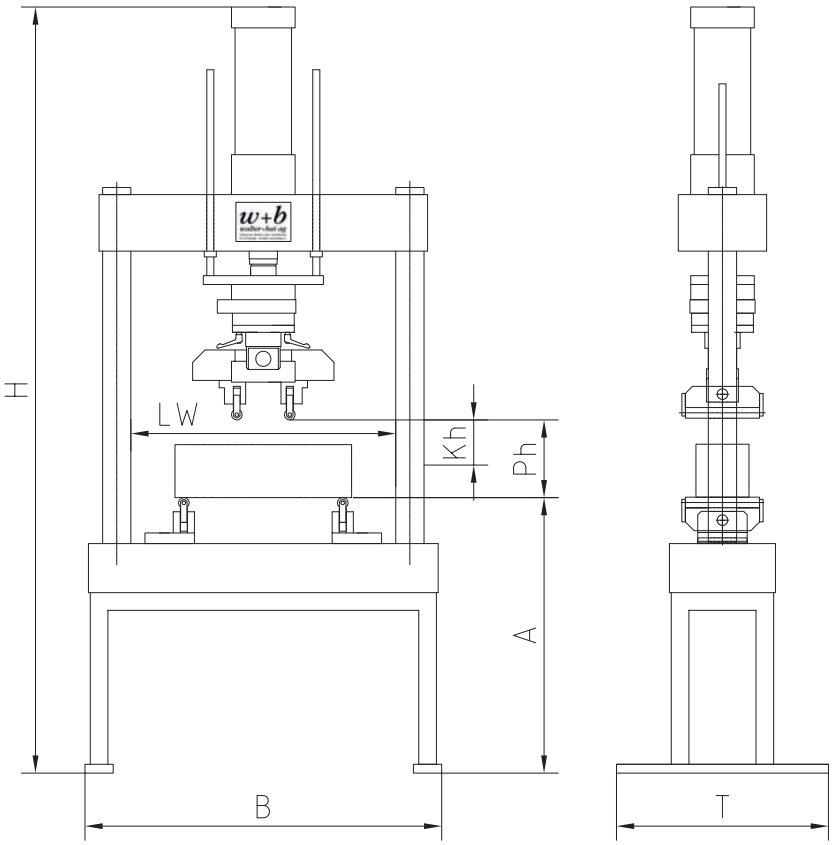
Samples

- **Beams**
  100 x 100 x 400 mm
  100 x 100 x 500 mm
  150 x 150 x 400 mm
  150 x 150 x 500 mm
  200 x 200 x 700 mm

Specifications

Force Capacities	Bending:	100 kN, 150 kN, 200 kN, 300 kN
Accuracy	In accordance with ISO 7500-1, Grade 0.5.	
Colour	Light Grey RAL 7035. Others upon request.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

Technical Data Type DBZ - 2S		100	150	200	300
Flexural Capacity	kN	100	150	200	300
Accuracy Range	kN	1 - 100	1.5 - 150	2 - 200	3 - 300
Test Chamber Height (Ph)	mm	20 - 310	20 - 310	20 - 310	20 - 810
Horizontal Daylight (LW)	mm	750	750	750	500
Bending Roller Ø	mm	20 / 30	20 / 30	20 / 30	20 / 30
Bending Roller Length	mm	210	210	210	210
Lower Support Span	mm	80 - 600	80 - 600	80 - 600	80 - 750
Piston Stroke (Kh)	mm	300	300	300	400
System Oil Pressure	bar	210	240	260	320
Working Height (A)	mm	800	800	800	1000
Frame Width (B)	mm	1010	1010	1010	770
Frame Depth (T)	mm	600	600	600	650
Frame Height (H)	mm	2300	2300	2300	2900
Weight	kg	1000	1100	1200	1160
Load Frame Stiffness	kN/mm	220	220	220	330



Universal Concrete Testing Machines

Series DBZ - 4S 100 - 1000 kN

Very universal concrete testing machines especially configured for energy absorption tests in accordance with EN 10834 and EN 14488.

Frame

- Rigid 4-column construction
- Double acting actuator with long piston stroke. With anti-rotation system to prevent the natural tendency to rotate.
- Machine can also be used for tensile tests with 60% of flexural capacity.
- Precision flat load cell mounted between piston rod and bending edge to reach Grade 0.5 acc. EN 7500-1.
- Ergonomic working height with excellent access to the testing chamber for efficient and easy testing.
- Machine equipped with compression stamp 100 x 100 mm and base frame 600 x 600 x 100 mm for energy absorption test.

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Different testing machine with integrated hydraulic power supply

Accessories / Options

- Options for upper crosshead adjustment:
  - no adjustment
  - manual clamping and adjustment
  - hydraulic clamping and adjustment
- Protection device around testing space
- Displacement transducer
- Testing devices
- Extensometers
- Deflection measuring systems

Standards and Tests

- **Energy Absorption Test**
  EN 10834
  EN 14488-3, -5
  ASTM C1550-08
- **Flexural Strength 3- and 4-Point**
  EN 12390 - 5
  ASTM C78, C293
  EN 1338, EN 1339, EN 1340

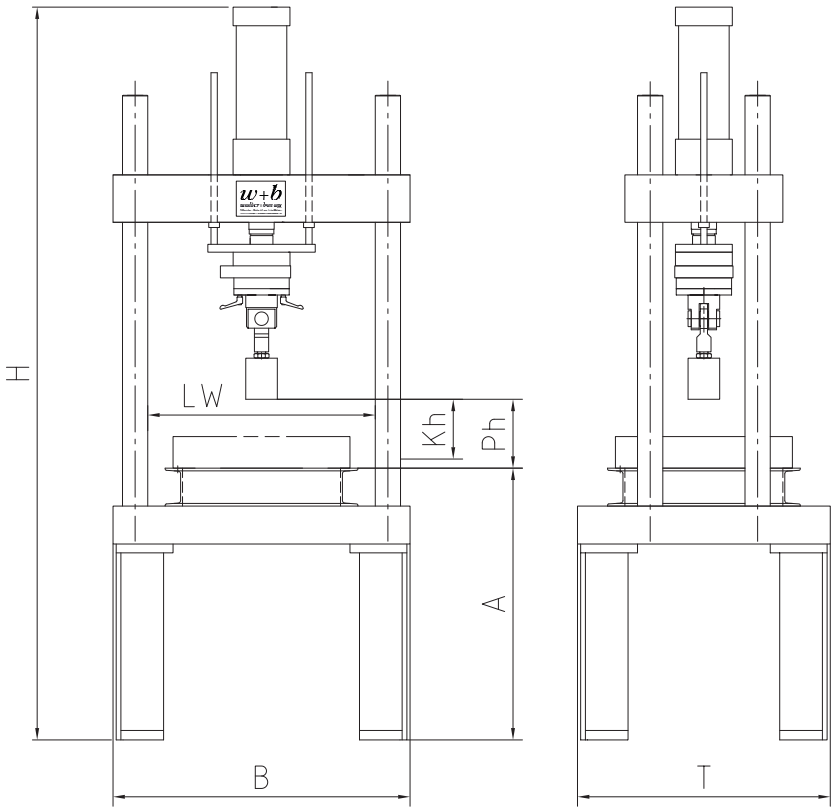
Samples

- **Platens** 600 x 600 x 100 mm
  Ø 800 mm
- **Beams** 100 x 100 x 400 mm
  100 x 100 x 500 mm
  150 x 150 x 400 mm
  150 x 150 x 500 mm
  200 x 200 x 700 mm

Specifications

Force Capacities	Bending:	100 kN, 150 kN, 200 kN, 300 kN, 600 kN, 1000 kN
Accuracy		In accordance with ISO 7500-1, Grade 0.5.
Colour		Light Grey RAL 7035. Others upon request.
Power Requirements		3 x 400 V, 50 Hz. Others upon request.

Technical Data Type DBZ - 4S		100/150	200/300	600	1000
Flexural Capacity	kN	100 / 150	200/300	600	1000
Accuracy Range	kN	1- 100/150	upon request!	upon request!	10 - 1000
Test Chamber Height (Ph)	mm	0 - 530			0 - 210
Horizontal Daylight (Lw)	mm	720 x 260			400 x 300
Compression Stamp	mm	100 x 100			100 x 100
Base Frame W x D	mm	600 x 600			600 x 600
Base Frame Height	mm	100			100
Piston Stroke (Kh)	mm	300			300
System Oil Pressure	bar	240			-
Working Height (A)	mm	850			890
Frame Width (B)	mm	940			700
Frame Depth (T)	mm	800			540
Frame Height (H)	mm	2675			3000
Weight	kg	900			-
Load Frame Stiffness	kN/mm	230			2500



Electromechanical Bending Concrete Testing Machines

Series DBZ - E 20 - 150 kN

Testing machine with innovative oil-free electromechanical drive. The upper crosshead features the electromechanical height adjustment for accurate and easy positioning.

Standards and Tests

- **Flexural Strength 3- and 4-Point**
  EN 12390 - 5
  ASTM C78, C293

Samples

- **Beams** 100 x 100 x 400 mm
  100 x 100 x 500 mm
  150 x 150 x 400 mm
  150 x 150 x 500 mm
  200 x 200 x 700 mm

Frame

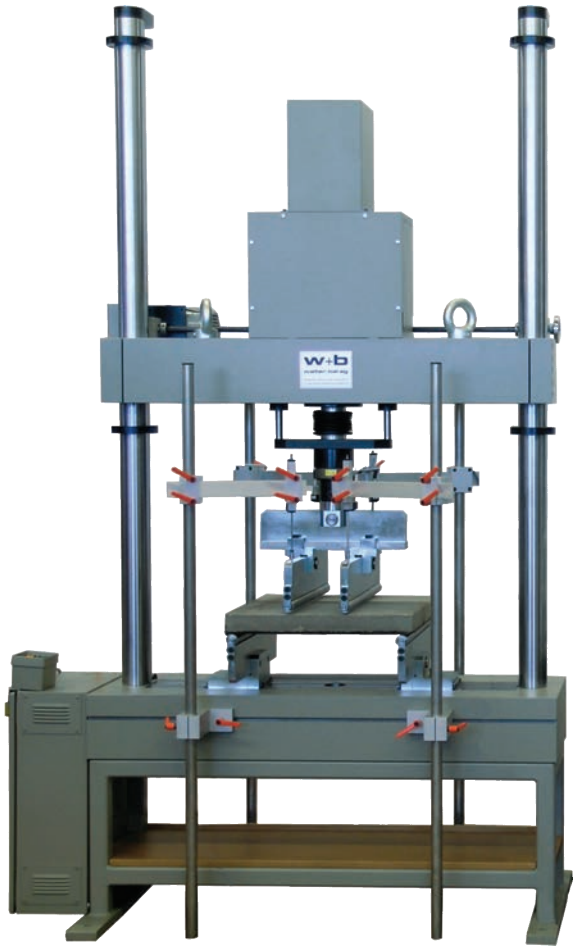
- Rigid 2-column construction
- Electromechanical drive mounted on upper crosshead
- Electromechanically moveable upper crosshead with mechanical clamping for easy and accurate test chamber height adjustment
- One swivelling and one fix bending support for easy adjustment of distance. The upper central support is also swivelling as requested by standards with easy rotating of the support for changing of 3- to 4-point testing.

Control

- Automatic test procedure in closed loop mode in connection with digital controller **DIGICON 2000/3000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**

Accessories / Options

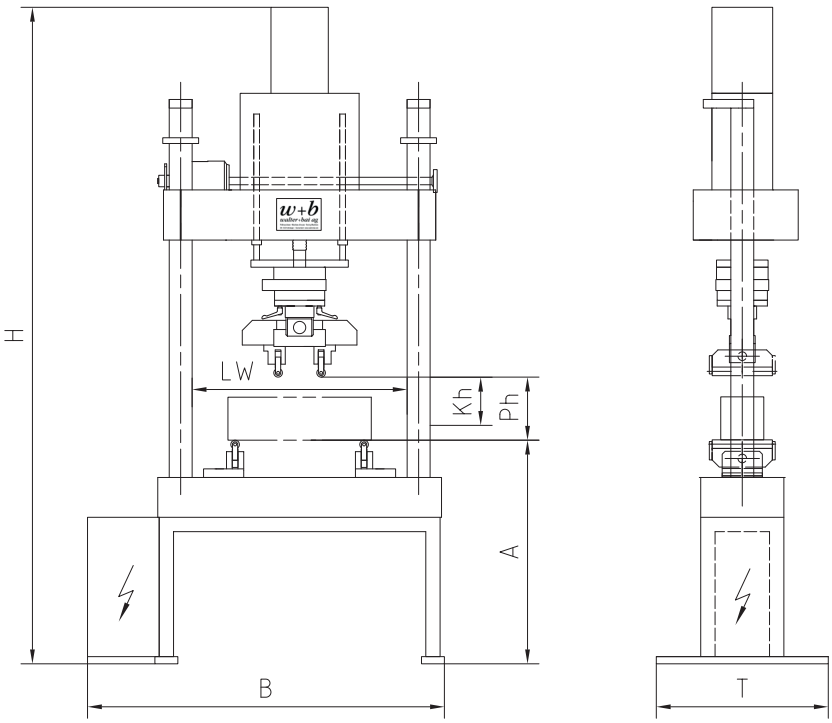
- Options for upper crosshead adjustment:
  - no adjustment
  - manual clamping and adjustment
  - manual clamping, electrical adjustment
- Protection device around testing space
- Testing devices
- Extensometers
- Deflection measuring systems



Specifications

Force Capacities	Bending:	20 kN, 50 kN, 100 kN, 150 kN
Accuracy	In accordance with ISO 7500-1, Grade 0.5.	
Colour	Light Grey RAL 7035. Others upon request.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

Technical Data Type DBZ - E		20	50	100	150
Flexural Capacity	kN	20	50	100	150
Accuracy Range	kN	0.5 - 20	0.5 - 50	1 - 100	1.5 - 150
Test Chamber Height (Ph)	mm	650	650	650	650
Horizontal Daylight	mm	1020	1020	1020	1020
Bending Roller Ø	mm	20 / 30	20 / 30	20 / 30	20 / 30
Bending Roller Length	mm	510	510	510	510
Lower Support Span	mm	80 - 850	80 - 850	80 - 850	80 - 850
Piston Stroke (Kh)	mm	200	200	200	200
Working Height (A)	mm	810	810	810	810
Frame Width (B)	mm	1610	1610	1610	1610
Frame Depth (T)	mm	700	700	700	700
Frame Height (H)	mm	3000	3000	3000	3000
Weight	kg	1600	1600	1600	1600
Load Frame Stiffness	kN/mm	200	200	200	200



Bending and Compression Concrete Testing Machines

Series DB 2000 - 4000 kN / 100 - 300 kN

Very compact testing machine with compression and bending testing areas.

Compression Frame
- Single acting ram
- Upper spherically seated compression platen for cylinder test conformity
- Lower fixed compression platen
- Platens Hardness > 55 HRC
- Protection device around testing space

Bending Frame
- Double acting ram with anti-rotation system to prevent the natural tendency to rotate.
- Precision flat load cell for grade 0.5
- Bending table with one swivelling and one fix bending support for easy adjustment of the bending distance. The upper central support is also swivelling as requested by standards with easy rotating of the support for changing of 3- to 4-point testing.

Overall System
- High stiffness 4-column construction

Control
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Control console with measuring and weighing system SP - W-MS
  - Different testing machine with integrated hydraulic power supply

Accessories / Options
- Testing devices
- Displacement transducers
- Extensometers
- Deflection measuring systems

Standards and Tests
- **Compressive Strength**
  EN 12390 - 4
  ASTM C39
- **Flexural Strength 3- and 4-Point**
  EN 12390 - 5
  ASTM C78, C293
  EN 1338, EN 1339, EN 1340

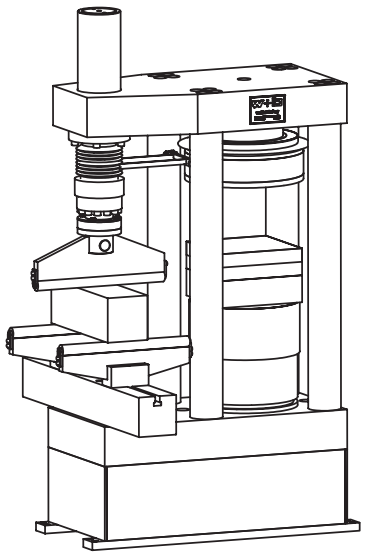
Samples
- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
  Ø 160 x 320 mm
  4"x 8", 6"x 12"
- **Cubes** 100, 150, 200[1] mm
- **Beams** 100 x 100 x 400 mm
  100 x 100 x 500 mm
  150 x 150 x 400 mm
  150 x 150 x 500 mm
  200 x 200 x 700 mm
- **Concrete** KERBS

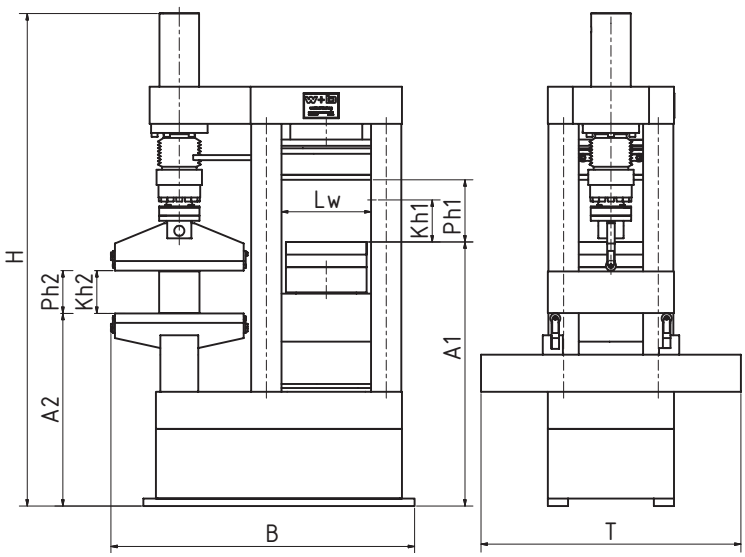
Specifications

Force Capacities	Compression:	2000 kN, 3000 kN, 4000 kN	
	Bending:	100 kN, 150 kN, 200 kN, 300 kN	
	Any compression frame can be combined with any bending frame.		
Accuracy	In accordance with ISO 7500-1	Compression Frame	Grade 1
		Flexural Frame	Grade 0.5
Colour	Light Grey RAL 7035. Others upon request.		
Power Requirements	3 x 400 V, 50 Hz. Others upon request.		

Technical Data Type DB		2000 / XXX	3000 / XXX	4000 / XXX
Overall System		**2000 / XXX**	**3000 / XXX**	**4000 / XXX**
Frame Width (B)	mm	1145	1145	1300
Frame Depth (T)	mm	1030	1030	1030
Frame Height (H)	mm	1955	1955	1985
Weight	kg	2245	2245	4360
Compression Frame		**2000**	**3000**	**4000**
Compression Capacity	kN	2000	3000	4000
Accuracy Range	kN	20 - 2000	30 - 3000	40 - 4000
Test Chamber Height (Ph1)	mm	340	340	340
Horizontal Daylight (Lw)	mm	355 x 255	355 x 255	450 x 450
Upper Compression Platen Ø	mm	320	320	415
Lower Compression Platen W x D	mm	320 x 320	320 x 320	415 x 415
Piston Stroke (Kh1)	mm	100	100	100
Working Height (A1)	mm	925	925	925
System Oil Pressure	bar	408	398	373
Load Frame Stiffness	kN/mm	3500	3500	4200

Bending Frame		100	150	200	300
Flexural Capacity	kN	100	150	200	300
Accuracy Range	kN	1 - 100	1 - 150	2 - 200	3 - 300
Bending Roller Ø	mm	40	40	40	40
Bending Roller Length	mm	510	510	510	510
Lower Support Span	mm	0 - 900	0 - 900	0 - 900	0 - 900
Test Chamber Height (Ph2)	mm	0 - 220	0 - 220	0 - 220	0 - 220
Piston Stroke (Kh2)	mm	220	220	220	220
Working Height (A2)	mm	765	765	765	765
System Oil Pressure	bar	199	297	193	289
Load Frame Stiffness	kN/mm	303	308	312	329





Combined Concrete and Cement Testing Machines

Series DB - H 400 - 1000 kN / 10 - 20 kN

Stand alone testing machine for bending and compression tests on concrete and cement samples in one single machine.

Bending Testing Frame
- Rigid 2-column construction
- Double acting ram
- Bending or compression test devices can be inserted
- Protection device around testing space

Compression Testing Frame
- Rigid 2-column construction
- Double acting ram
- Upper spherically seated compression platen for cylinder test conformity
- Lower fixed compression platen
- Hardness > 55 HRC
- Various optional testing devices can be placed between the compression platens
- Protection device around testing space

Overall System
- Hydraulic power pack with oil-air cooling system is integrated in the base of the machine
- Digital display with optional strip printer can be mounted on the side of the machine.

Control
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**

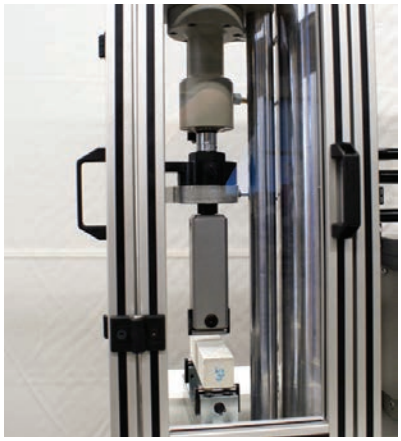
Accessories / Options
- Paper roll printer
- Displacement transducers
- Cement testing devices
- Concrete testing devices
- Extensometers

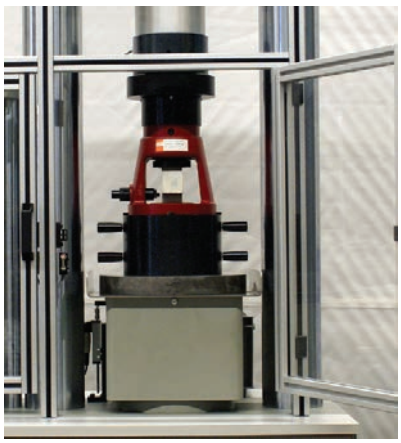
Concrete Standards and Tests
- **Compressive Strength**
  EN 12390 - 4
  ASTM C39

Samples
- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
  Ø 160 x 320 mm
  4"x 8", 6"x 12"
- **Cubes** 100, 150, 200 mm

Cement Standards and Tests
- **Compressive Strength and Flexural Strength**
  EN 196 - 1

Samples
- **Prisms** 40 x 40 x 160 mm

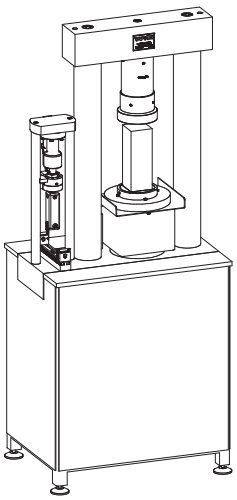


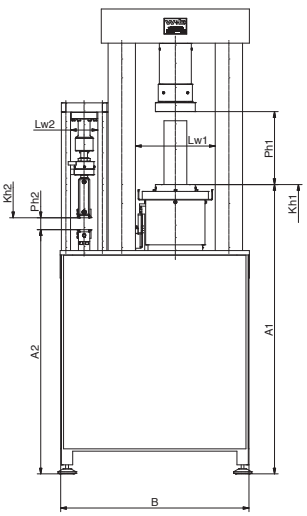


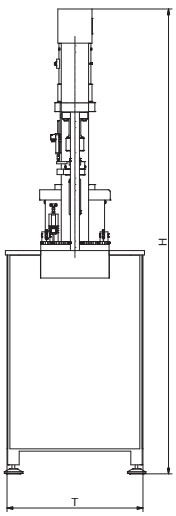
Specifications

Models	Series DB - H - A Series DB - H - D	Servo controlled with **DIGICON 2000/3000** Manual controlled with **DIGICON 1000**	
Force Capacities	Concrete Frame: Cement Frame: Any concrete frame can be combined with any cement frame.	400 kN, 600 kN, 1000 kN 10 kN, 15 kN, 20 kN	
Accuracy	In accordance with ISO 7500-1	Concrete Frame Cement Frame	Grade 1 Grade 0.5
Colour	Light Grey RAL 7035. Others upon request.		
Power Requirements	3 x 400 V, 50 Hz. Others upon request.		

Technical Data Type DB - H		**400 / XX**	**600 / XX**	**1000 / XX**
Overall System		**400 / XX**	**600 / XX**	**1000 / XX**
Overall Width (B)	mm	830	830	830
Overall Depth (T)	mm	610	610	610
Overall Height (H)	mm	2040	2040	2040
Weight	kg	850	900	1000
Compression Frame		**400**	**600**	**1000**
Compression Capacity	kN	400	600	1000
Accuracy Range	kN	4 - 400	6 - 600	10 - 1000
Test Chamber Height (Ph1)	mm	320	320	320
Horizontal Daylight (Lw1)	mm	350	350	350
Upper Compression Platen Ø	mm	175	175	175
Lower Compression Platen Ø	mm	175	175	175
Piston Stroke (Kh1)	mm	50	50	50
System Oil Pressure	bar	180	270	-
Working Height (A1)	mm	1270	1270	1270
Load Frame Stiffness	kN/mm	1500	1500	1500
Bending Frame		**10**	**15**	**20**
Flexural Capacity	kN	10	15	20
Accuracy Range	kN	0.1 - 10	0.15 - 15	0.2 - 20
Test Chamber Height (Ph2)	mm	260	260	260
Horizontal Daylight (Lw2)	mm	120	120	120
Bending Roller Ø	mm	10	10	10
Bending Roller Length	mm	50	50	50
Lower Support Span	mm	40 - 260	40 - 260	40 - 260
Piston Stroke (Kh2)	mm	30	30	30
System Oil Pressure	bar	80	120	160
Working Height (A2)	mm	1070	1070	1070
Load Frame Stiffness	kN/mm	440	440	440







Universal Bending Testing Machines with Extra Wide Bending Table

Series B - S 50 - 200 kN

Very universal bending testing machines with 6 meter wide bending table. With appropriate accessories the machine can universally be used for tensile and compression tests.

Standards and Tests

- **Flexural Strength 3- and 4-Point**
  EN 12390 - 5
  ASTM C78, C293

Samples

- **Beams** - Concrete
  - Timber
  - Other

Frame

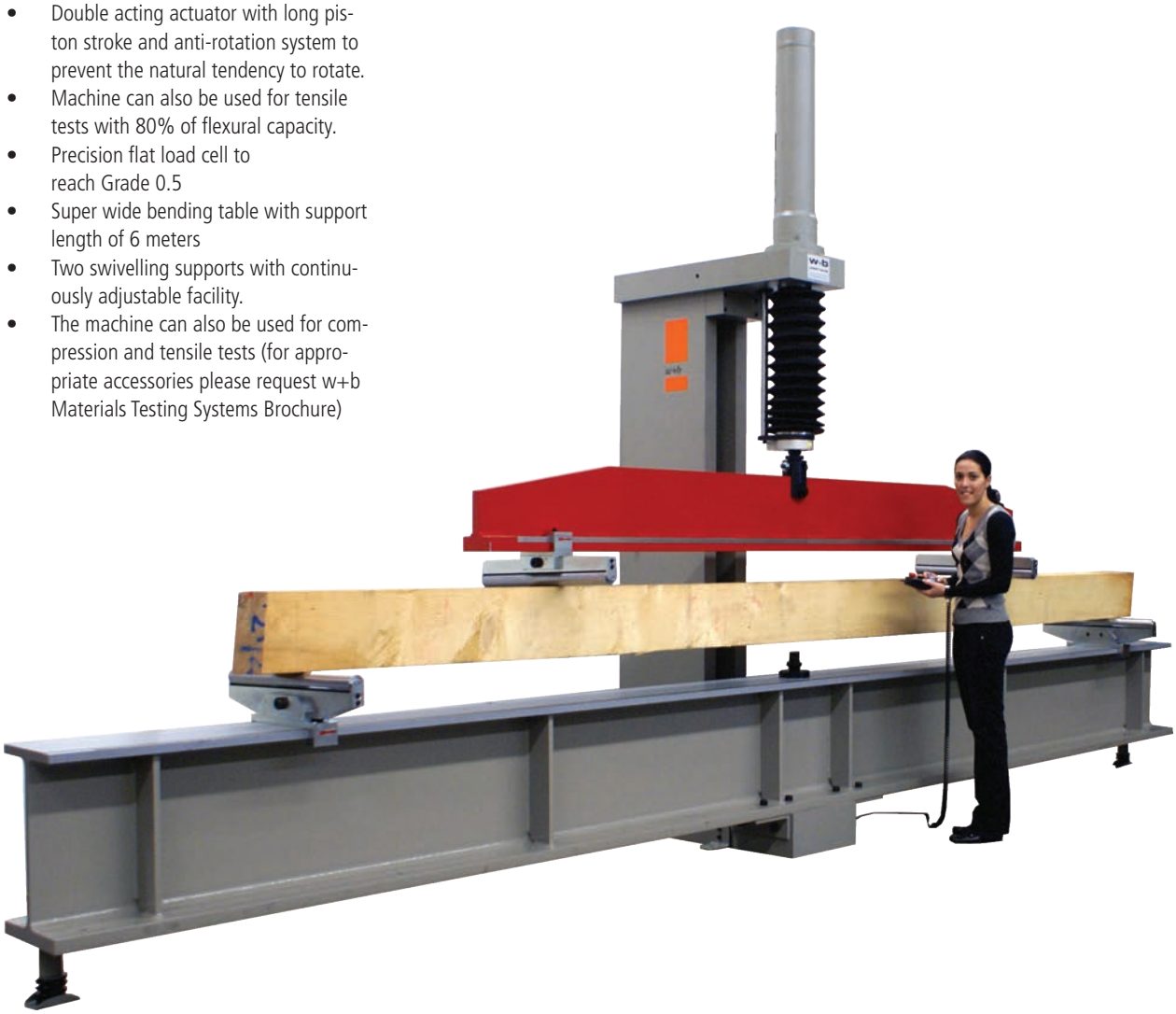
- Rigid C-shape construction
- Double acting actuator with long piston stroke and anti-rotation system to prevent the natural tendency to rotate.
- Machine can also be used for tensile tests with 80% of flexural capacity.
- Precision flat load cell to reach Grade 0.5
- Super wide bending table with support length of 6 meters
- Two swivelling supports with continuously adjustable facility.
- The machine can also be used for compression and tensile tests (for appropriate accessories please request w+b Materials Testing Systems Brochure)

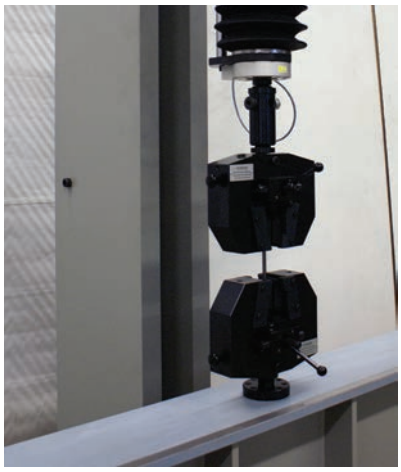
Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Different testing machine with integrated hydraulic power supply

Accessories / Options

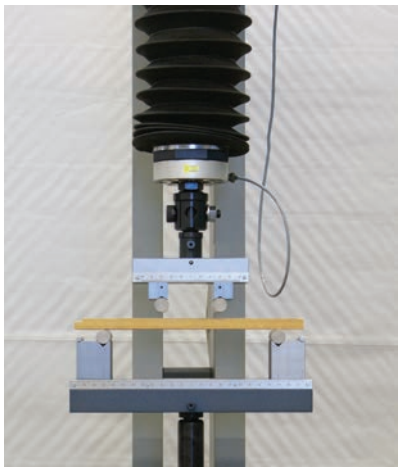
- 4-point bending beam
- Testing devices
- Extensometers
- Deflection measuring systems



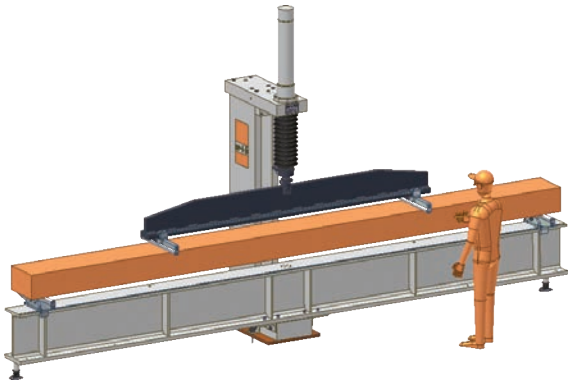


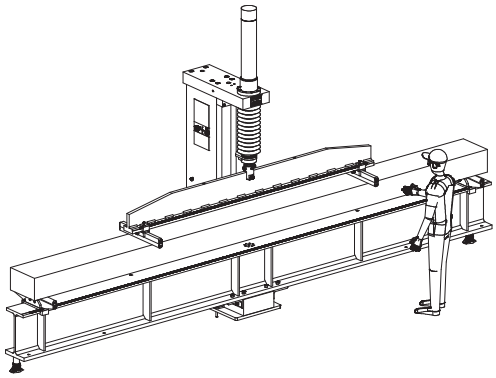
Specifications

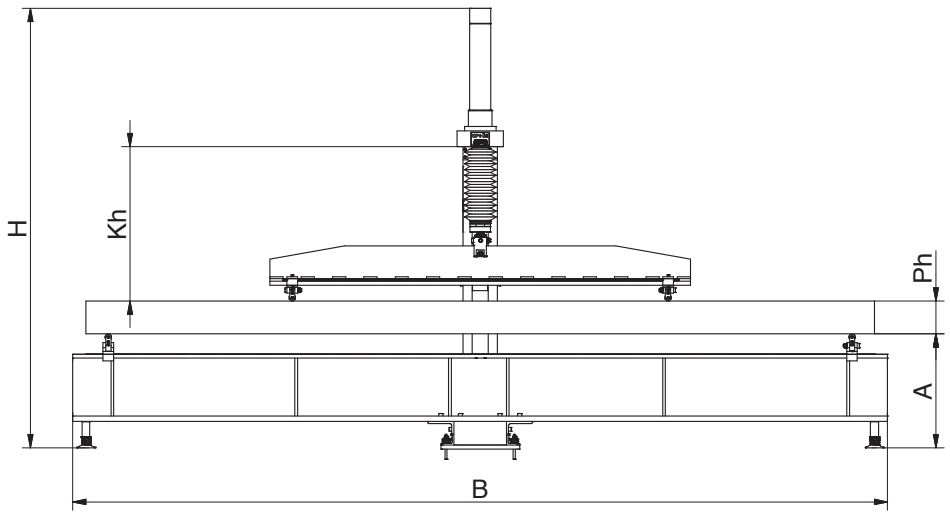
Force Capacities	Flexural:	50 kN, 100 kN, 150 kN, 200 kN, 300 kN
Accuracy	In accordance with ISO 7500-1, Grade 0.5.	
Colour	Light Grey RAL 7035. Others upon request.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

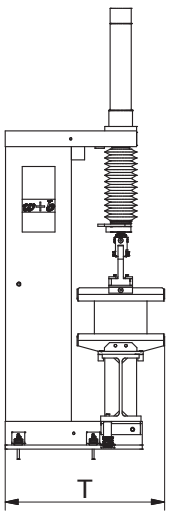


Technical Data Type B - S		50	100	150	200
Flexural Capacity	kN	50	100	150	200
Accuracy Range	kN	0.5 - 50	1 - 100	1.5 - 150	Upon request!
Test Chamber Height (Ph)	mm	75 - 725	75 - 725	75 - 725	
Bending Roller Ø	mm	50	50	50	
Bending Roller Length	mm	650	650	650	
Lower Support Span	mm	150 - 6000	150 - 6000	150 - 6000	
Piston Stroke (Kh)	mm	650	650	650	
System Oil Pressure	bar	140	140	140	
Working Height (A)	mm	880	880	880	
Frame Width (B)	mm	6200	6200	6200	
Frame Depth (T)	mm	1220	1220	1220	
Frame Height (H)	mm	3355	3355	3355	
Weight	kg	5200	5200	5200	









Concrete Pipe Crushing Testing Machines

Series SDM 500 - 1500 kN

Specially designed for crushing tests on sewer and drain pipes, concrete pipes, fittings, cones and others in accordance with EN 1916.

Standards and Tests

- **Compressive Strength**
  EN 1916

Samples

- **Pipes**
  max. Ø 2000 x 2500 mm length

Frame

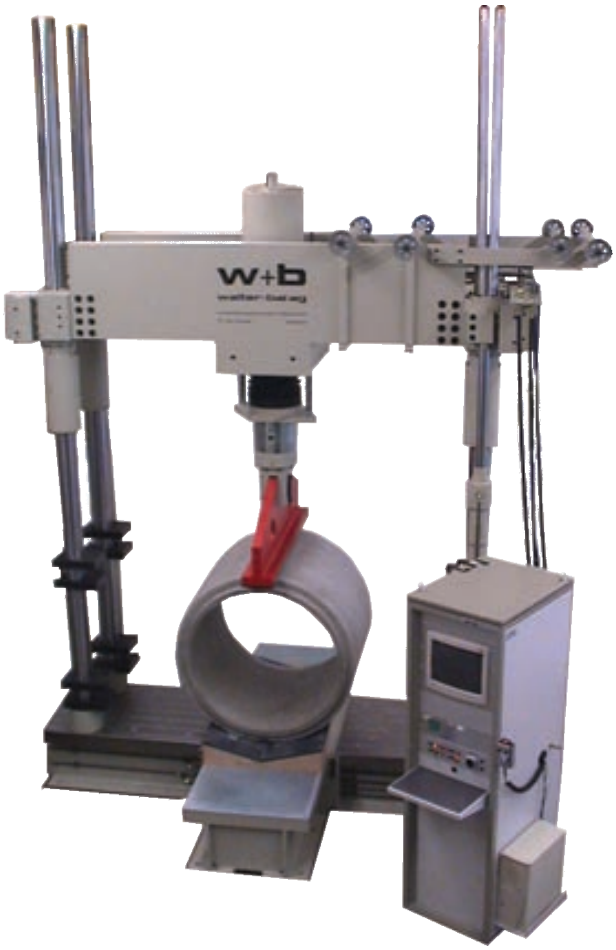
- Rigid 2- or 4-column construction
- Double acting actuator with integrated displacement transducer and anti-rotation system
- Rectangular shaped top bearer is detachable from the actuator
- Bottom bearer is V - shaped with an included angle of 150°
- The system does not permit rotation at horizontal plane but allows it at vertical plane of a min. value of ± 8°

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC

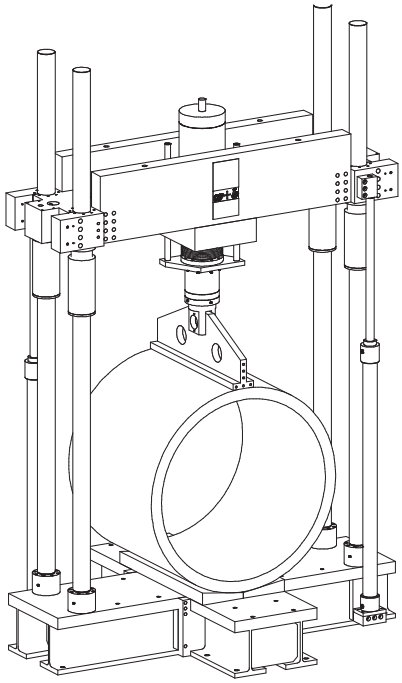
Accessories / Options

- 3- and 4-point bending accessories
- Crosshead adjustment systems (see following pages)
- Drive-In cart (see following pages)
- Horizontal actuators for biaxial testing (see following pages)
- Precision load cell
- Testing devices
- Extensometers
- Deformation measuring systems

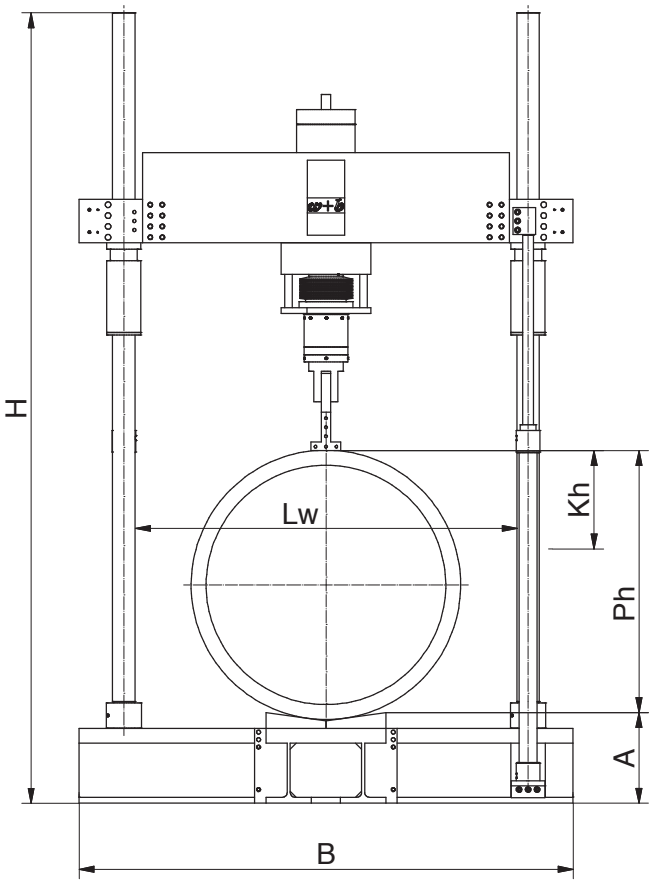


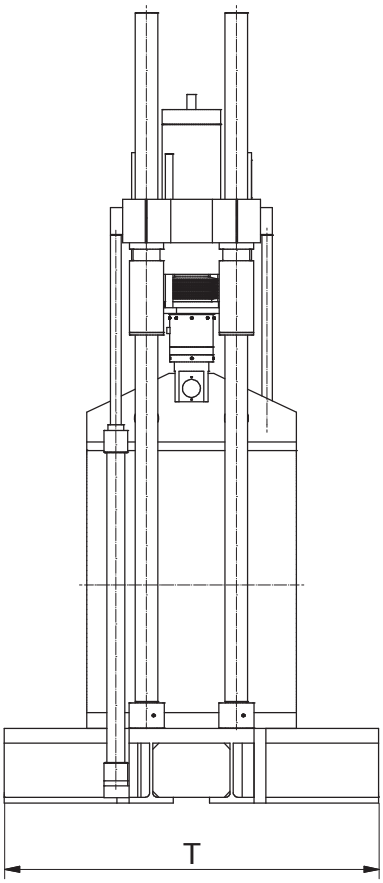
Specifications

Force Capacities	Compression:	500 kN, 1000 kN, 1500 kN
Accuracy		In accordance with ISO 7500-1, Grade 2. Optional with precision load cell Grade 1.
Colour		Light Grey RAL 7035. Others upon request.
Power Requirements		3 x 400 V, 50 Hz. Others upon request.



Technical Data Type SDM		500	1000	1500
Compression Capacity	kN	500	1000	1500
Accuracy Range	kN	5 - 500	10 - 1000	15 - 1500
Test Chamber Height (Ph)	mm	2710	2710	2710
Horizontal Daylight (Lw)	mm	2550	2550	2550
Upper Bending Beam W x D	mm	200 x 1400	200 x 1400	200 x 1400
Lower Bending Table W x D	mm	800 x 2500	800 x 2500	800 x 2500
Piston Stroke (Kh)	mm	500	500	500
System Oil Pressure	bar	300	300	300
Working Height	mm	520	520	520
Frame Width (B)	mm	3750	3750	3750
Frame Depth (T)	mm	2500	2500	2500
Frame Height (H)	mm	6000	6000	6000
Weight	kg	7500	14200	20000





Biaxial Masonry Testing Machines

Series SDM - B 500 - 1500 kN / 75 - 100 kN

For the Series SDM optional horizontal actuators are available for biaxial testing of masonry for the determination of compressive, shear and flexural strength under predefined static vertical compression loads in accordance with EN 1052.

Sample Sizes

- **Masonry**
  Length 1400 mm
  Width 400 mm
- Others upon request!

Standards and Tests

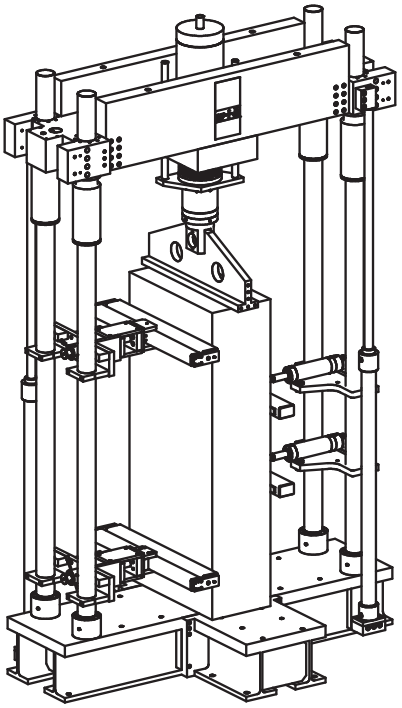
- **Compressive Strength and Elastic Modulus**
  EN 1052 - 1
- **Initial Shear Strength**
  EN 1052 - 3 and - 4
- **Flexural Strength**
  EN 1052 - 2
- **Flexural Strength under a predefined static vertical compression load**
  EN 1052 - 2
- **Initial Shear Strength**
  EN 1052 - 2

Accessories / Options

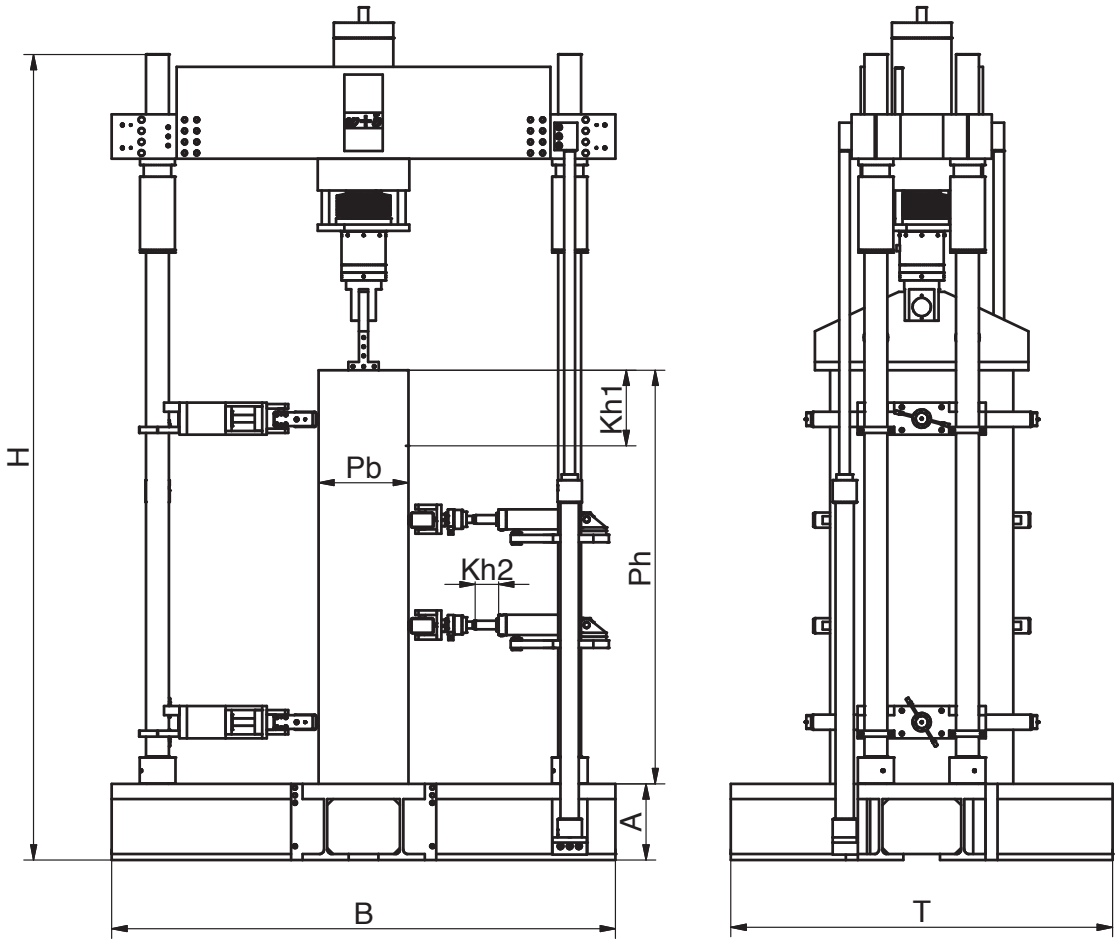
- **Testing of Floor Systems:**
  shear test of beam and block floor system in accordance with EN 15037 - 1
- Deformation measuring systems

Specifications

Force Capacities	Compression: 500 kN, 700 kN, 1000 kN
Accuracy	In accordance with ISO 7500-1, Grade 2. Optional with precision load cell Grade 1.
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	3 x 400 V, 50 Hz. Others upon request.



Technical Data Type SDM - B		500	1000	1500
Compression Capacity	kN	500	1000	1500
Accuracy Range	kN	5 - 500	10 - 1000	15 - 1500
Piston Stroke (Kh)	mm	500	500	500
Horizontal Actuators Test Force	kN	75 / 100	75 / 100	75 / 100
Accuracy Range	kN	1 - 75 / 100	1 - 75 / 100	1 - 75 / 100
Horizontal Actuators Piston Stroke	mm	200	200	200
Test Chamber Height (Ph)	mm	2710	2710	2710
Horizontal Test Space (Pb)	mm	25 - 415	25 - 415	25 - 415
Upper Bending Beam W x D	mm	200 x 1400	200 x 1400	200 x 1400
Horizontal Compression Stamps	mm	1300 x 50	1300 x 50	1300 x 50
System Oil Pressure	bar	300	300	300
Working Height	mm	520	520	520
Frame Width (B)	mm	3750	3750	3750
Frame Depth (T)	mm	2500	2500	2500
Frame Height (H)	mm	6000	6000	6000
Weight	kg	7500	14200	20000



Upper Crosshead Adjustment Systems

to facilitate quick, easy and accurate positioning

Manual

- **Lock:** **Manual** through locking pins
- **Lift:** **Manual** through crank handle

Electrical

- **Lock:** **Manual** through locking pins
- **Lift:** **Electrical** through motor drive

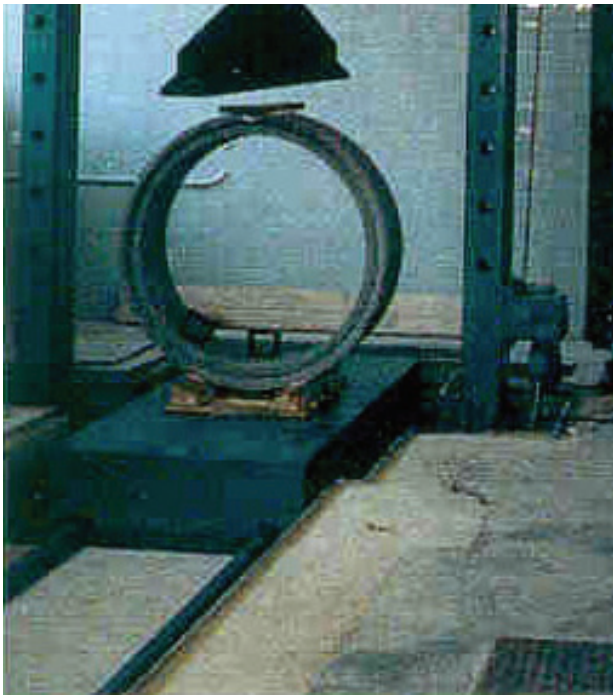
Hydraulic

- **Lock:** **Hydraulic** through passive clamping and hydraulic unlocking
- **Lift:** **Hydraulic** through two long stroke actuators

Drive-In Cart

for easy loading of the pipes with a crane and for the test preparation

The cart can be pushed easily by hand into the testing machine. Inside the machine, the trolley is automatically lowered on the base of the machine through a hydraulic system controlled at the console. Rolling track according to customer needs, at least 4 meters long. If the machine is not lowered into the floor, the tracks can be mounted on distance blocks to compensate the height difference.



Gully and Manhole Top Testing Machines

Series D - GT 500 - 1000 kN

Specially designed for testing of gully and manhole tops for vehicular and pedestrian areas according to EN 124.

Standards and Tests
- **Compressive Strength**
  EN 124

Samples
- **Gully and Manhole Tops**
  max. 900 x 1400 x 550 mm

Frame
- Large load frame for convenient operation
- High stiffness 4-column construction
- Double acting actuator with integrated displacement transducer and anti-rotation system
- Differential pressure transducer
- Upper spherically seated compression platen

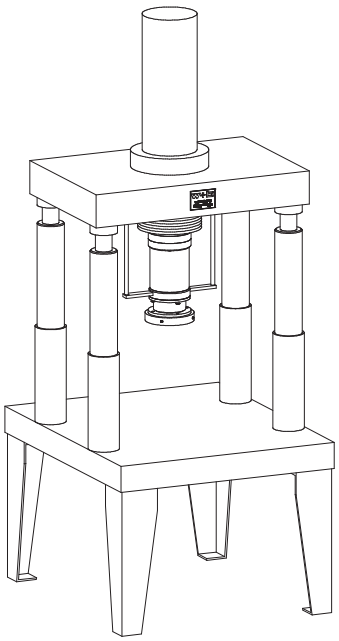
Control
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Different testing machine with integrated hydraulic power supply

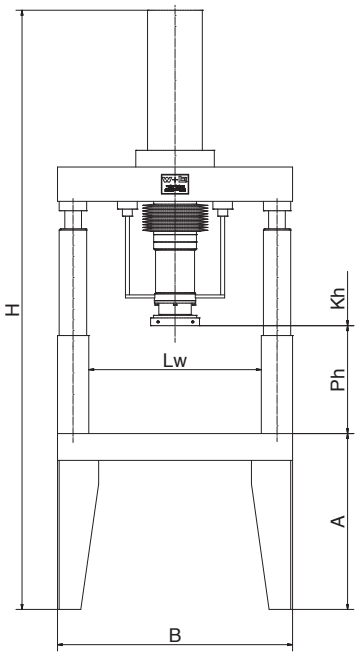
Accessories / Options
- Precision load cell
- Testing devices
- Extensometers
- Displacement Transducer

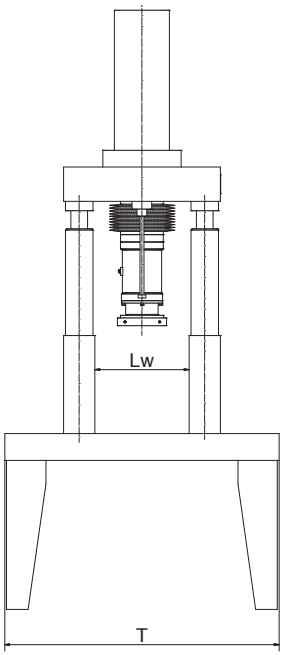
Specifications

Force Capacities	Compression: 500 kN, 1000 kN
Accuracy	In accordance with ISO 7500-1, Grade 2. Optional with precision load cell Grade 1.
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	3 x 400 V, 50 Hz. Others upon request.

Technical Data Type D - GT		500	1000
Compression Capacities	kN	500	1000
Tensile Capacities	kN	400	800
Accuracy Range	kN	5 - 500	10 - 1000
Test Chamber Height (Ph)	mm	150 - 550	150 - 550
Vertical Daylight (Lw)	mm	900x500	900x500
Upper Compression Platen Ø	mm	250	250
Piston Stroke (Kh)	mm	400	400
System Oil Pressure	bar	200	200
Frame Width (B)	mm	1200	1200
Frame Depth (T)	mm	1400	1400
Frame Height (H)	mm	2900	2900
Working Height (A)	mm	900	900
Weight	kg	4100	4100
Load Frame Stiffness	kN/mm	1700	1700







Creep
Testing Machines
Series HKB 100 - 1000 kN

For creep tests on building materials by means of a pressure exerted load. Test can be carried out either on a single sample or on several samples in series. Test duration up to several years.

Standards and Tests
- **Long Term Creep Test**

Samples
- **Cylinders** max. Ø 160 mm
- **Cubes** max. 150 mm
- **Other Samples**

Frame
- Rigid 4-column construction
- Upper crosshead is adjustable in height.
- Upper compression platen is spherically seated with ± 2.5° mobility
- Hydro pneumatic loading device is integrated in the base of the machine
- The force is kept constant by a compressed gas storage system
- The load cylinder is put under pressure by a hand or motor driven pump
- Intermediate platen with centring device to the columns to test two or three samples in series

Pressurized Oil Supply
- A hand pump with oil tank, connecting hose and coupling are included as standard
- The pump serves to produce the pressure corresponding to the required force, as well as to correct the force during the long-term test.
- Any number of machines can be driven by one pump

Force Read Out
- Digital: Pressure transducer and Digital read-out **DIGICON 1000/E725**
- Optional data acquisition with creep testing software **PROTEUS CREEP**

Accessories / Options
- Motorized pump
- Mechanical or electronic deformation measurement systems for precise measurements during the test
- Other test chamber heights
- Extensometers

Specifications

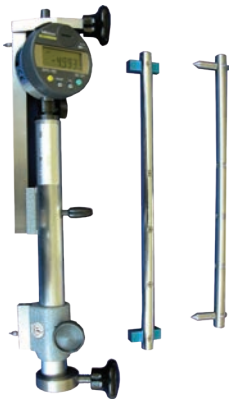
Force Capacities	Compression: 100 kN, 250 kN, 400 kN, 600 kN, 1000 kN
Accuracy	In accordance with ISO 7500-1, Grade 1. 10% to 100%.
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	- with optional digital read out **DIGICON 1000:** 230 V, 50 Hz

Technical Data Type HKB		100	250	400	600	1000
Compression Capacity	kN	100	250	400	600	1000
Accuracy Range	kN	10 - 100	25 - 250	40 - 400	60 - 600	100-1000
Max. Test Chamber Height	mm	290 - 860	290 - 860	290 - 860	290 - 860	290-1250
Upper Compression Platen Ø	mm	200	200	200	200	200
Lower Compression Platen Ø	mm	200	200	200	200	200
Piston Stroke	mm	20	20	20	20	20
Frame Width	mm	980 / 640	980 / 640	980 / 640	980 / 640	980 / 640
Frame Depth	mm	540	540	540	540	540
Frame Height	mm	2060	2060	2500	2500	2500
Working Height	mm	700	700	700	700	700
Weight	kg	420	510	650	700	750
Load Frame Stiffness	kN/mm	500	500	650	650	750

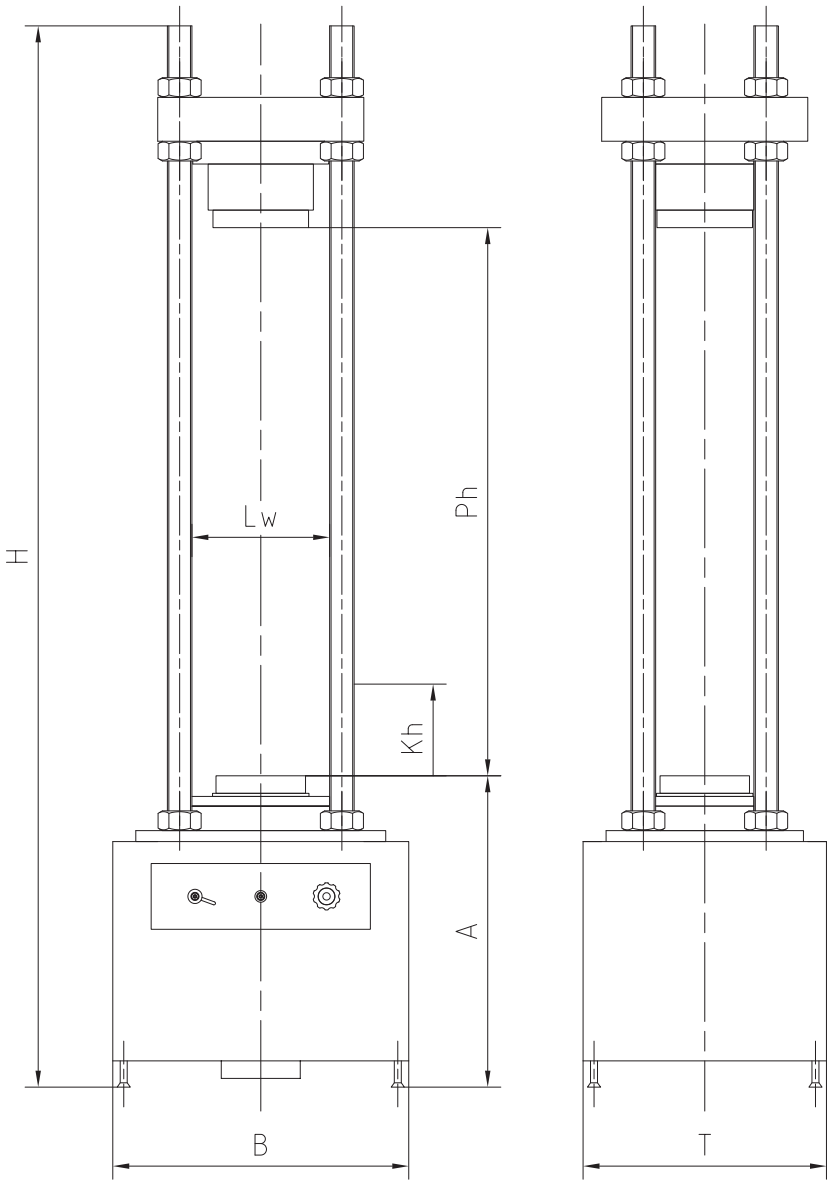
Electronic Deformation Measurement Series LVDT

Measuring Range: 1, 2.5, 5 or 10 mm
Fixtures clued onto the sample.

Mechanical Deformation Measurement Series DM



Measuring Range: 5 mm
Measuring Base: 20 - 200 mm variable

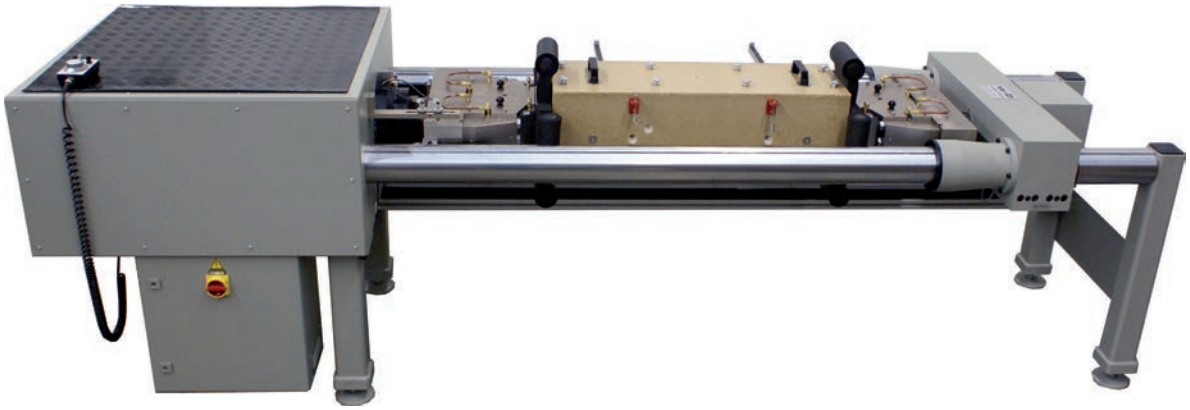


Temperature Stress Testing Machine (TSTM) For Studies on Early-Age Behaviour of Concretes and Fibre Reinforced Concretes

Type LFMZ - H up to 400 kN

TSTM Test Systems are used, along with suitable accessories, to investigate early age mechanical behaviour, monitoring of stiffness, creep or the relaxation of concrete sample from setting time, to investigate the reinforcement on early-age concrete, temperature stress or for experimental study on early-age crack of concrete under a controlled temperature history.

The system allows tests on concrete in tension or in compression direction from setting time under free and restraint conditions to investigate the response at an early age.
Among others the Young's modulus, the creep or the relaxation with active compensation of shrinkage, total restraint, in single or incremental loading histories or cyclic loading applied at regular intervals in tension or in compression of the sample can be monitored at early age at the end of the setting time. The setting time can be determined for example with a so called FreshCon device allowing the determination of the setting time on basis of ultrasonic measurements.
The Testing Machine allows to be controlled in displacement / deformation or in force control.

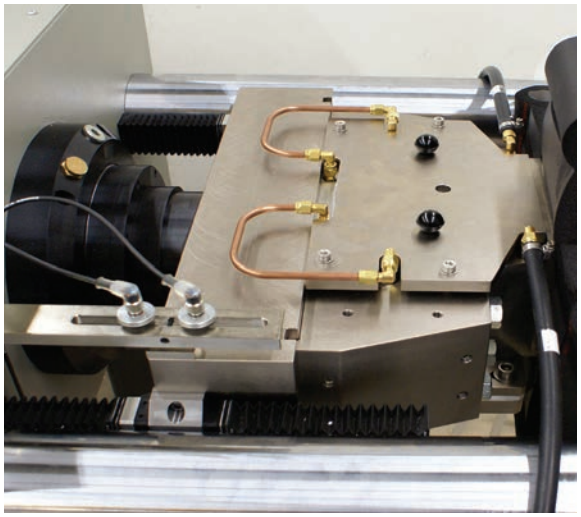


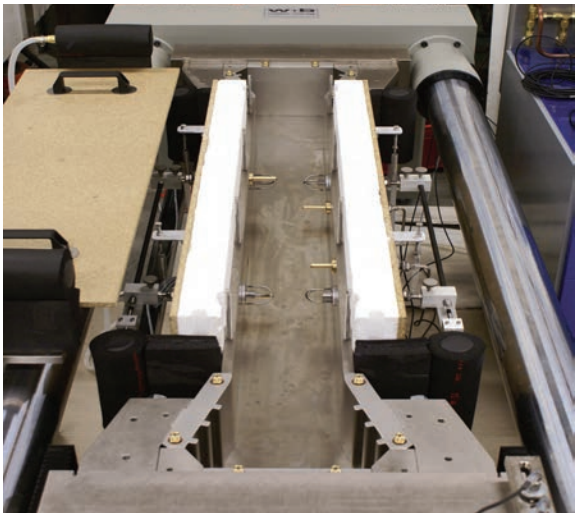
Temperature Control System

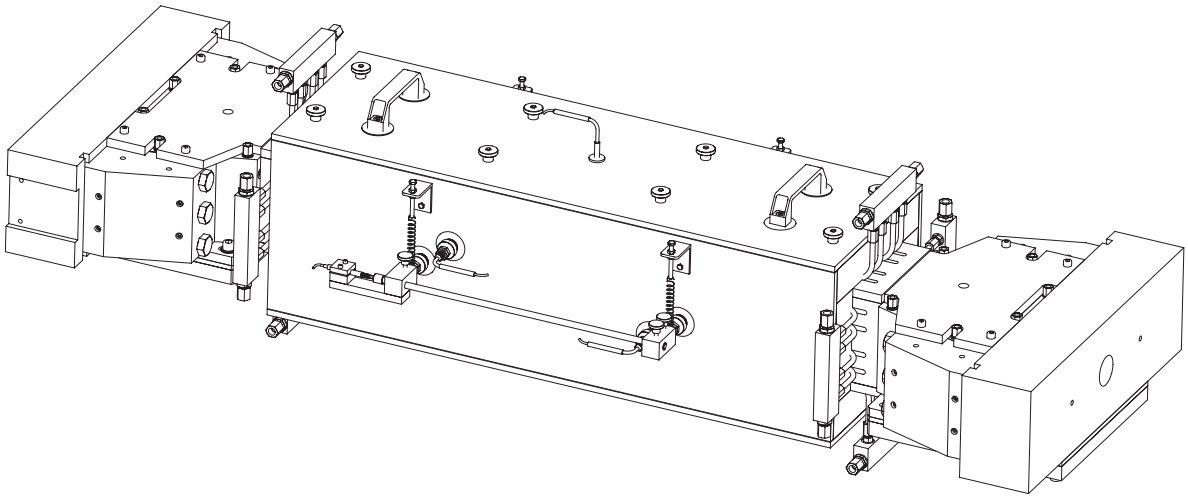
A temperature control system with temperature sensors (thermocouples) allows monitoring of sample's temperature for data acquisition.

Isolated and Temperature controlled Form

A well isolated Temperature Controlled Form Work is supplied for the selected sample sizes. Feedthroughs are provided for temperature sensors and deformation system. Additionally the gripping part can be isolated and tempered.

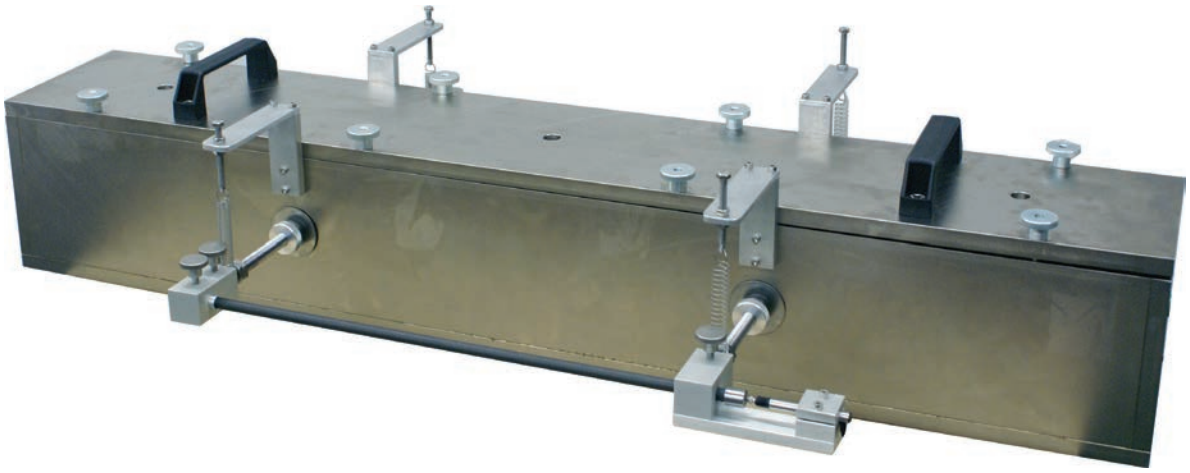






Accounting for Thermal and Shrinkage Deformations

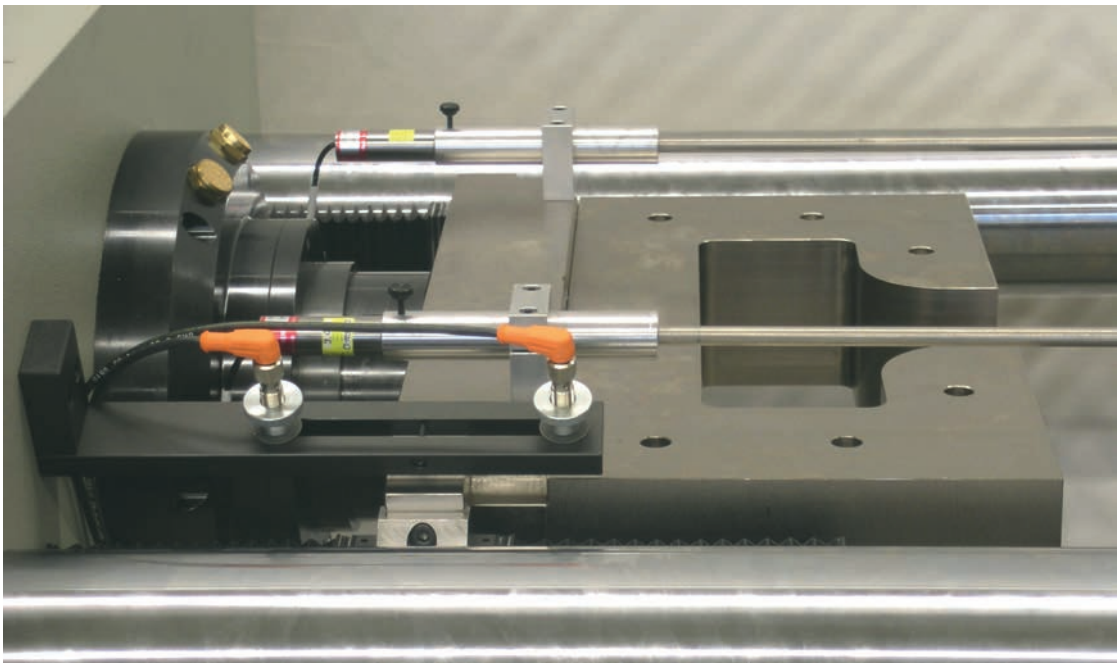
If thermal and shrinkage deformations need to be known, a dummy mould can be used for the measurement of these deformations.

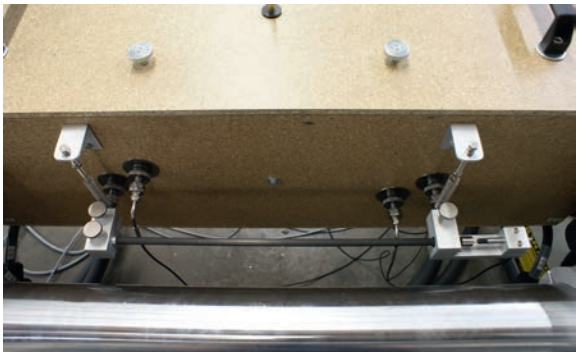


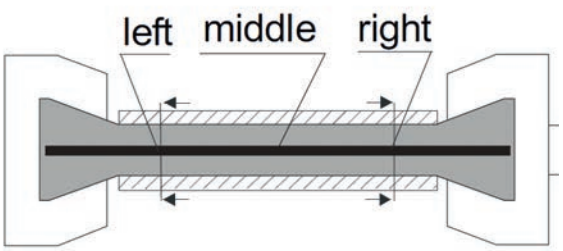
Measuring Displacement and / or Deformation right from Setting Time due to suitable Sensors

Examples of used systems for deformation measurement:

- Foucault Current's contact free sensors.
- LVDT displacement transducers
- Laser displacement sensors
- Mold Strain / Vibrating Wire Stain Gauges
- Fiber Bragg Gratings

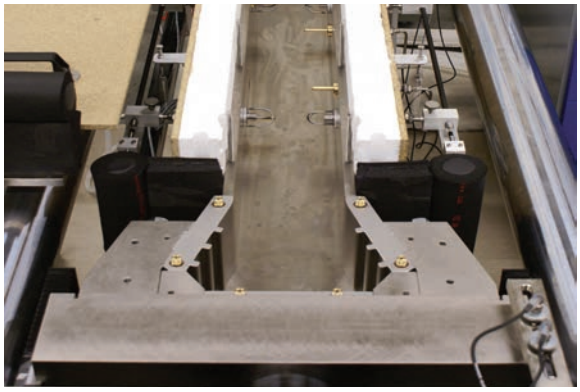




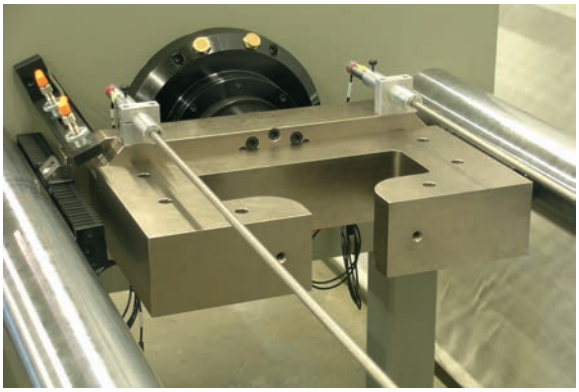


Commonly used Sample Shapes

Typically used sample types are (but are not limited to) Dog-Bone samples with wedge ends or curvature with cross-section 100x100 mm², 100x150 mm² or 150x150 mm² with straight lengths of 750 to 1500 mm.



Grips for Wedge-End Dog-Bone Samples



Grips for curved Dog-Bone Samples (Relaxation Test)

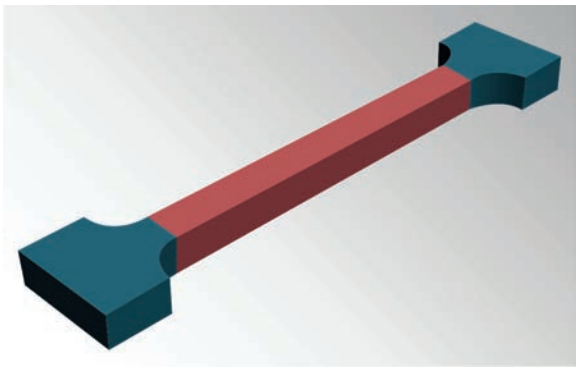


Illustration of a curved Dog-Bone Sample

Control and Data-Acquisition

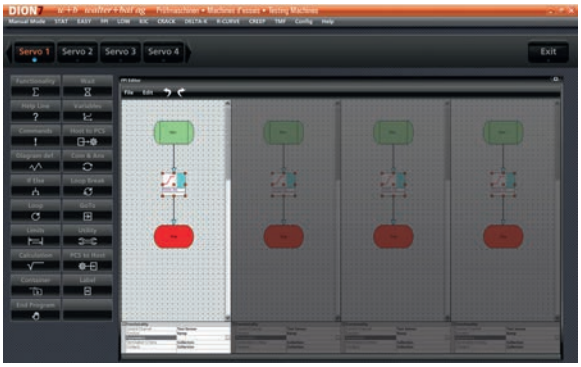
Control and Data-Acquisition is achieved through Ultra-High-Speed & High Resolution Digital Controller PCS8000 and DION7 Application Software.

This modular & versatile fully digital controller represents the latest generation of ultra-high-speed & high-resolution controllers, adapted for the full spectrum of applications ranging from materials and component tests to complex multi-axis (multi-channel) simulation.

The PCS8000 is able to control everything from monotonic electromechanical testing machines to electrodynamic or servohydraulic systems, single channel actuators to multi-channel test stands.

Tests can be programmed in bloc-programming with data-acquistion in many flexible ways.

The system allows to connect force, displacement, deformation, temperature and other sensors.



Specifications

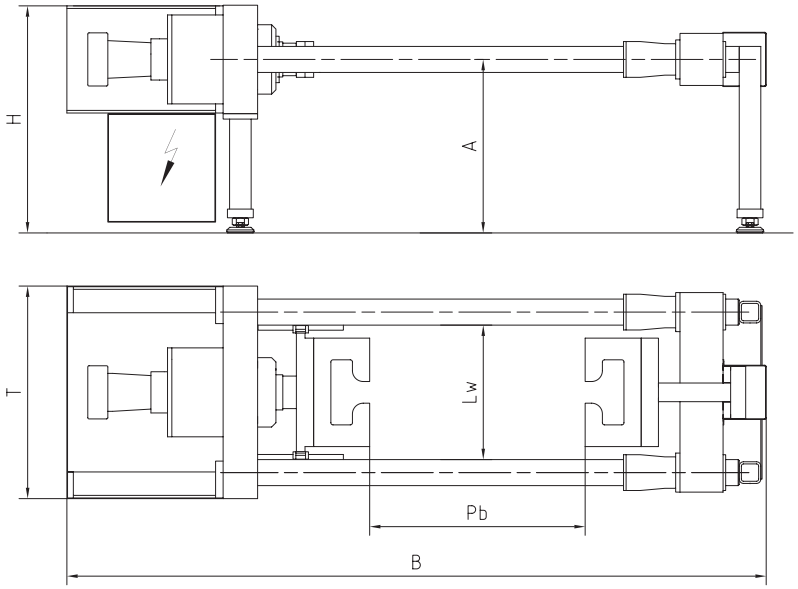
Force Capacities Compression / Tension: 400 kN / 100 kN

Accuracy In accordance with ISO 7500-1, Grade 0.5.

Colour Light Grey RAL 7035. Others upon request.

Power Requirements 3 x 400 V, 50 Hz. Others upon request.

Technical Data Type LFMZ		100	200	400
Compression Capacity	kN	100	200	400
Tension Capacity	kN	100	100	100
Piston Stroke	mm	100	100	100
Test Speed	mm/min.	0 - 20	0 - 20	0 - 20
Max. Distance betw. Grips (Pb)	mm	1300	1500	1500
Distance betw. Columns (Lw)	mm	500	620	620
Frame Width (B)	mm	1950	3050	3250
Frame Depth (T)	mm	900	980	980
Frame Height (H)	mm	1200	1050	1050
Working Height (A)	mm	600	800	800
Weight	kg	1700	2180	2300
Load Frame Stiffness	kN/mm	200	650	1000



Our References

Capacity	Ordered	Customer	Destination
100 kN	x 3	Technische Universität Braunschweig (10564)	DE-Braunschweig
400 kN	x 1	Universität Gesamthochschule Essen (7184)	DE-Essen
400 kN	x 1	VDZ – Verein Deutscher Zementwerke (3518)	DE-Düsseldorf
400 kN	x 1	EPFL – Ecole Polytéchnique Fédérale de Lausanne (13158)	CH-Lausanne
400 kN	x 1	ULB – Université Libre de Bruxelles (14781)	BE-Bruxelles
400 kN	x 1	Changjiang River Scientific Research Institute (17080)	CN-Wuhan
400 kN	x 1	Jiangsu Bote New Materials Co., Ltd (20856)	CN-Jiangsu Province
400 kN	x 1	Hohai University ((25186)	CN-Nanjing

Fully Automatic Concrete Testing System

Series D - AUTO 3000 kN

Automatic determination of the compressive strengths of concrete cubes or cylinders. No manually operation needed, even when different samples are tested!

This unique testing system provides a professional and efficient testing of large series, either cubes or cylinders. Once the identification of the sample is done and via barcode and serial interface exchanged to the building material testing software PROTEUS-MT the automatic operation with its high reproducibility of the test conditions and of the test results is started.

The process includes the following operations:

- Sample identification and data transfer to the building material testing software
- On time sample loading via portal system and conveyor
- Automatic recognition of sample type
- Automatic measuring of the sample dimensions, either edge lengths or diameter
- Automatic weight measuring
- Loading into compression testing machine with automatic centring for precise aligned purpose
- Automatic height measuring of the sample at a defined preload
- Calculation of the density
- Accurate force application through digital closed loop controller type **DIGICON 2000/3000**, according to relevant standards, until specimen failure with automatic piston returning
- Fully data acquisition through PC and testing software **PROTEUS-MT** with data storing, print out of a protocol or data transfer to your Laboratory Information Management System (LIMS)
- Ejection of the sample on a conveyor and disposal
- Automatic cleaning of the lower and upper spherically platen

Standards and Tests

- **Compressive Strength**
  EN 12390 - 4
  ASTM C39

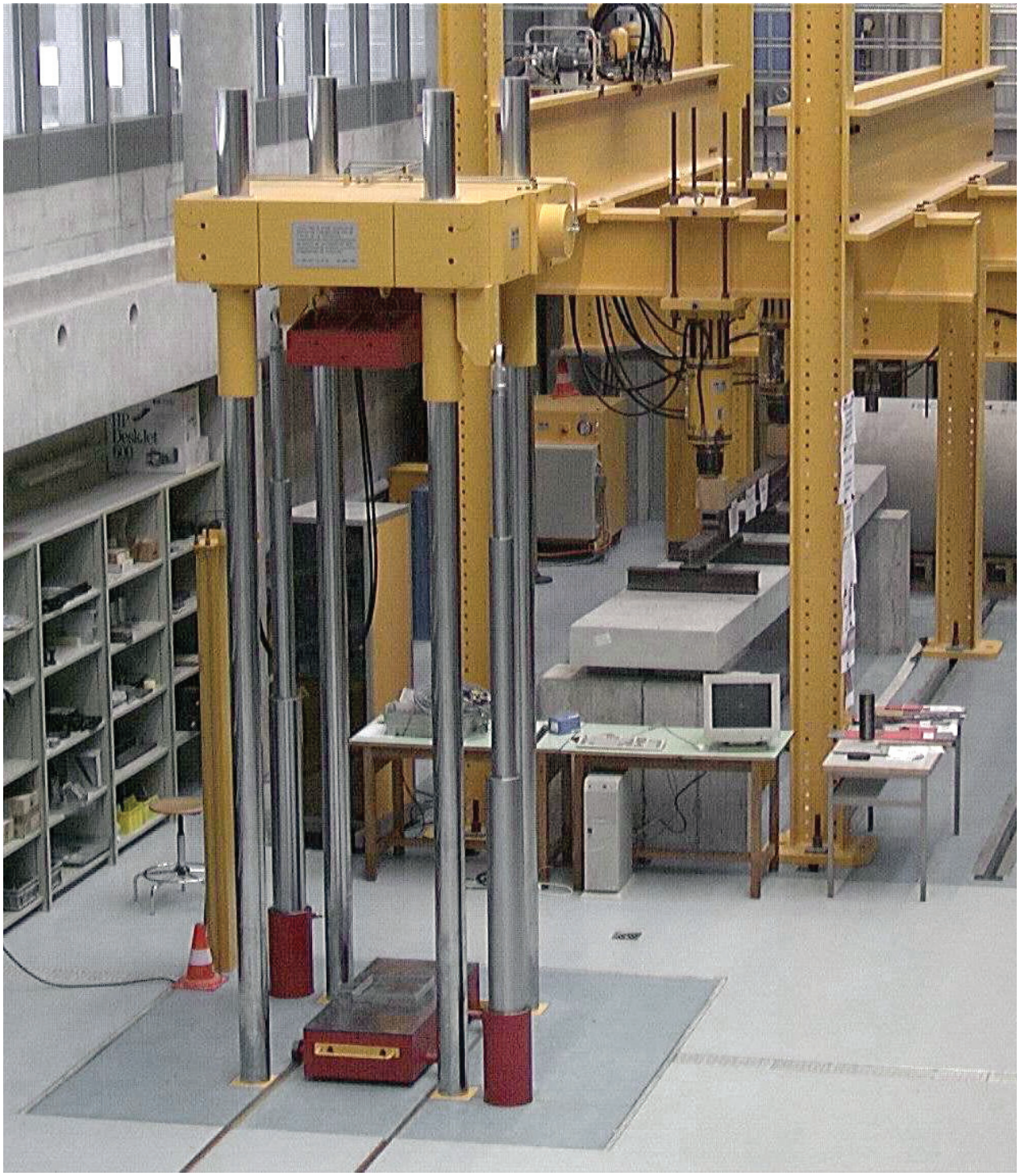
Samples

- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
- **Cubes** 100, 150, 200 mm

Large Load Frames for High Capacity Testing

up to 10'000 kN or higher

As customer made testing machines, we supply compression testing machines for capacities up to 10 MN or higher.



Combination of Different Load Frames
to a Testing System

Any load frame can be combined with different testing machines and a control console. Below are some examples shown.

The combinations are very cost effective and room saving in the laboratory. The control console con be used for up to 4 machines.

Same electronics, controller and software are used. Only one control console is needed for several machines.

Example 1
Versatile and Universal Testing

- Compression Testing Machine Type DV 1000 kN with hydraulic movable crosshead
- Bending Testing Machine Type BV 200 kN with hydraulic movable crosshead

connected to 19" Control Console Type NS 19 PA with
- Integrated Hydraulic Power Pack
- Digital Controller Type **DIGICON 2000/3000**
- PC running Testing Software **PROTEUS-MT**

Example 2
Universal Combination

- High Stiffness
  Compression Testing Machine
  Type D - S 4000 kN

- Universal Bending Testing Machine
  Type DBZ - 2S 150 kN

connected to
19″ Control Console
Type NS 19 PA with
- Integrated Hydrauic Power Pack
- Digital Controller **DIGICON 2000/3000**
- PC running Testing Software **PRO-TEUS-MT**

Example 3
4 Test Spaces

- Concrete Testing Machine
  Type DB 4000 / 300 kN
  Compression Area 4000 kN
  Bending Area 300 kN

- Cement Testing Machine
  Type DB 300 / 20 kN
  Compression Area 300 kN
  Bending Area 20 kN
  with Integrated Hydraulic Power Pack

connected to
PC-Table with
- Digital Controller **DIGICON 2000/3000**
- PC running Testing Software

Example 4
Efficient Testing

- Concrete Testing Machine
  Type DB 2000 / 200 kN
  Compression Area 2000 kN
  Bending Area 200 kN

- Gully and Manhole Top
  Testing Machine
  Type D-GT 1000 kN

connected to
Control Console with
Measuring and Weighting System
Series SP - WMS
- Integrated Hydraulic Power Pack
- Digital Controller **DIGICON 2000/3000**

Reduced Height 19" Power Packs with Digital Controller on Top
Series PAC

Compact control units with digital controller or digital display on top and with integrated hydraulic power pack part to furnish the pressurized oil for the testing machines.

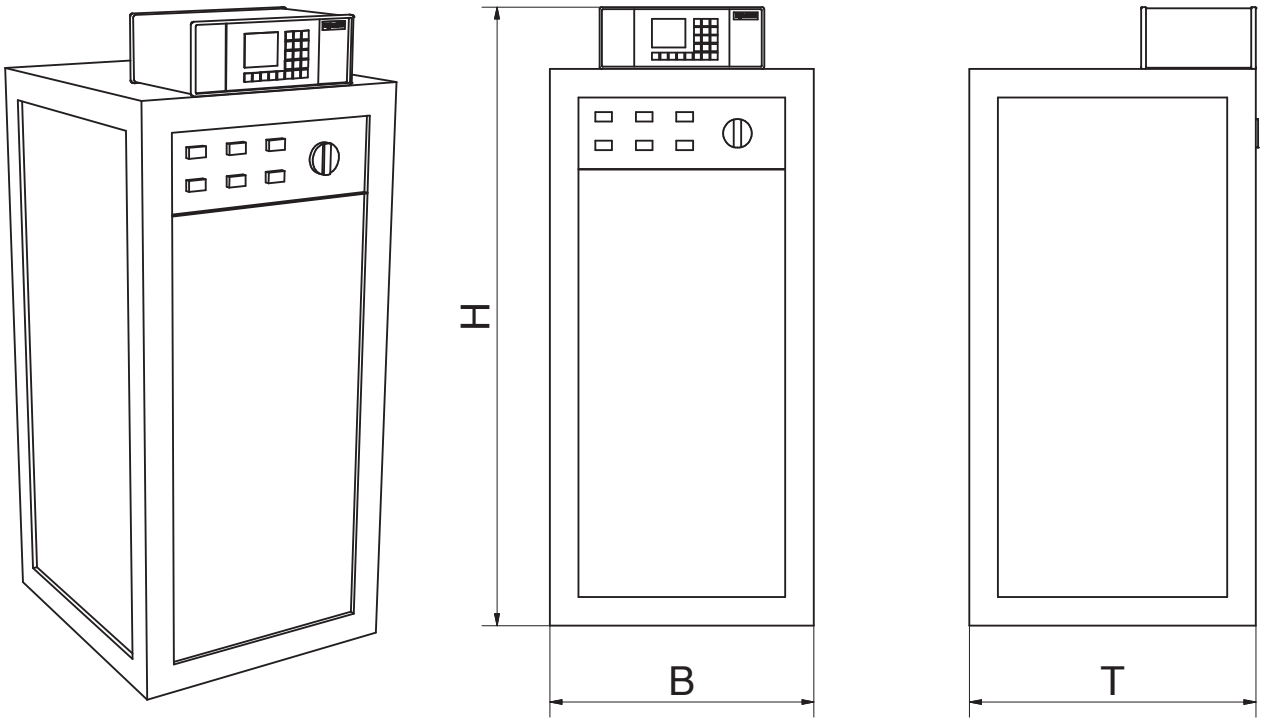
Hydraulic Power Pack
- To furnish the pressurized oil for the testing machines
- Including large oil tank, pump, filters, pressure limiter, oil-air cooler
- Low noise internal gear pump
- Safety controllers as max. oil temperature, minimum oil level, filter clogged, motor overload
- Tank is put on anti-vibration elements to avoid any vibrations on the console
- Filtration 3 Micron

Control
- Up to 4 machines can be controlled with one console
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**

Specifications

Oil Flows	1.5 - 8 Ltr. / min. Higher oil flows upon request!
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	3 x 400 V, 50 Hz. Others upon request.

Type PAC		1.5	2.5	4.0	5.0	6.5	8
Pump Delivery	l/min.	1.5	2.5	4.0	5.0	6.5	8
System Pressure	bar	400	400	400	400	400	400
Tank Capacity	Litres	25	25	40	40	50	80
Cooling Requirement	l/min.	0.2	0.4	0.6	0.8	1.0	2.5
Power Consumption	kW	1.0	1.5	2.5	3.0	4.0	5
Width	mm	600	600	600	600	600	600
Depth	mm	800	800	800	800	800	800
Height	mm	1160	1160	1160	1160	1160	1160
Weight with Oil fill	kg	300	310	340	360	380	400
Noise level at 1 m	dBA	58	58	59	59	59	59



19" Standard Control Consoles
Series NS 19 - PA

Compact and ergonomic control units with integrated hydraulic power pack in the lower part to furnish the pressurized oil for the testing machines.

Features
- **Upper Part:**
  - PC
  - Monitor
  - Digital display
  - Electrical control with emergency stop
  - Digital display or digital controller
  - Manual loading and unloading valves
- **Lower Part:**
  - Integrated low noise hydraulic power pack

Hydraulic Power Pack
- To furnish the pressurized oil for the testing machines
- Including large oil tank, pump, filters, pressure limiter, oil-air cooler
- Low noise internal gear pump
- Safety controllers as max. oil temperature, minimum oil level, filter clogged, motor overload
- Tank is put on anti-vibration elements to avoid any vibrations on the console
- Filtration 3 Micron

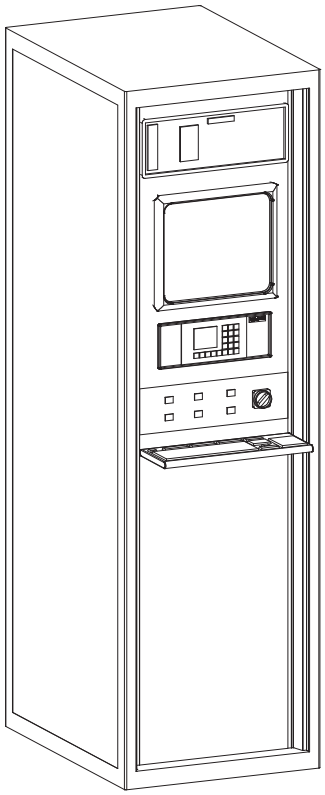
Control
- Up to 4 machines can be controlled with one console
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- PC with building material testing software **PROTEUS-MT**

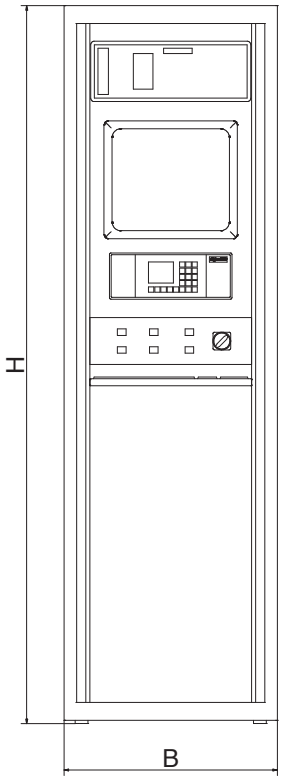
Options / Accessories
- Printer on swivelling console
- Slide-out keyboard
- Door with lock
- Rollers and fast couplings for universal use
- Configuration according different specifications to suit your specific needs

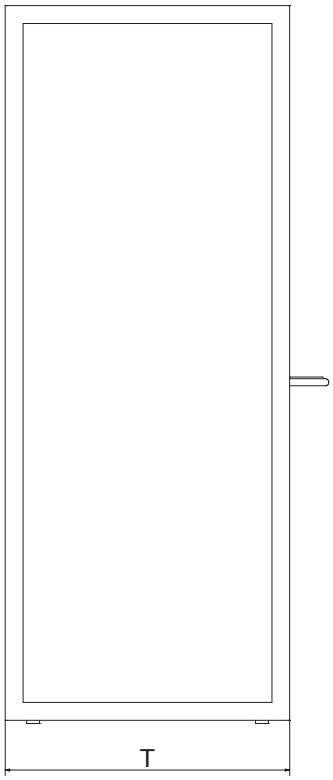
Specifications

Oil Flows	1.5 - 8 Ltr. / min. Higher oil flows upon request!
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	3 x 400 V, 50 Hz. Others upon request.

Type NS 19 - PA		1.5	2.5	4.0	5.0	6.5	8.0
Pump Delivery	l/min.	1.5	2.5	4.0	5.0	6.5	8.0
System Pressure	bar	400	400	280	280	280	280
Tank Capacity	Litres	25	25	40	40	50	80
Cooling Requirement	l/min.	0.2	0.4	0.6	0.8	1.0	2.5
Power Consumption	kW	1.0	1.5	2.5	3.0	4.0	5
Width	mm	600	600	600	600	600	600
Depth	mm	800	800	800	800	800	800
Height	mm	2050	2050	2050	2050	2050	2050
Weight with Oil fill	kg	300	310	340	360	380	400
Noise level at 1 m	dBA	58	58	59	59	59	59







Control Console with Measuring and Weighing System
Series SP with WMS

The system combines accurate, efficient and productive testing with ergonomic working. It allows an automatic determination of weight and dimensions of cubes and cylinders.

Measuring Process
The sample is shifted over the rollers against the front stop. Then the measuring-bow with incremental measuring system is pulled manually forward against the sample. The bottom on top of the handle releases the measuring. The integrated high precision balance determines the weight of the sample. The specimen height is automatically measured in the compression testing machine at a pre-load of 10 kN. All measuring values are automatically transferred into the testing software via RS 232 or USB.

Features
- **Upper Part:**
  - 19" rack with integrated electrical control and digital controller
  - PC, Monitor and Printer
  - Balance control display
- **Middle Part:**
  - Integrated high precision balance
  - Digital measuring device
  - Roller path for easy entering of the specimen into the testing machine
- **Lower Part:**
  - Front doors and cabinets
  - Integrated low noise hydraulic power pack to furnish the pressurized oil for the testing machines

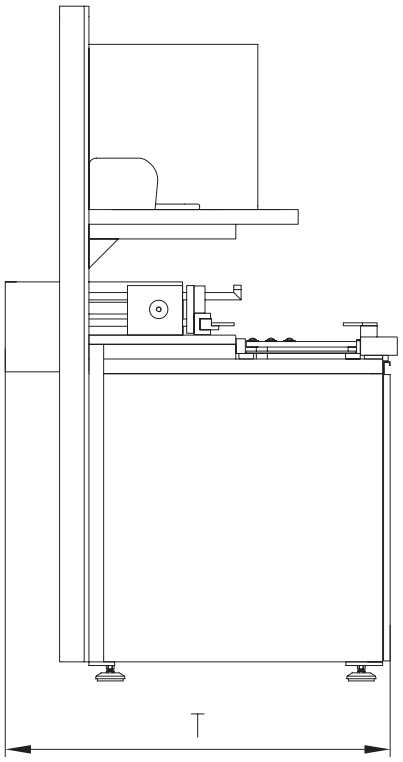
Control
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- PC with building material testing software **PROTEUS-MT**

Options / Accessories
- Models with 1, 2 or 3 corpus
- Additional 1 meter roller to put on the side of the system
- Automatic measuring of the dimensions by pressing a release switch and with hydraulic linear actuator
- Digital vernier
- Extensometers

Specimens
- **Cylinders** Ø 95 - 160 mm
- **Cubes** 95 - 210 mm

Available with Machines
- Series D
- Series DV
- Series DB
- Any other testing machine can be connected on the other side of the console.

Specifications



Models

SP	Control console
SP - WMS	with measuring and weighing system
SP - WMS2	with additional 3rd corpus

Accuracy

Balance	1 g
Measuring Device	0.1 mm

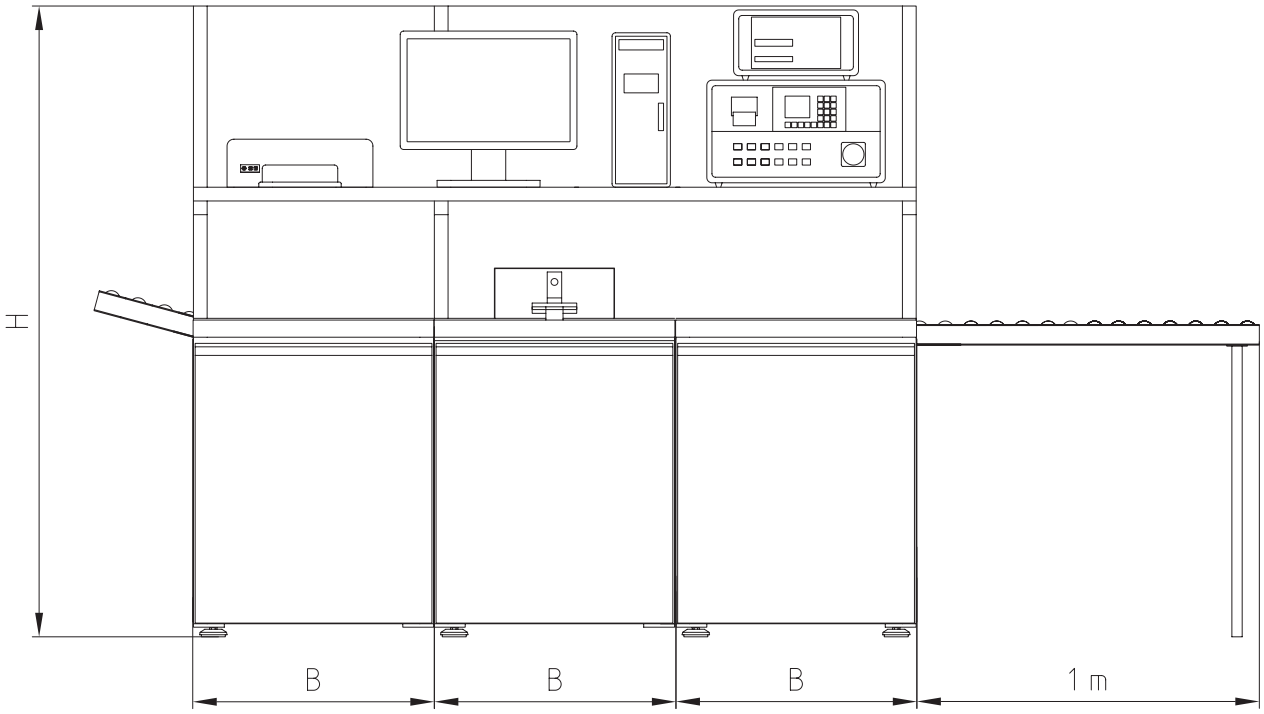
Colour Stainless steel and white board on the back.

Power Requirements 3 x 400 V, 50 Hz. Others upon request.

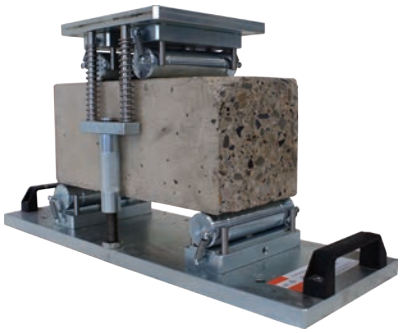
Technical Data		SP	SP - WMS	SP - WMS2
System Corpus	No.	1	2	3
Console Width (B)	mm	700	1400	2100
Console Depth (T)	mm	840	1025	1025
Console Height (H)	mm	1900	1900	1900
Roller Width	mm	300	300	300
Working Height	mm	900	900	900

Available Integrated Hydraulic Power Packs

Power Pack	PA	1.5	2.5	4.0	5.0	6.5
Pump Delivery	l/min.	1.5	2.5	4.0	5.0	6.5
System Pressure	bar	400	400	400	400	400*f*
Tank Capacity	Litres	25	25	40	40	50
Cooling Requirement	l/min.	0.2	0.4	0.6	0.8	1.0
Power Consumption	kW	1.0	1.5	2.5	3.0	4.0
Weight with Oil fill	kg	300	310	340	360	380
Noise level at 1 m	dBA	58	58	59	59	59



Concrete Testing Devices
for Compression Testing Machines



Flexural Test Device Series BV

Specially designed for 3- and 4-point bending tests on concrete beams. Equipped with two lower rollers, one of them articulated and two upper rollers for 4-point bending tests. It is possible to place in the centre only one upper roller for 3-point bending tests. To perform the flexural tests, the device can directly be placed into compression testing machines.

Technical Data	BV 150
Standards	EN 12390 - 5 and ASTM C78, C293
Sample Dimensions	100 x 100 x 400/500 mm, 150 x 150 x 600/750 mm
Device Dimensions W x D x H	610 x 200 x 320 mm
Weight	27 kg

Splitting Tensile Test Device for Cylinders Series SPV 100 - 102

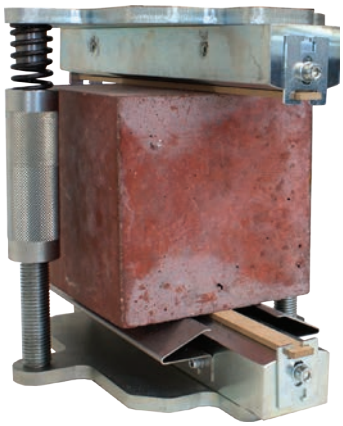
Specially designed for splitting tensile tests on cylindrical specimens. The device can directly be placed into compression testing machines.

Technical Data	SPV 100	SPV 101	SPV 102
Standards	EN 12390-6, ASTM C496		
Sample Dimensions Diameter x Height	150 x 300 mm 160 x 320 mm 6" x 12"	100 x 200 mm 110 x 220 mm 4" x 8"	40 x 80 mm
Device Dimensions W x D x H			
Weight	30 kg	15 kg	1 kg

Splitting Tensile Test Device for Cylinders Series SPV 200

Specially designed for splitting tensile tests on cylindrical specimens or cubes and block pavers. The base is equipped with flat springs centring and keeping the specimen in position. Two columns with adjustable height sustain the upper plate by two springs. The device can directly be placed into compression testing machines.

Technical Data	SPV 200
Standards	EN 12390 - 6, EN 1338
Sample Dimensions Diameter x Height	100 x 200 mm, 160 x 320 mm, 4" x 8", 6" x 12"
Device Dimensions W x D x H	350 x 250 x 264 mm
Weight	17 kg



Splitting Tensile Test Device for Cubes Series SPV 300

Specially designed for splitting tensile tests on cylindrical specimens or cubes and block pavers. The base is equipped with flat springs centring and keeping the specimen in position. Two columns with adjustable height sustain the upper plate by two springs. The device can directly be placed into compression testing machines.

Technical Data	SPV 300
Standards	EN 12390 - 6, EN 1338
Sample Dimensions	100 mm , 150 mm
Device Dimensions W x D x H	350 x 250 x 264 mm
Weight	17 kg

Concrete Testing Devices
for Bending Testing Machines

Bending Devices Series BV 3 and BV 4

Specially designed for 3- and 4-point bending tests on concrete beams and fibre reinforced beams. The device can easily be mounted into the bending testing machine.

Technical Data	BV 3 and BV 4
Standards	EN 12390 - 5, EN 14488 - 3, ASTM C78, C293
Roller Diameter	20 / 30 mm
Roller Length	210 / 510 mm

Compression Platens Series DV

Specially designed for the determination of the compressive strength on concrete specimens in accordance with EN 12390 - 3 and EN 14488 - 2. The device can directly be placed into bending testing machines.

Direct Tensile Test Device Series ZV

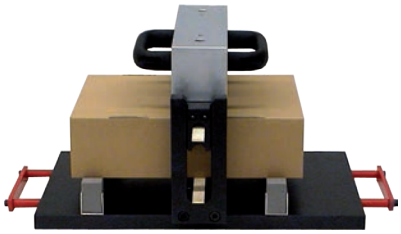
Specially designed for the determination of the bond strength of cores by direct tension in accordance with EN 14488 - 4. The device can be directly fixed into bending testing machines.

Energy Absorption Test Device Series PDV 600

Specially designed for the determination of energy absorption capacity of fibre reinforced slab specimens in accordance with EN 14488-5. Consisting of base frame and compression stamp. Optional with deflection measuring system (see page 99).

Technical Data	PDV 600
Standards	EN 14488-5
Base Frame Dimensions	600 x 600 x 100 mm
Dimension Compression Stamp	100 x 100 mm

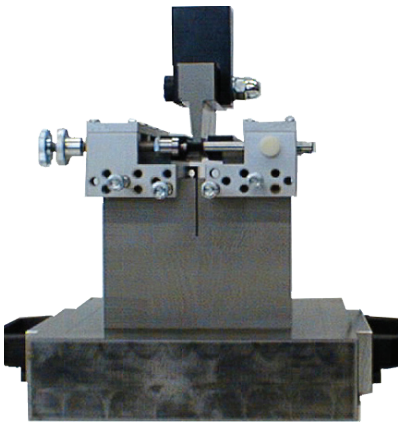
Further Testing Devices
for Concrete Testing Machines



Splitting Tensile (Brazilian) Test Device Series SPV 1338

Specially designed to test paving stones according to EN 1338 and other international standards. This splitting device can be placed into the compression area of concrete testing machines. Accessories: hardboard strips 4 x 10 x 285 or 320 mm (100 pcs.) in accordance with EN 1338.

Technical Data Type SPV	1338-1	1338-2	1338-3
Standards		EN 1338	
Sample Width max.	265 mm	265 mm	300 mm
Sample Length	unlimited	unlimited	unlimited
Sample Height	25 - 125 mm	40 - 140 mm	40 - 140 mm
Dimensions Device W x D x H	330 x 430 x 310 mm	330 x 430 x 310 mm	330 x 430 x 310 mm



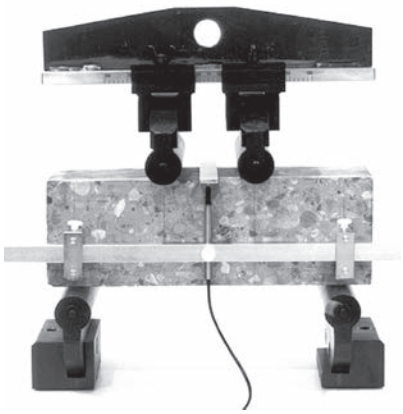
Wedge Splitting Test Device Series WST

For the determination of the specific rupture energy of notched cubes of 100 or 150 mm side length in existing testing machines with closed loop control. Consisting of splitting edge, angular holders with rolls, 2 LVDT displacement transducers with fixtures, digital display with integrated measuring amplifier for value true display of averaged deformation. Devices for larger samples as cubes 200 mm or cylinders Ø 150 x 300 or 160 x 320 mm upon request.

Technical Data	WST 100
Standards	-
Sample Dimensions Cube Length	100 or 150 mm

Deflection Measuring System Series BMS for Bending Tests

Deflection measuring system with 2 displacement transducers on both side of the sample for testing of fibre reinforced concrete beams in accordance with EN 14651.

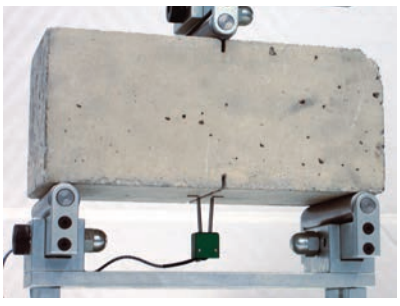


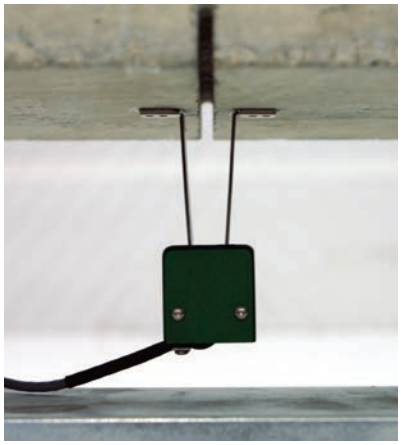
Specially designed for testing of fibre reinforced concrete beams. With 2 displacement transducer on both sides of the sample for averaging of the measuring data.

Technical Data	BMS
EN ISO 9513 Accuracy Class	0.5
Measuring Range	5 / 10 / 20 / 25 mm

CMOD Crack Mouth Clip-On Gauges Series 3541 for Bending Tests

For the determination of the flexural tensile strength with measuring of the crack / notch mouth opening displacement in accordance with EN 14651 of metallic fibre concrete specimen.

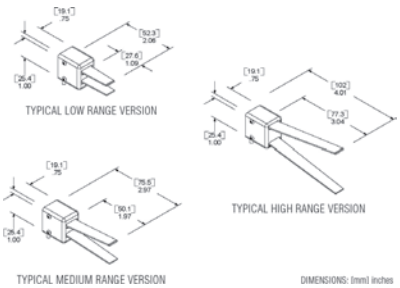




The flexural tensile strength is determined through a 3-point bending test. The crack mouth opening displacement is measured with the CMOD gauge on the specimen. The concrete prisms are notched in the middle. The knife edge holders are clued onto the specimen at the centre of the width.

Typical gauges length for these type of tests are 5 or 10 mm.

The groove design complies with international standards where greater stability and accuracy results from the sharper groove root.

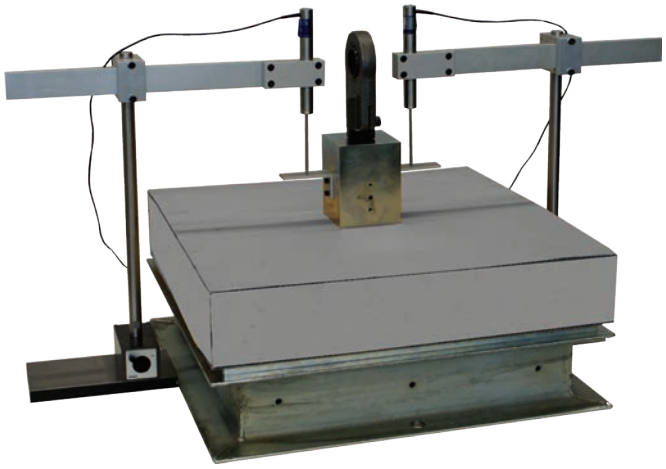


Technical Data	Series 3541
EN ISO 9513 Accuracy Class	0.5
Standard Initial Gauge Length	3, 5, 8, 10, 12 or 20 mm
Measuring Range	+2.5/-1, +4/-1, +7/-1, +10/-1, +12/-2 mm
Linearity Error incl. Hysteresis	0.15 (for < 6 mm), 0.20 (rest)

Precise Deflection Measuring System Series DBMS for Energy Absorption Tests

This system is used for the determination of the deflection of fibre reinforced slab specimens from sprayed concrete in the energy absorption test according to EN 14488 - 5.

Consisting of support frame, displacement transducer, mounting and measuring amplifier as well as plunger for the installation into the testing machine.
The support frame has special cutting edges for the placement of the specimens. The plunger has aluminium angles on the sides for the displacement transducers.
The displacement transducers can be disassembled to the bottom after the test so that the samples and support frame can easily be removed.
The measuring system consists of support the accept displacement transducers, 2 displacement transducers and dual measuring amplifier with averaging function (A, B, (A+B)/2).
This measuring system is especially designed to be mounted into the bending testing machines Series DBZ.
Option: with digital transducer to reach Class 0.1 according to EN ISO 9513.



Technical Data	Series DBMS
Standards	EN 14488 - 5
EN ISO 9513 Accuracy Class	Class 0.5 (Optional Class 0.1)
Measuring Range	25 mm or 50 mm

Displacement Transducers Series LVDT for Compression Tests

To capture the compressive average deformation with three displacement transducers between the compression platens.

Specially designed for precise measurement of the deformation of concrete or rock cylinders between compression platens in compression testing machines. The displacement transducers are mounted on magnetic holders for easy test set-up and are connected to the electronic signal conditioner for averaged (A+B+C/3) signal.

Options

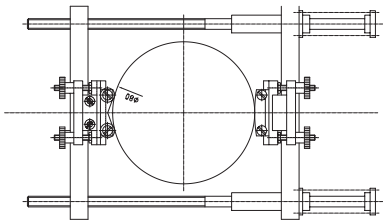
- LVDT transducers
  with measuring travel 0.5 to 25 mm,
  Class 0.5
- Digital transducers,
  Class 0.1

Technical Data	LVDT
Standards	various
EN ISO 9513 Accuracy Class	Class 0.5 / Class 0.1
Measuring Range LVDT	1, 2.5, 5, 10, 15 or 25 mm

E-Modulus Extensometer

Type BD 25 / 50 (DD1)

Specially designed to determine the E-Modulus on concrete cylinders, cores and prisms according to DIN 1048, ISO 6784 a.s.o. The deformation is captured along two opposite generating lines on the test specimen.



Mount the extensometer with the required gauge length (Lo) onto the specimen. The scale and the gauge length can be changed after loosening the knurled screws. Adjust the specimen gripping force by turning the spring loaded screws. Disengage both clamps of the measuring mechanisms. Connect the extensometer cables and balance the electrical signal using the ZERO potentiometer on the measuring amplifier. Run a test and remove the extensometer before specimen failure.

Accessories

- Clamps for larger diameters and greater gauge lengths.
- Digital transducer indicators with measuring amplifier.
- Software **PROTEUS-MT** for data acquisition, calculation and printout of test results.
- Control and measuring electronics.
- Upon request fixtures and gauge length as required.

Technical Data	BD 25 / 50 (DD1)
EN ISO 9513 Accuracy Class	0.25
Standard Initial Gauge Length	40 - 220 mm
Measuring Range	± 2 mm
Linearity Error incl. Hysteresis	±0.05%
Operating Temperature	- 10°C - +60°C
Dimensions Flat Specimens	❑ 40 - 160 mm
Dimensions Round Specimens	Ø 40 - 160 mm

Averaging Axial Extensometer

Series BDR - 3

For the Youngs-Modulus determination on concrete cylinders according to DIN 1048 and ISO 6784. To capture the compressive deformation along three generating lines with high precision displacement transducers.

With the testing software **PROTEUS-MT** the difference of the 3-signal-conditioners is observed and Youngs-modulus of the average signal automatically calculated.

Features

- Signal conditioners with averaging module (A+B+C / 3) and digital readout with RS 232.
- Building material testing software PROTEUS-MT.
- 2 pairs of holding rings for specimen diameters Ø 50 - 100 mm (2.0 - 4.5") / Ø 100 - 160 mm (4.5 - 6.0")
- 2 sets of distance bolts for gauge length 100 or 150 mm
- 3 pcs. LVDT transducers

Other gauge lengths and specimen diameters upon request!
Option: digital transducers for Class 0.1

Technical Data	BDR - 3
EN ISO 9513 Accuracy Class	0.5
Standard Initial Gauge Length	100 mm, 150 mm or 200 mm
Measuring Range	± 1 mm, ± 2.5 mm or ± 5 mm
Linearity Error incl. Hysteresis	<±0.25%
Operating Temperature	- 10°C - +60°C
Specimen Diameters	50 - 100 mm, 100 - 150 mm, 150 - 200 mm
Specimen Heights	200 mm, 300 mm or others

Axial and Diametral Extensometer

Series BDR - 2 - Q

Extensometer for the determination of the E-Modulus by measuring both axial deformation and diametral extension of cylinder specimens in accordance with DIN 1048, ISO 6784, ASTM C469 a.s.o.

With the testing software **PROTEUS-MT** the difference of the 2-signal-conditioners is observed and Youngs-modulus or Poisonal ratio from the average axial signal and diametral signal is automatically calculated.

Features

- Signal conditioners with averaging module (A+B / 2) and digital readout with RS 232 or USB.
- Testing software **PROTEUS-MT**
- 2 pairs of holding rings for specimen diameters Ø 50 - 120 mm (2.0 - 4.5") / Ø 120 - 160 mm (4.5 - 6.0")
- 2 sets of distance bolts for gauge length 100 or 150 mm
- Diametral measuring device
- 3 pcs. LVDT transducers

Other gauge lengths and specimen diameters upon request!

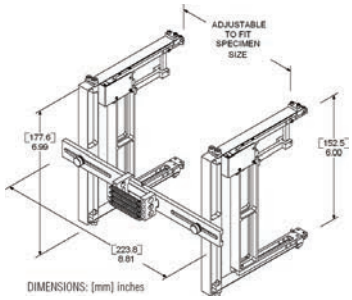
Technical Data	BDR - 2 - Q
EN ISO 9513 Accuracy Class	0.5
Axial Standard Initial Gauge Length	100 mm, 150 mm or 200 mm
Axial Measuring Range	± 1 mm, ± 2.5 mm or ± 5 mm
Diametral Measuring Range	± 1 mm, ± 2.5 mm or ± 5 mm
Linearity Error incl. Hysteresis	<±0.25%
Operating Temperature	- 10°C - +60°C
Specimen Diameters	50 - 100 mm, 100 - 150 mm, 150 - 200 mm
Specimen Heights	200 mm, 300 mm or others

Averaging Axial Extensometers

Series 3542 – RA 1 (fixed) and RA 2 (adjustable)

Extensometer for compression tests on larger diameter specimens. They measure axial strain on opposite sides. These extensometers are made for asphalt or concrete core samples with diameter up to 200 mm / 8 inches.

Designed for compressive strength tests on rock, concrete and other large compression samples, the 3542-RA measures axial strain on opposite sides of the test specimen, and the output is an average of the two readings. All are self-supporting on the specimen and mount very easily. For tests where a single diameter specimen is typically used, the fixed diameter Model 3542-RA1 is recommended. For applications where a continuously adjustable diameter extensometer is required, the Model 3542-RA2 is available. If desired, the two readings can be independent, providing two outputs. Many rock tests are done in tri-axial pressure vessels. Versions for use in oil to 1360 bar at 200 °C are available. These will fit in unusually small inside diameter vessels. For small diameter specimens, we suggest the Model 3442-RA1 averaging axial extensometer. All Model 3542-RA extensometers are designed so they may be used together with the Model 3544 circumferential or 3975 diametral extensometer. Available with high accuracy, averaging output or optional dual independent outputs.

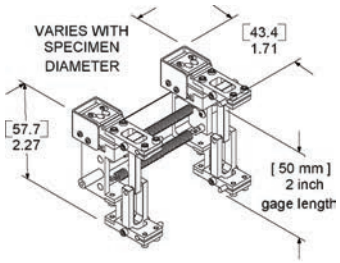


Technical Data	Series 3542 - RA
EN ISO 9513 Accuracy Class	0.5
Standard Initial Gauge Length	25, 50, 80, 100, 150, 200 mm (1, 2, 3, 4, 5, 6, 8 in)
Measuring Range	±1.25, ±2.5, ±6 mm (±0.05, ±0.10, ±0.25 in)
Linearity Error incl. Hysteresis	< 0.20 %
Operating Temperature	Various options from -265°C up to +175°C
Dimensions Round Specimens	max. Ø 200 mm (8 in)
Operating Force	< 30 g per side

Axial Miniature Extensometer

Series 3442 - RA 1

Extensometers for compression tests on smaller diameter specimens. These extensometers are made for concrete or asphalt core samples with diameters smaller than 50 mm / 2 inches.



3442RA1 WITH 2" OR 50 MM GAGE LENGTH

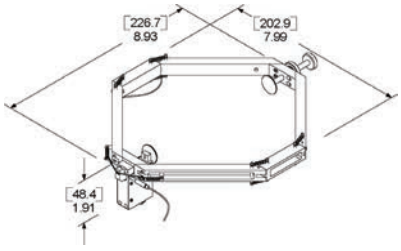
With gauge lengths 25 and 50 mm and measuring ranges of 1.2 and 2.5 mm, the Model 3442RA1 was designed for applications where compressive strength tests on small rock, concrete and other small compression samples is desired.
Axial strain is measured on opposite sides of the test specimen and the output is an average of the two readings. The Model 3442RA1 is available in a variety of configurations for samples 50 mm or smaller in diameter. All are self-supporting on the specimen and mount very easily. The included conical point contacts are made from tungsten carbide. If desired, the two readings can be independent, providing two outputs. Versions for use in oil to 1360 bar at 200 °C are available. These units will fit in unusually small inside diameter vessels. For large diameter specimens, we suggest one of the Model 3542RA averaging axial extensometers.
Available with high accuracy, averaging output or optional dual independent outputs.

Technical Data	Series 3442 - RA1
EN ISO 9513 Accuracy Class	0.5
Standard Initial Gauge Length	25.0 mm, 50.0 mm (1.0 in, 2.0 in)
Measuring Range	±1.25 mm, ±2.5 mm (±0.05 in, ±0.10 in)
Linearity Error incl. Hysteresis	< 0.20 %
Operating Temperature	Various options from -265°C up to +175°C
Dimensions Round Specimens	max. Ø 50 mm (2 in)
Operating Force	< 30 g per side

Diametral Extensometers

Series 3975

Extensometers for the determination of Poisson's Ratio on concrete, rock or asphalt samples. These extensometers are designed for the determination of small diametral strains.



This extensometer was designed for accurate measurement of small diametral strains such as those required to determine Poisson's ratio of rock, concrete and asphalt samples. The units are designed to be used in conjunction with the Model 3542RA axial averaging extensometer. Self-supporting on the test sample, these extensometers will work on standard sized diameter samples, but special configurations are available upon request. They are designed for use in testing for Poisson's ratio and for applications where accurate diametral measurements with low strains are required. The Model 3975 is the best choice for small diametral strains in large compression samples. Circumferential extensometer Model 3544 is recommended for large strain measurements. These units are easily attached to the sample, and rounded contact edges maintain the position on the specimen. Rugged, dual flexure design for improved performance. Easy mounting, attaches with integral springs. Self-supporting on the specimen.

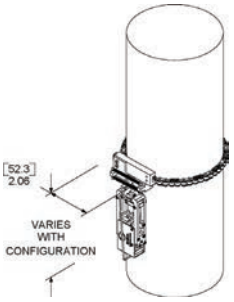
Technical Data	Series 3975
EN ISO 9513 Accuracy Class	0.5
Measuring Range	+0.75 mm, +1.5 mm, +2.00 mm
Linearity Error incl. Hysteresis	< 0.20 %
Operating Temperature	Various options from -40°C up to +100°C

Circumferential Extensometers
Series 3544

Extensometers for compression tests on asphalt, rock, concrete and other large samples. These extensometers measure the change in circumference as the sample is compressed.

Designed for concrete and rock compression testing or for compression tests on other large samples. The Model 3544 may be used simultaneously with the Model 3542RA axial extensometers. Circumferential extensometers measure the change in circumference as the sample is compressed. This is considered by many researchers to be a more accurate way to determine diametral strain, since the measurement is taken over the entire material inside the circumference. A high precision custom roller chain with special rollers mounts the extensometer to the specimen.

As the specimen diameter enlarges during the test, the chain causes the extensometer to expand. The unit is self-supported on the sample with integral springs. Links are easily added or removed to adjust for different size specimens. A mechanical adjustment allows the output to be set to zero. A breakaway device protects the extensometer in the event of specimen rupture. Often rock specimens are tested in tri-axial pressure cells. Versions of the Model 3544 are available to fit inside the vessel and operate in oil environments at up to 1360 bar at 200 °C.

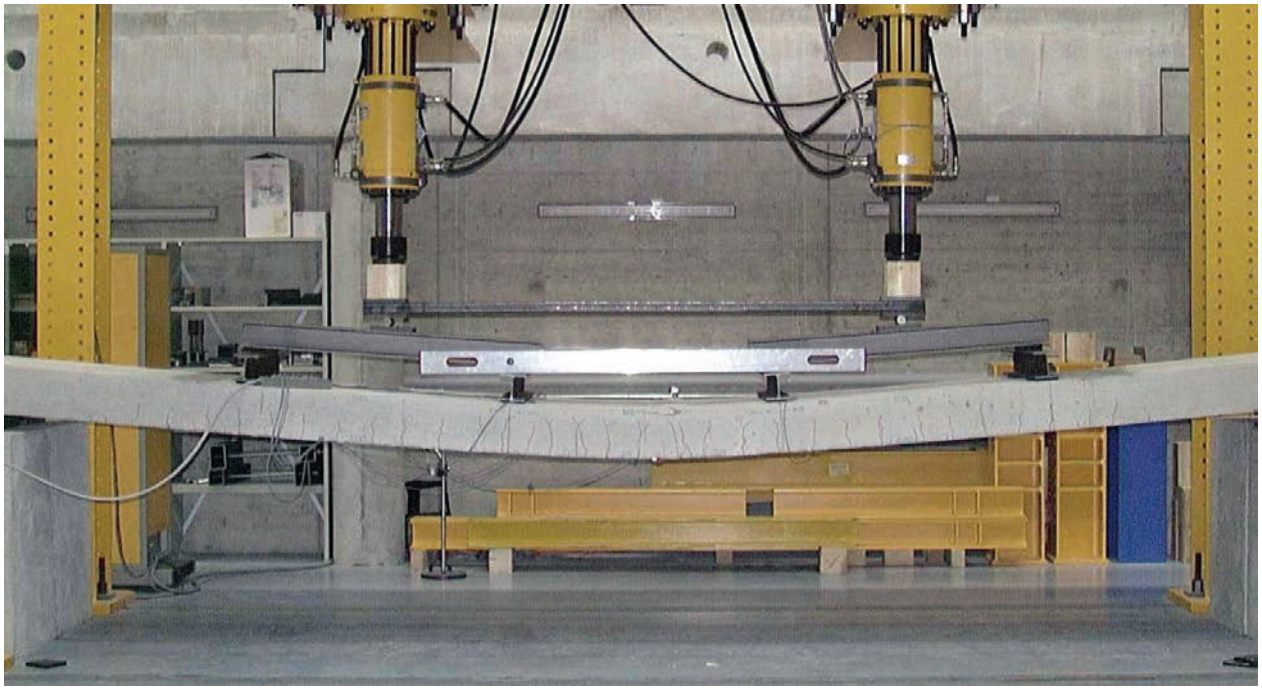


Technical Data	Series 3544
EN ISO 9513 Accuracy Class	0.5
Diameter Range	50 - 100, 50 - 150, 50 - 200 mm (2 - 4, 2 - 6, 2 - 8 in)
Measuring Range	+ 2, 3, 6 or 12 mm (0.08, 0.125, 0.25, 0.50 in)
Linearity Error incl. Hysteresis	<0.25 - 0.30% depending on model
Operating Temperature	Various options from -265°C up to +175°C

Custom Manufactured Testing Rigs with Servohydraulic Actuators
for Structural Concrete Testing

For static and fatigue testing of concrete beams, supporting elements, components a.s.o. Through our ability in engineering w+b can offer complete custom manufactured installations to suit your specific testing needs.

For further Details please refer to Section I - Structural Testing.



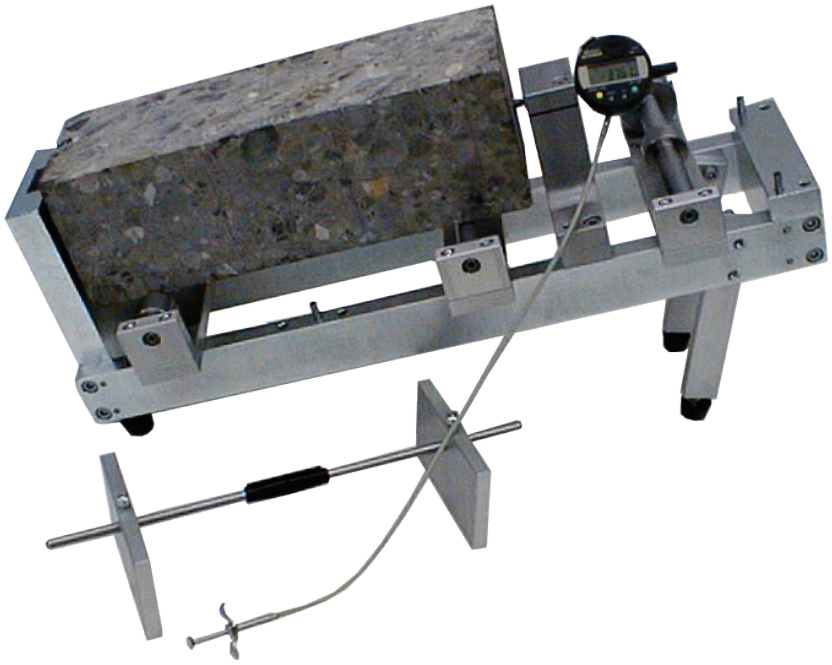
Shrinkage Measuring Test Devices
Type SWG - 525 - D

Designed to measure the length variations of concrete prisms.

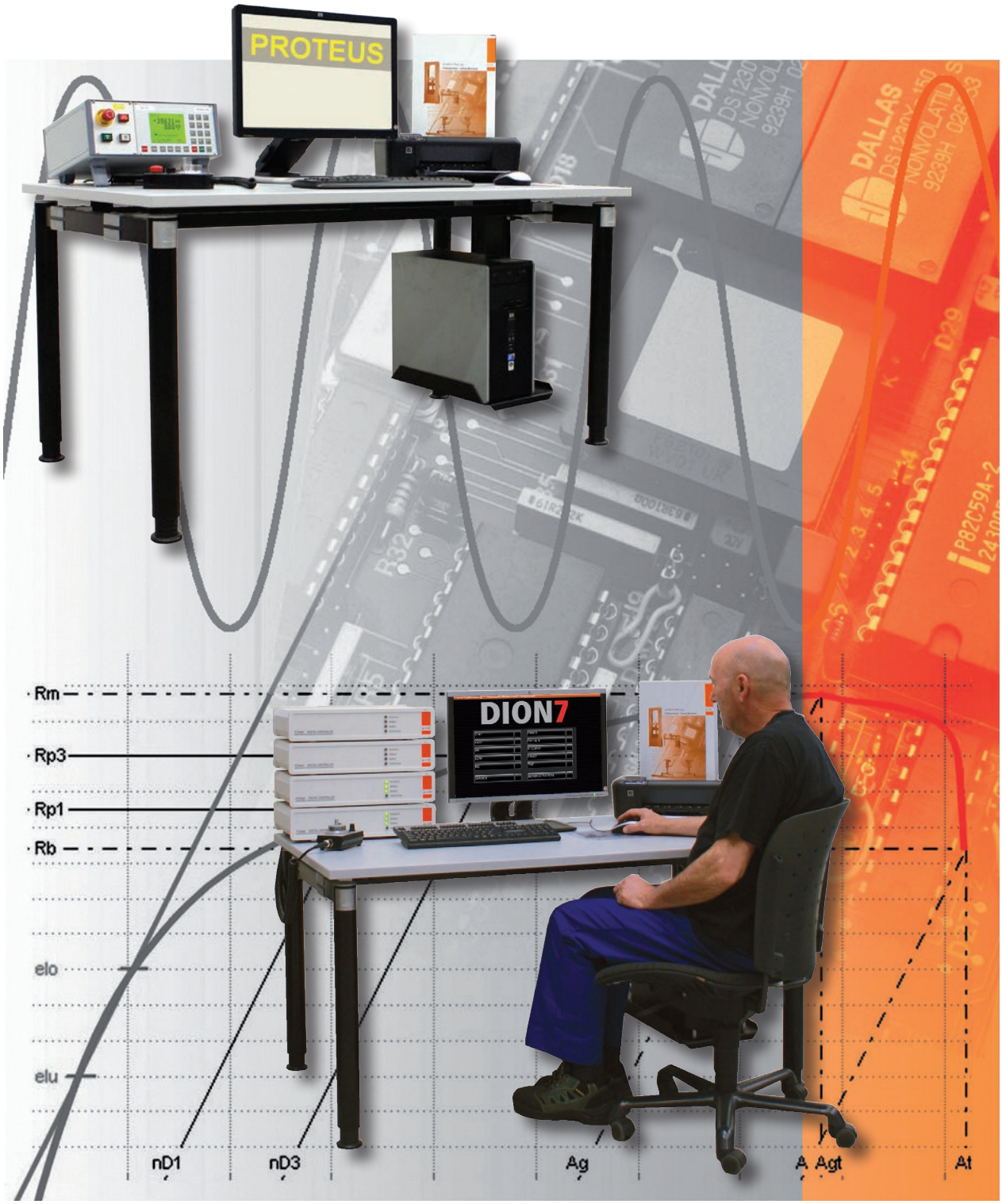
Sample Dimensions
- **Concrete Prims**
  100 x 100 x 300 mm
  120 x 120 x 360 mm
  150 x 150 x 525 mm
  a.s.o.

Features
- Digital dial gauge with 1/1000 mm resolution and wire release
- Comparison measuring stick
- Optional strip printer for automatic data acquisition in time intervals of 5 or 30 seconds, 1, 30 or 60 minutes with RS 232C interface to PC.

Options
- **PROTEUS CREEP** software for data aquisition of up to 7 samples with PC



Displays and Digital Controllers
for Building Materials Testing



Digital Controllers and Displays
for Building Materials Testing

Type DIGICON 2000
- Cement Testing Machines
- Concrete Testing Machines
- CBR / Marshall Testing Machines
- Wood and Timber Testing Machines

Type DIGICON 3000
- Asphalt and Bituminous Testing Machines
- Rock Mechanics Testing Machines

Type PCS 8000 for Multi-Channel Applications
- Asphalt and Bituminous Testing Machines
- Rock Mechanics Testing Machines
- Multi-Actuator Structural Testing

CONTENT SECTION L

Closed Loop Digital Controller
Type DIGICON 2000

The DIGICON 2000 meets the wide variety of testing needs of laboratories and manufacturers in the field of building materials testing. DIGICON 2000 is an extendable system and can control up to four different machines in closed loop force, displacement, deformation or external mode.

Features
- The control modes can be changed during a certain test for more advanced testing without interruption.
- The system itself is free programmable and supports all widely used sample bodies with no dimensional limitations.
- Standard tests can be stored as test templates. Automatic start and completation of test cycle.
- Force, displacement, deformation signal conditioners and servo amplifier.
- Manual/automatic selector test option with manual control facility for calibration purposes.
- RS232 or USB output for PC-control in connection with building material testing software **PROTEUS-MT**.
- Real digital close loop control for accurate load increase, rate, automatic break detection and piston return after specimen failure.
- The loading rate can be programmed in stress (N/mm²/S or kN/S).
- Load and stress display with peak hold
- Automatic zeroing
- Programmable release time of piston after specimen failure.
- Storing of 30 test samples
- Automatic printout after specimen failure of date, specimen size, reference, maximum load, compressive strength and all other necessary information as per relevant standard (print out records calibrated to the same accuracy as the display).
- The controller at itself can be equipped with calliper, balance and other measuring system with direct input of measurement into test program with averaging of multiple inputs and automatic calculations as density a.s.o.
- Table for correction of machine deformation

Options
- Strip Printer
- Testing Software **PROTEUS-MT** for test control, data acquisition, calculations and print-out of test reports
- Balance and calliper for data input
- Digital handwheel for easy test set-up

Models
- Desktop housing placed on table
- Integrated in testing machines (compact models)
- Integrated in 19" control console

Specifications

Type	DIGICON 2000
Machines / Measuring Ranges	max. 4
Machines / Measurement Channels	max. 8 (Option max. 20 with PCI PC-Card)
Control Rate	250 Hz / 4 ms
Data Acquisition Frequency	250 Hz
Resolution	60 000 Digit
Microprocessor	16 Bit / 48 MHz
Sample Storing	max. 30
Measuring Amplifier	integrated, max. 4 transducers
Linearisation	from Force Channel
10 V Inputs	max. 4
Peak Value Detection	max. and min.
Clock and Calendar	integrated
Break Detection	0.1 - 99 %
Proportional Gain Table	Bypass Control
Machine Deformation	Compensation Table
Valve Output	15 - 600 mA or 10 V
Voltage Output	10 V
Interface to PC	RS232
Power Supply	230 V, 50 Hz.

Front View

Display with Start / Stop Control

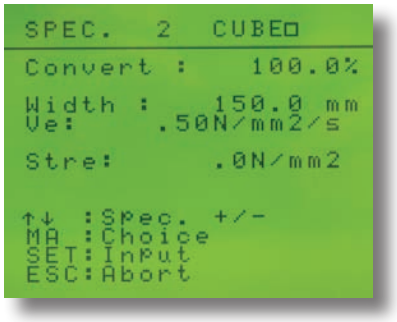
Back View

Connection of

- Transducer 4x
- 10 V Input 4x
- Control Output 3x
- Servo Valve
- Safety
- Hand Wheel
- PC

Menus and Operation
Digital Controllers / Digital Display
Type DIGICON 2000 / DIGICON 1000

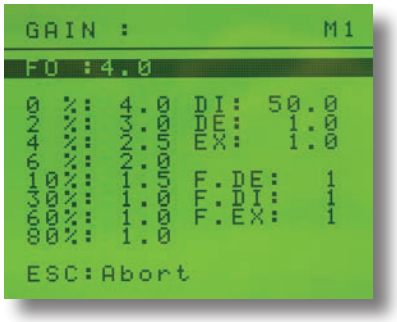
Testing from Stored Samples
for fast and easy testing from the predefined variables.



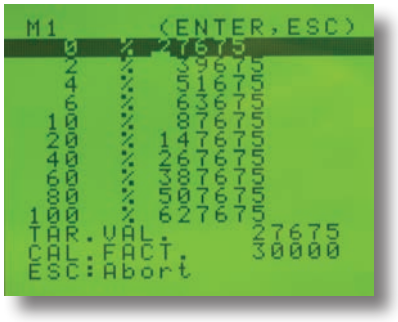
Storing of 30 Test Samples
Different variables for each samples are stored and can be used as test template.

Testing of Cubes
Example: Determination of the Compressive Strength of Cubes 150 mm.

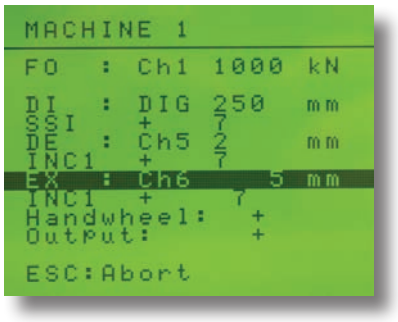
Premium Test-Set
with setting of piston sink time and auto zeroing for fast testing. Sensitive break detector avoids specimen destruction.



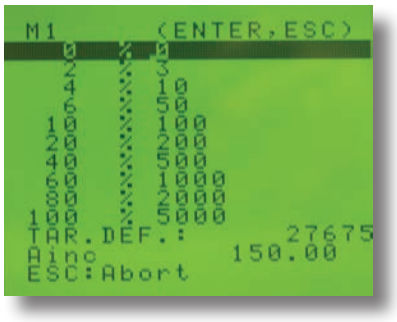
Setting Variable Gain
for highly stable closed loop control of the test procedure



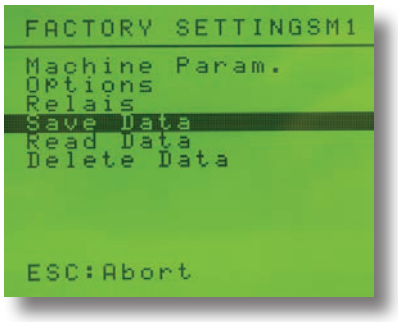
Linearisation of Channels
The linearisation of the force channels provides high accuracy.



Digital Increment Channels
or SSI 24 bit format can be used as inputs.

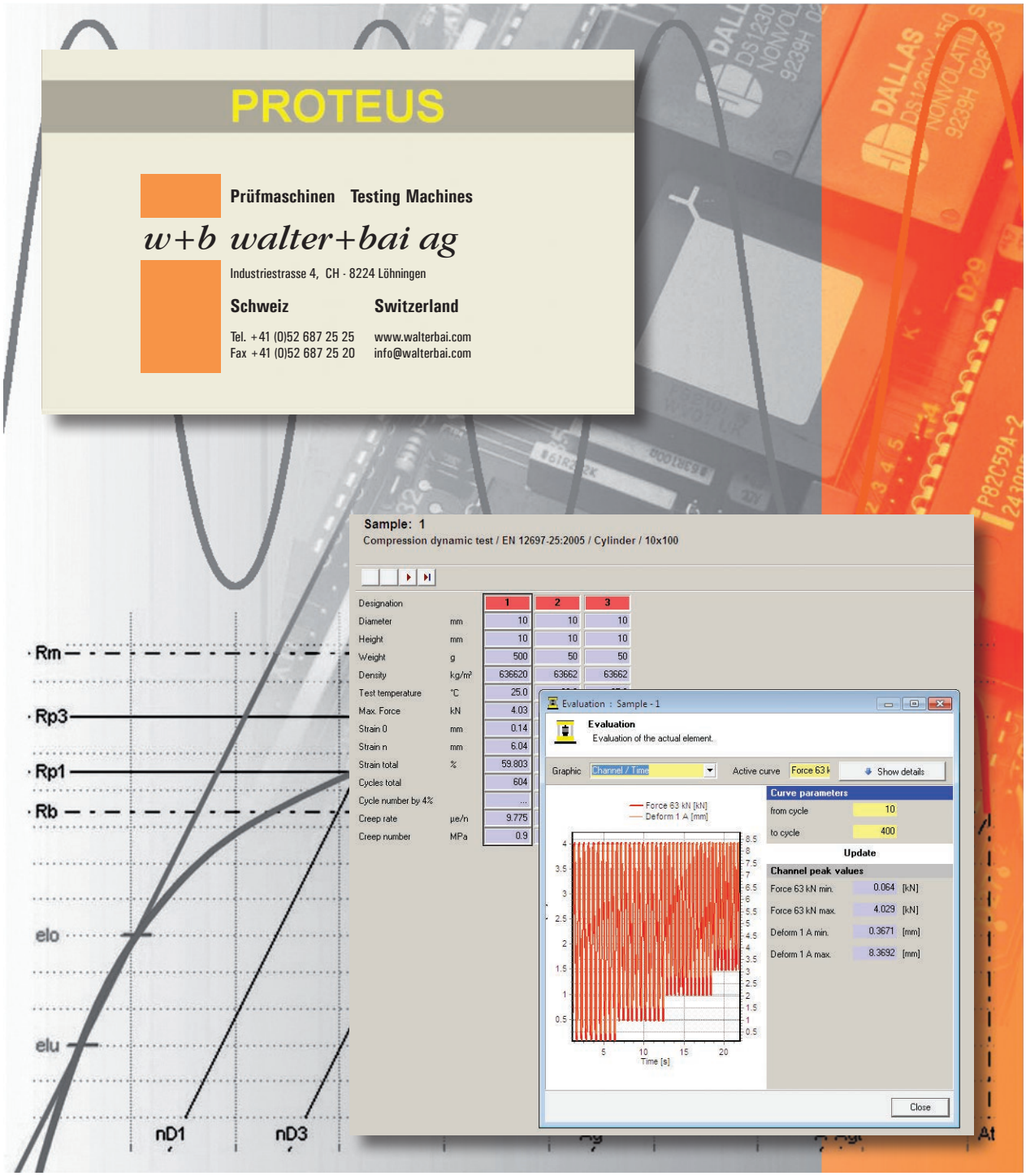


Machine Deformation
Setting of machine deformation enhances the accuracy for the deformation measuring system.



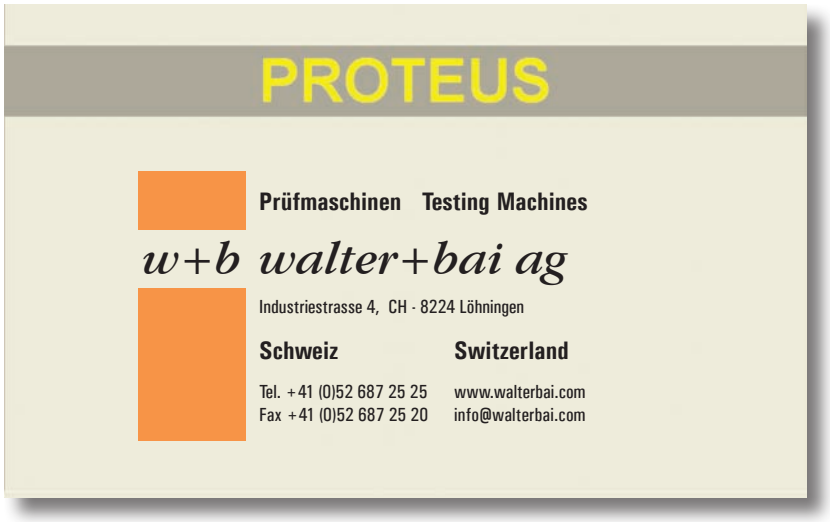
Security of Functions
The protected data saving in EEPROM guarantees a high degree of functional securty of the controller.

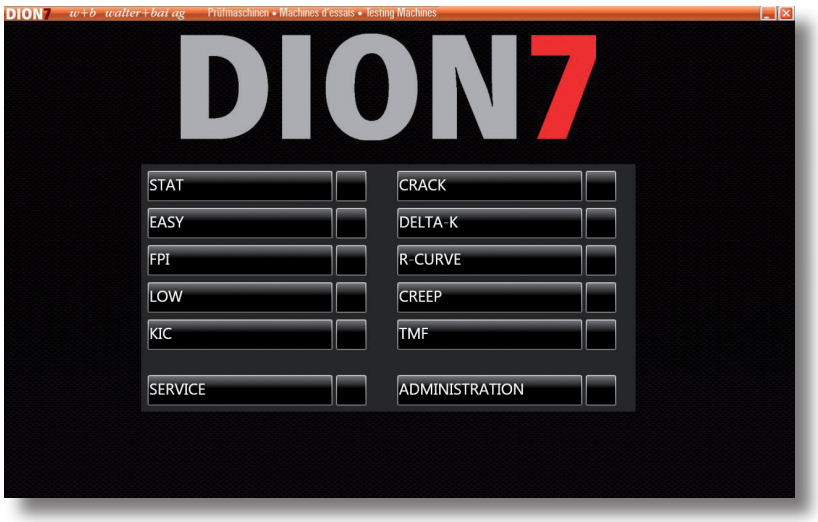
Software
for Building Materials Testing



Building Materials
Testing Software

We offer flexible and powerful building materials testing software. Available are different software packages in accordance with the relevant international standards.
The packages offers fully automatic control of the test procedure and data collection of results including analysis and reporting.
Control and evaluation has never been as user-friendly as it is now when using these application packages.
These packages offers you both, rapid and productive testing but also specialized applications for advanced testing requirements.





CONTENT SECTION K

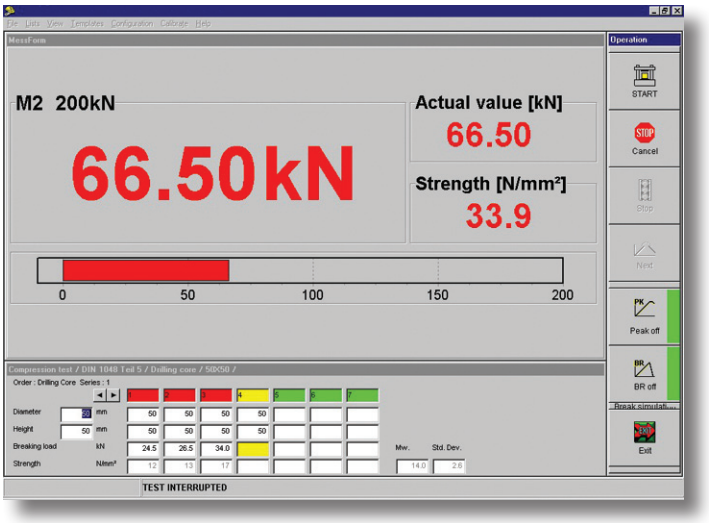
Testing Software for Building Materials

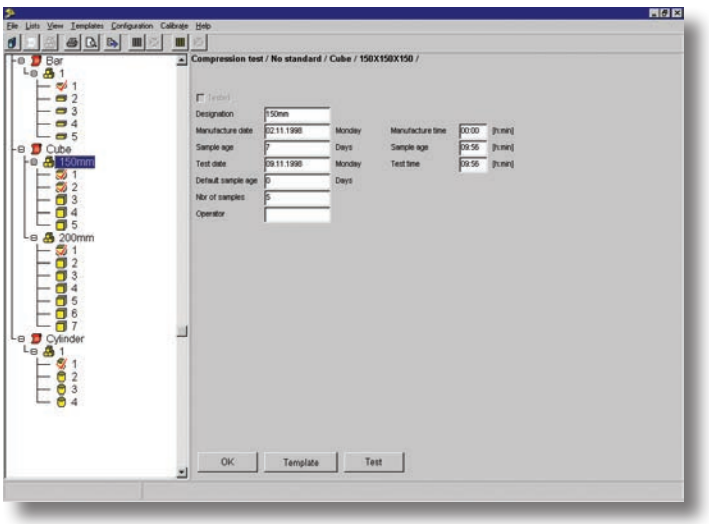
PROTEUS-MT

PROTEUS-MT offers many advantages in the field of building materials testing. Test control, data collection and evaluation and reporting capabilities have never been as user-friendly. PROTEUS-MT offers both, rapid and productive testing but also specialised applications for advanced testing.

Features

- The high degree of flexibility brought by template generation and by the test editor allows configuring the program according to the exact specifications needed.
- PROTEUS-MT is not only used in cement and ready-mix plants, building material test laboratories, but also for R&D in technical universities.
- Standard test types according to current standards, can be expanded in a modular way.
  Option: test editor, to define custom-specific test sequences
- Supports all widely used sample bodies with no dimensional limitations.
- Standard tests and special tests defined and stored as test templates. (Parameters set automatically according to the Standard used.)
- Custom test templates can be scaled according to the number of measurements, of decimal places, etc.
- Keying in an order and testing as separate activities.
- Mixed tests within a single test order (e.g. Elasticity Modulus and Pressure Test, etc.)
- Log output (including charts) according to type of test and of sample.
  Option: form designer for custom adaptation of log.
- Structured Database (BDE) with additional custom data that can be defined at every level (Order-Series-Sample), Object-Oriented, Modular and Network-Ready
- Data export in ASCII-format.
  Option: additional processing in external software such as your Laboratory Information Management System.
- Supports measuring devices such as measuring station, scales and slide gauges.
- Password protection for sensitive functions (H/W configuration, templetes, etc.)





Templates Make Testing Fast and Easy

Test templates contain all parameters needed for testing, such as Type of Sample, Type of Test, Test Standard, Quality Control, Graphical Representation and more. Several tests within a single order performed by assigning a test template to the series. Custom-made additional test templates can be defined in addition to the standard ones.

Simple to Operate

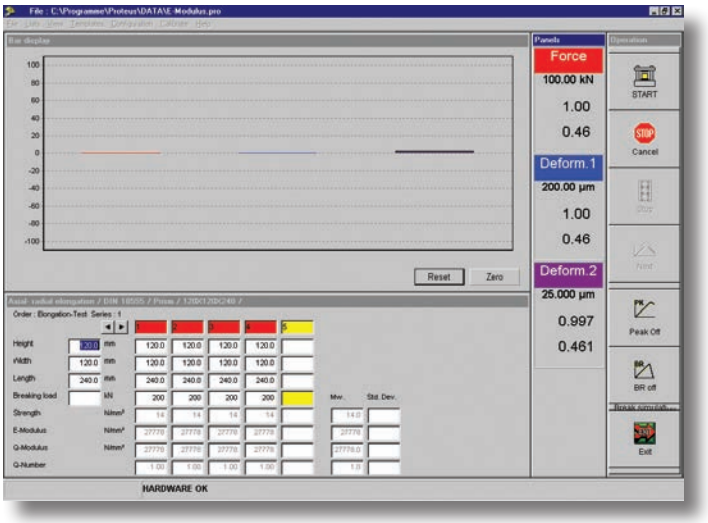
- All program functions can be selected with the mouse. The main functions may also be called with a combination of keys. Powerful object-specific functions called directly with the right mouse button to speed up operations: Copy, Paste, Clear
- Test classification in a relational database
- Database Structure: Databases can be structured according to any suitable folder hierarchy. Thus, tests can be sorted according to individual criteria, e.g. according to customers or suppliers, materials, type of test, time scales, test bodies. Each database contains any number of orders and series. A series contains at most 99 samples. Example: An order contains 3 series (Age 2, 7 and 28 days), each one with 3 samples.
- Data Export for Additional Processing: The data export function provides an interface with other external programs and stores the data in standard ASCII format. Option: Customer-specific ASCII formats.
- Logging: All series in an order can be printed out. The type of form is correctly handled by the Logging Manager, based on the test template. Option: Form Designer for custom-specific adaptation of forms.

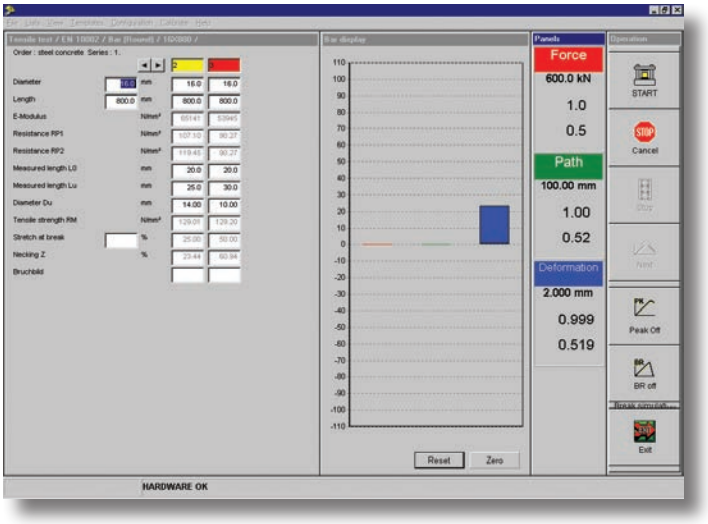
Standard Sample Bodies

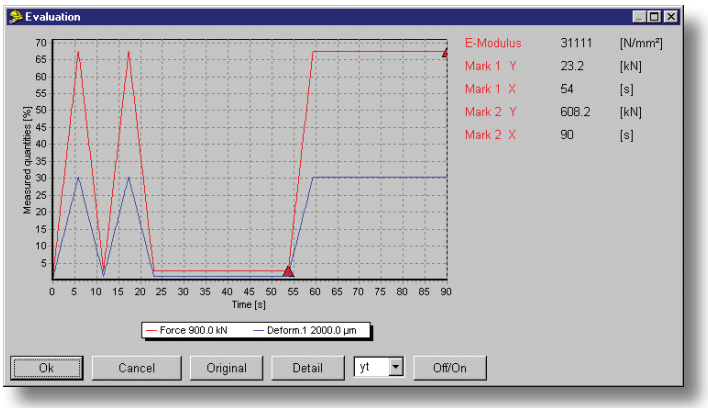
Depending on the type of test and the standard, the following approved sample bodies are available:

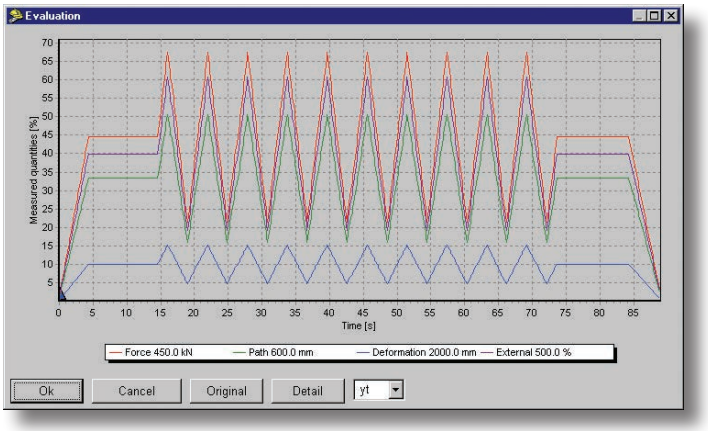
- Cubes:
  10, 15, 20 cm, 4, 6 inch
- Cylinders:
  10 x 20, 12 x 36, 15 x 15, 15 x 30, 16 x 32, 20 x 20, 20 x 40 cm
- Drilling Cores:
  50 x 50, 50 x 100, 80 x 80, 80 x 160 mm
- Prisms:
  40 x 40 x 160 mm
- Bars:
  10 x 15 x 70, 12 x 12 x 36, 15 x 15 x 70, 20 x 20 x 90 cm
- Plates:
  60 x 60 x 10 cm

Dimensions to be selected without limitations.





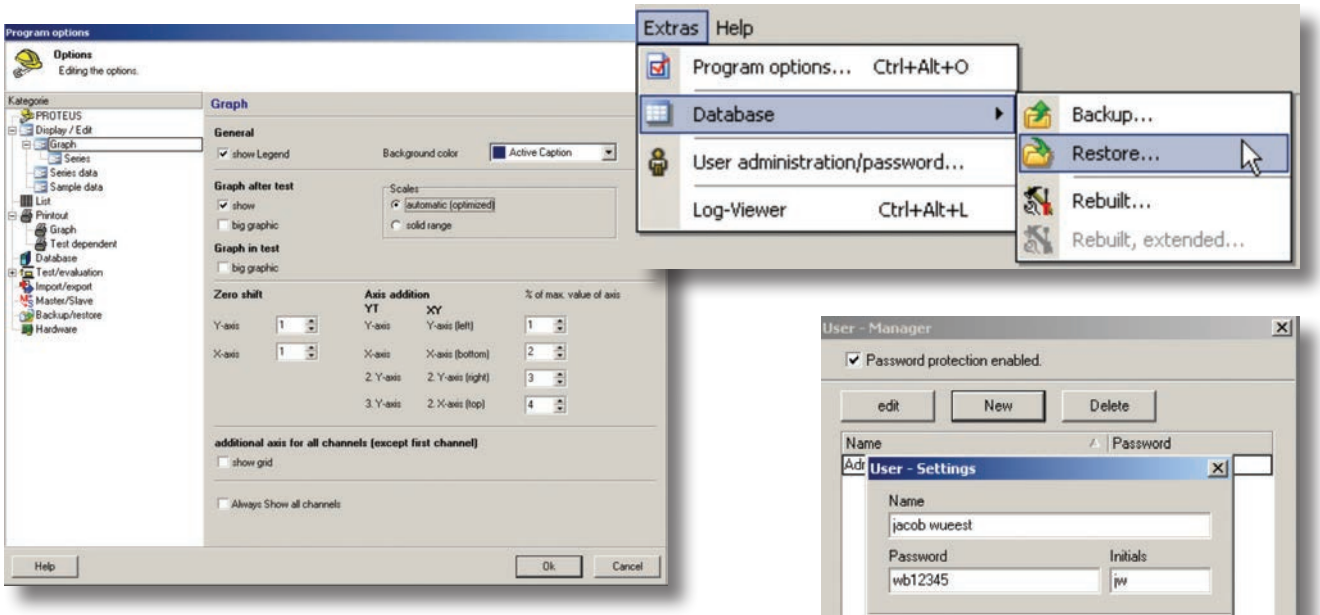


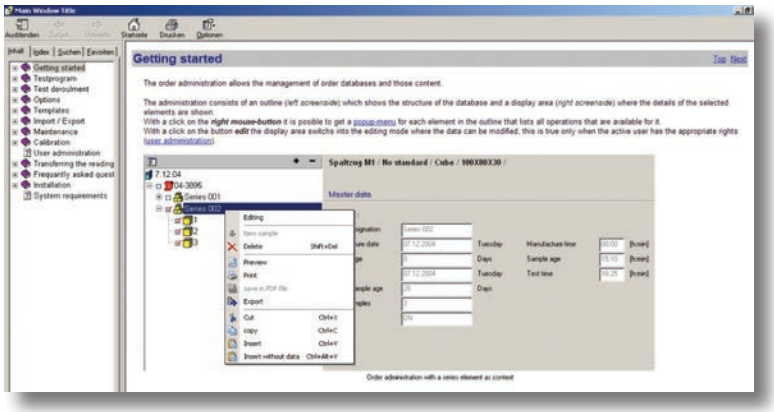


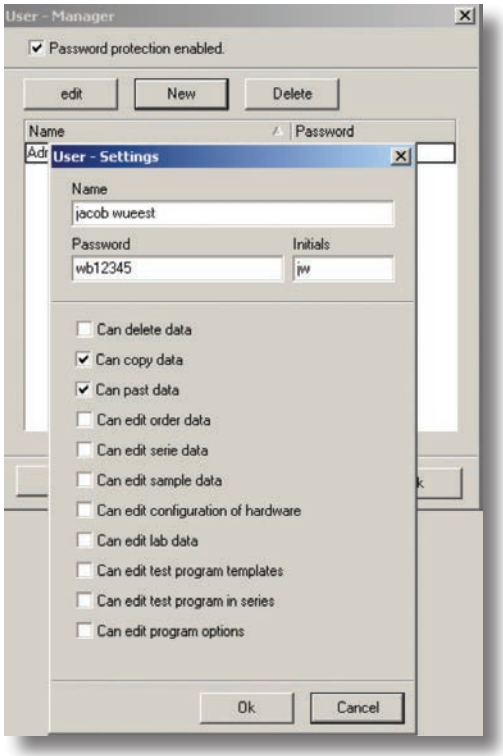
Testing Software for Building Materials
PROTEUS-MT

PROTEUS-MT Basis Module

- Data base contains a sample administration.
- Actual test and printer list with calendar make the daily work easier
- Connection of several controllers or measurements with up to 4 machines each
- is possible.
- For the combination bending-compression test 2 controllers are simultaneously in operation.
- Works with sliding gauge, balance, dial gauge and digital measuring station.
- Templates simplify the tests fundamentally. They are made with help of an assistant.
- Universal and special tests can be arranged on a graphically surface.
- Automated routine tests are easily created
- Password protection for the laboratory head for templates and hardware adjustments
- Standard export of the results in the ASCII-format for further processing in other programs
- Standard protocols for all tests, optional with or without graphic.
- Number of digits and rounding of the results can be indicated in the templates.
- Laboratory data base for further data fields in the order or series with choice of data, text and numeric fields with description and sorting
- Program for the calibration of the machine with DIGICON 2000/3000





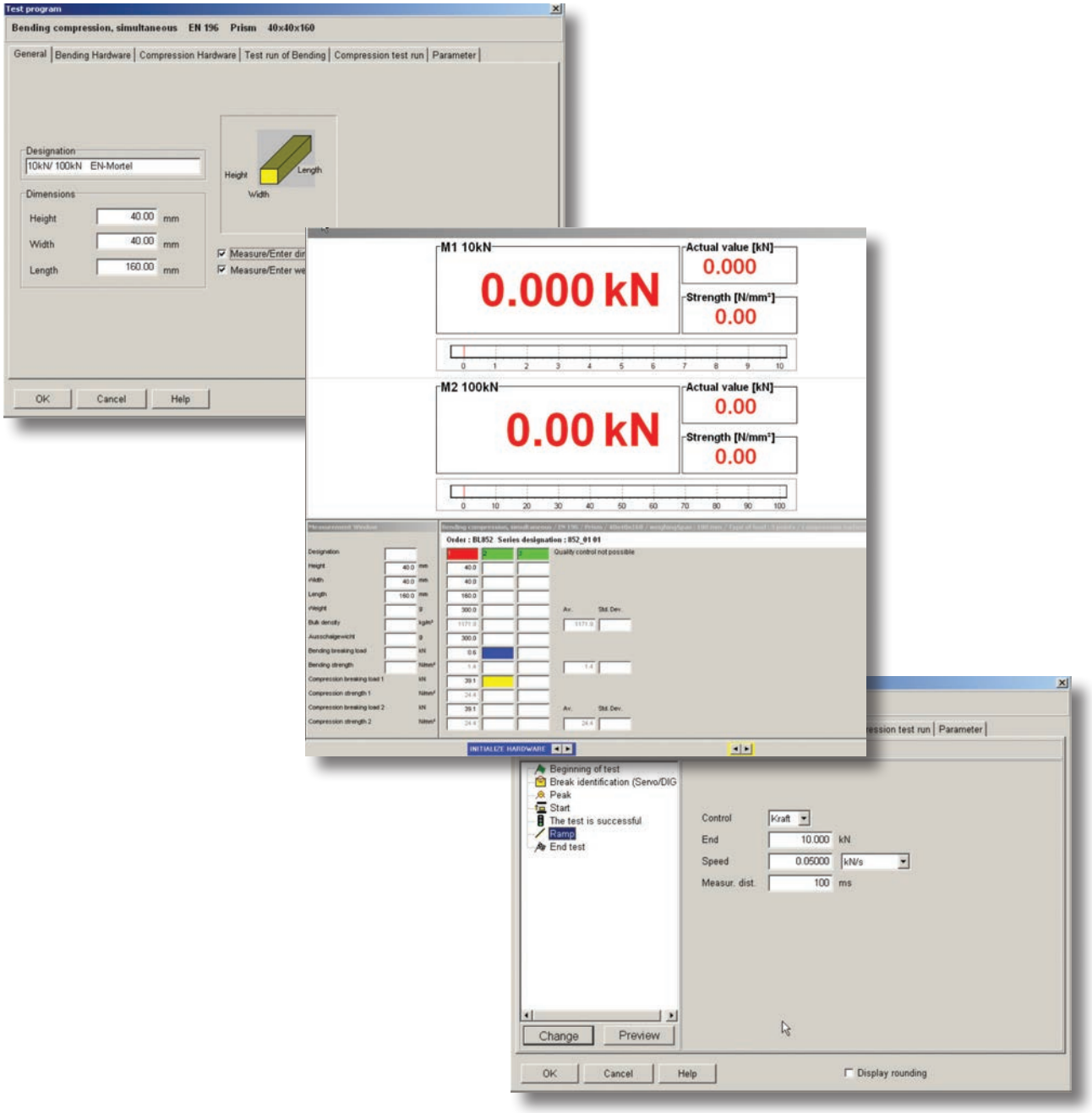


Cement and Mortar Testing

For the automatic determination of the flexural strength and compression strength of cement and mortar samples.

- The testing in series allows calculation of mean and standard deviation
- Graphical analysis of force, deformation and deflection
- Sample administration with acquisition at time of delivery / production and testing of samples with date according test list
- Deformation control allows closed loop tests with force maximum
- Inputs of values from electronic sliding gauge and balance
- Simultaneous bending and compression testing with 2 machines controlled

Bending and Compression Tests	
Standards	EN 196
Samples	prisms, cubes, cylinders
Determination	flexural strength, compressive strength
Calculations	density



Concrete Testing

For the automatic testing of concrete samples.

- Flexural, compression and split tensile strength determination
- The testing in series allows calculation of mean and standard deviation
- Analysis of force, deformation and deflection
- Sample administration with acquisition at time of delivery / production and testing of samples with date according test list
- Deformation control allows closed loop tests with force maximum
- Inputs from measuring and weighing system for automatic measurement of samples (weight and size) and input of values from sliding gauge and balance

Compression Tests	
Standards	EN 12390 - 3, SIA 162-1, DIN 1048, ÖNB 3303, NFP 18406, BS 1881
Samples	prism, beams
Determination	compressive strength, density

Bending Tests	
Standards	EN 12390 - 5, DIN 1048, ÖNB 3303, NFP 18406
Samples	cubes, cylinders, platens
Determination	flexural strength, density

Compression Tests with Predefined Compression Area	
Standards	-
Samples	single samples like paving stones, cubes, prisms, beams, platens
Determination	compressive strength according to predefined compression area

Tensile Splitting Tests (Brazilian Test)	
Standards	EN 12390 - 6, DIN 1048, BS 1881, NFP 18-406, ÖNB 3303
Samples	cubes and cylinders
Determination	tensile splitting strength

Bending Test with Bending Deformation	
Standards	-
Samples	prisms, beams, platens
Determination	deformation, break load and bending strength

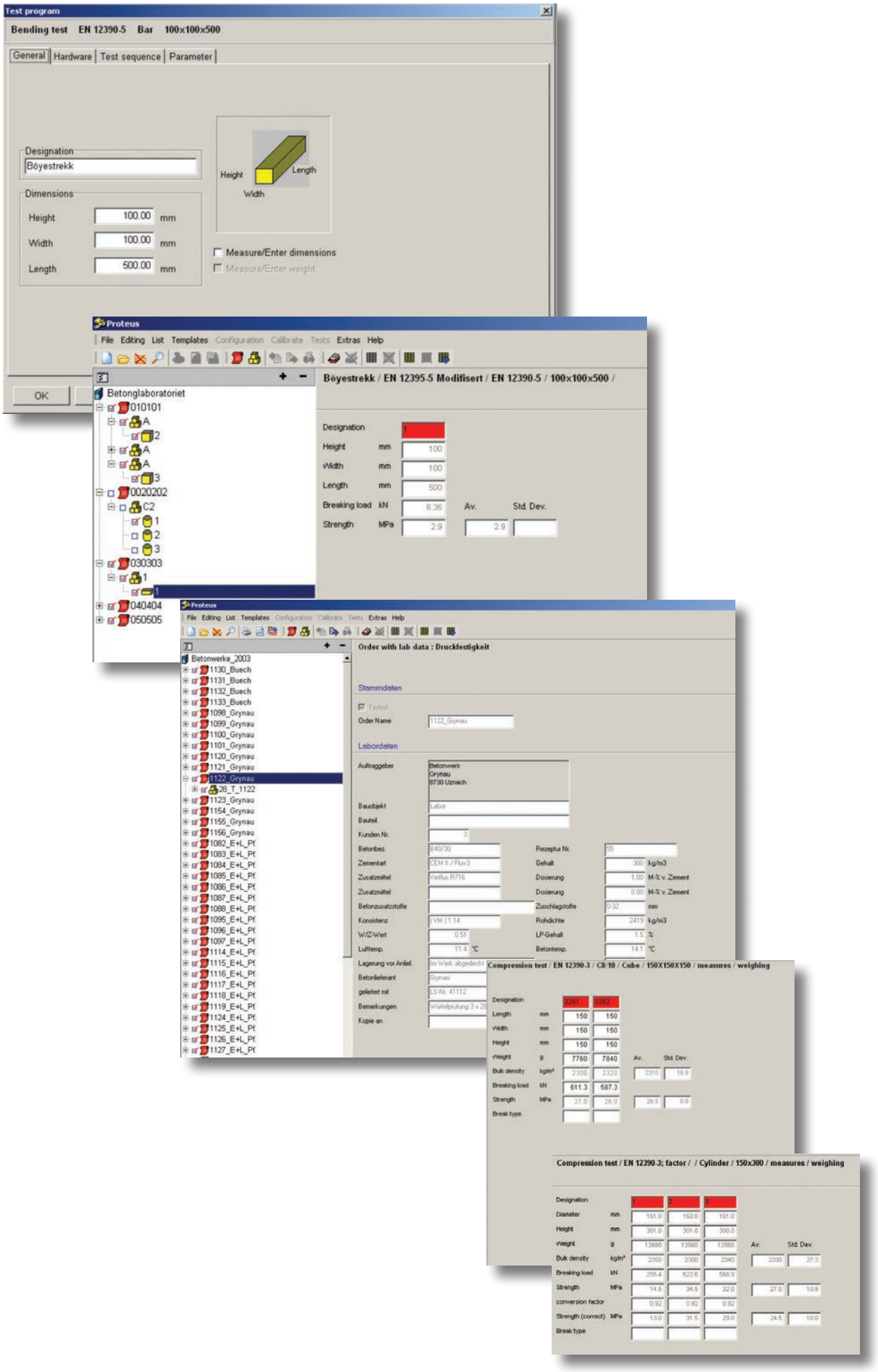
Splitting Tensile Test with Radial Strain	
Standards	-
Samples	cylinders, cores
Determination	splitting tensile strength, cross deformation, E-Modulus, break deformation

Pull-out Test of Reinforcing Steel	
Standards	EN 1881-2003
Description	Fulfilled-criteria with enter of min. load and max. shifting· Data acquisition of failed test, max. load and shifting

Paving Stone Splitting Test (Brazilian Test)	
Standards	EN 1338
Samples	paving stones
Determination	splitting tensile strength, measurements on the surface of specimen

Plate Bending Test	
Standards	EN 1339
Samples	concrete platens
Determination	flexural strength and load depending to the length, measurements on specimen

Curb Bending Test	
Standards	EN 1340
Samples	curb stones
Determination	flexural strength, input of moment of area and distance to the center of gravity


Test program
Bending test EN 12390-5 Bar 100x100x500
General Hardware Test sequence Parameter
Designation
Böyestrekk
Dimensions
Height 100.00 mm
Width 100.00 mm
Length 500.00 mm
Height
Length
Width
Measure/Enter dimensions
Measure/Enter weight
OK
Proteus
File Editing List Templates Configuration Calibrate Tests Extras Help
Betonglaboratoriet
Böyestrekk / EN 12395-5 Modifisert / EN 12390-5 / 100x100x500 /
Designation
Height mm 100
Width mm 100
Length mm 500
Breaking load kN 6.36
Strength MPa 2.9
Av. 2.9
Std. Dev.
Order with lab data : Druckfestigkeit
Stammdaten
Labordaten
Compression test / EN 12390-3 / C8/10 / Cube / 150X150X150 / measures / weighing
Compression test / EN 12390-3; factor / / Cylinder / 150x300 / measures / weighing

Fibre Reinforced Concrete Testing

Energy Absorption Test	
Standards	-
Samples	cubes, prisms, beams, platens, cores, cylinders
Determination	whole or partial energy, flexural strength and deformation

Energy Test of Sprayed Concrete	
Standards	SIA 262 - 6, DBV Data Sheet
Samples	cubes, prisms, beams, platens, cores, cylinders of reinforced sprayed concrete
Determination	bending w1, work w1, break load, strength fctf, and specific density

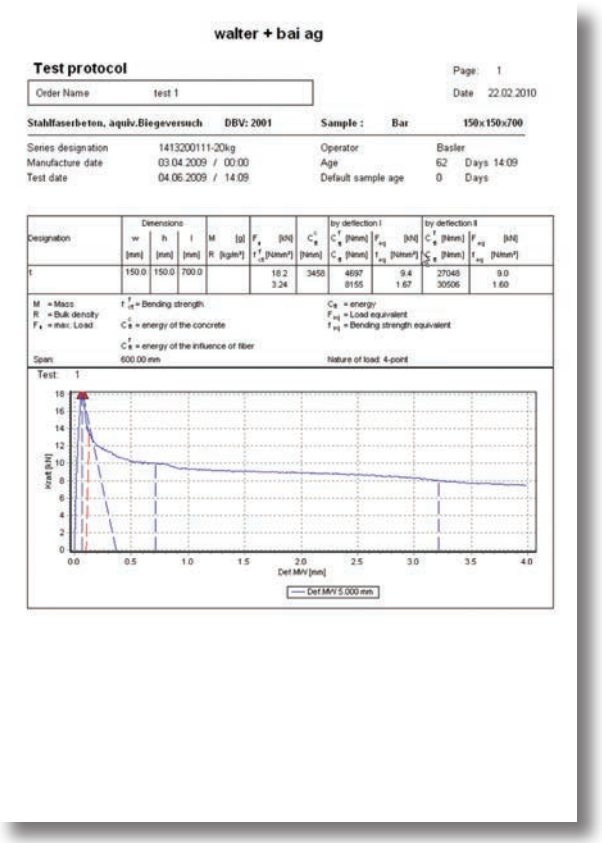
Bending Test of Sprayed Concrete	
Standards	NFP 18409
Samples	steel reinforced concrete
Determination	flexural strength, deformation

Testing of Fibre Metallic Reinforced Concrete	
Standards	EN 14651 - 2000
Samples	beams, prisms
Determination	proportional-limit, bending and compression-strength, CMOD deflection

Testing of Sprayed Concrete on Reinforced Platens	
Standards	EN 14651
Samples	sprayed concrete on reinforced platens
Determination	first crack and flexural strength, load-deformation properties, energy absorption until predefined deformation

Measuring and Weighing Station

Automatic Determination of Dimensions and Weight		
Standards	-	
Samples	cubes, cylinders	
Determination	length and width height weight	diagonal measurement in testing machine integrated balance


walter + bai ag

Test protocol

Page: 1

Order Name test 1

Date 22.02.2010

Stahlfaserbeton, äquiv.Biegeversuch DBV: 2001 Sample : Bar 150x150x700

Series designation 1413200111-20kg
Manufacture date 03.04.2009 / 00:00
Test date 04.06.2009 / 14:09

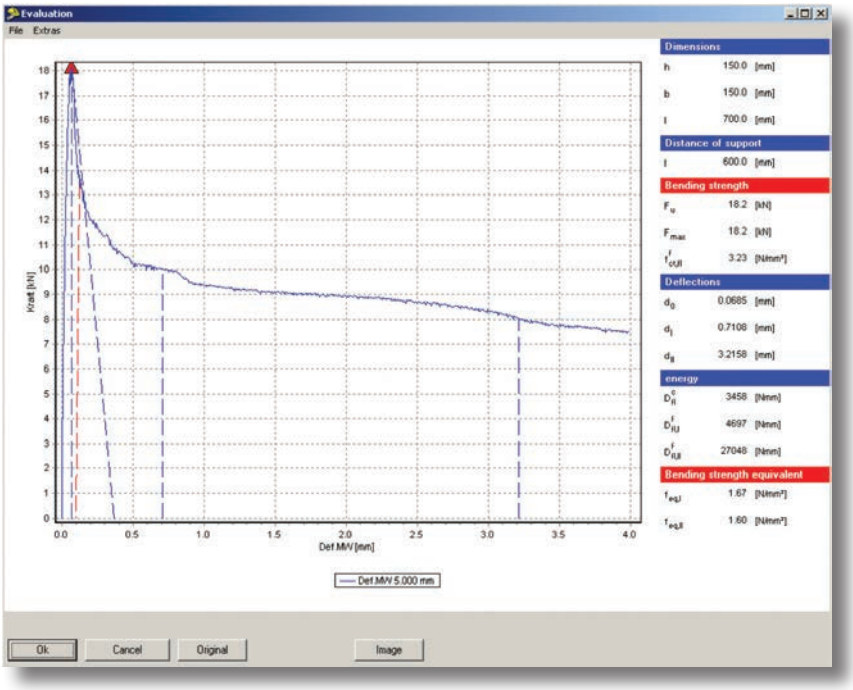
Operator Basler
Age 62 Days 14:09
Default sample age 0 Days

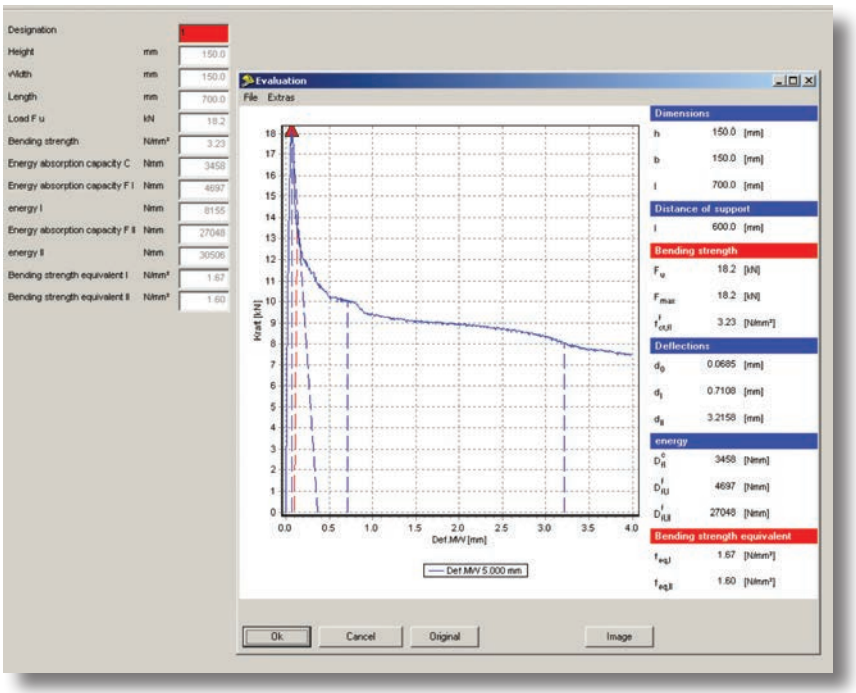
Designation	Dimensions w [mm]	h [mm]	l [mm]	M [g]	R [kg/m³]	F_e [kN]	f^r_{ct} [N/mm²]	C^r_e [N/mm]	by deflection I C^r_e [Nmm]	F_{eq} [kN]	f_{eq} [N/mm²]	by deflection II C^r_e [Nmm]	F_{eq} [kN]	f_{eq} [N/mm²]
1	150.0	150.0	700.0			18.2 3.24		3458	4697 0155	9.4 1.67		27048 30506		9.0 1.60

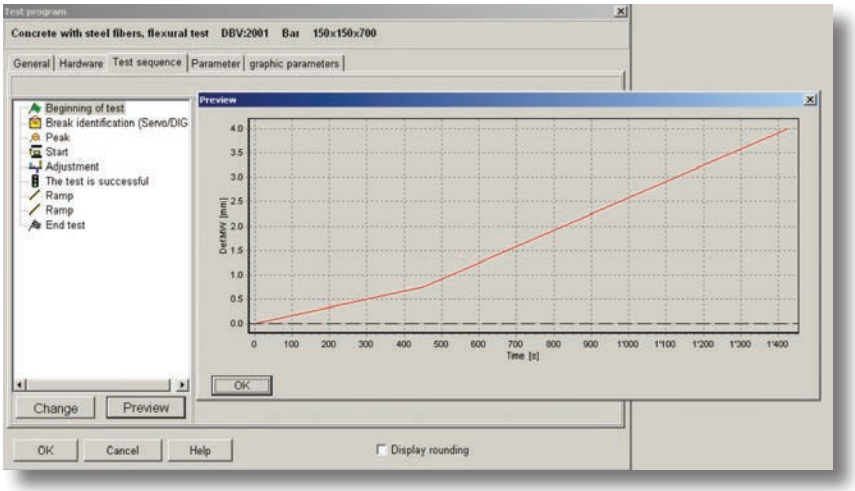
M = Mass
R = Bulk density
F_e = max. Load
f^r_{ct} = Bending strength
C^r_e = energy of the concrete
C^r_e = energy of the influence of fiber
C_e = energy
F_{eq} = Load equivalent
f_{eq} = Bending strength equivalent

Span: 600.00 mm
Nature of load: 4-point

Test: 1


Evaluation
File Extras
Dimensions
h 150.0 [mm]
b 150.0 [mm]
l 700.0 [mm]
Distance of support
l 600.0 [mm]
Bending strength
F u 18.2 [kN]
F max 18.2 [kN]
f cf,II 3.23 [N/mm²]
Deflections
d0 0.0685 [mm]
d1 0.7108 [mm]
d3 3.2158 [mm]
energy
D C H 3458 [Nmm]
D f KJ 4697 [Nmm]
D f K,II 27048 [Nmm]
Bending strength equivalent
f eq,I 1.67 [N/mm²]
f eq,II 1.60 [N/mm²]
Kraft [kN]
Def.M/V [mm]
Def.M/V 5.000 mm
Ok
Cancel
Original
Image


Designation
Height mm 150.0
Width mm 150.0
Length mm 700.0
Load F u kN 18.2
Bending strength N/mm² 3.23
Energy absorption capacity C Nmm 3458
Energy absorption capacity F I Nmm 4697
energy I Nmm 8155
Energy absorption capacity F II Nmm 27048
energy II Nmm 30506
Bending strength equivalent I N/mm² 1.67
Bending strength equivalent II N/mm² 1.60
Evaluation
File Extras
Dimensions
Distance of support
Bending strength
Deflections
energy
Bending strength equivalent
Kraft [kN]
Def.M/V [mm]
Def.M/V 5.000 mm
Ok
Cancel
Original
Image


Concrete with steel fibers, flexural test DBV:2001 Bar 150x150x700
General Hardware Test sequence Parameter graphic parameters
Beginning of test
Break identification (Servo/DIG
Peak
Start
Adjustment
The test is successful
Ramp
Ramp
End test
Preview
Def.M/V [mm]
Time [s]
OK
Change
Preview
OK
Cancel
Help
Display rounding

Modulus of Elasticity – E-Modulus

For the automatic determination of compression and bending E-Modulus on building materials.

- Extensometers are necessary for this determination.
- The testing procedure is freely programmable with icons.
- After programming of the testing routine, the test is executed in closed loop mode.
- Input of single values allows an acquisition and surveillance.
- Depending on the extensometer, the test procedure is run until specimen failure
- With the appropriate accessory, it is possible to measure the axial and diametrical deformation for the determination of E-Modulus with diametral values
- Graphical analysis of stress/deformation, force/travel or time value.
- Diagrams of single sample or series of samples with multiple graphic.
- Testing in series allows the calculation of the mean and the standard deviation.
- Sample administration with acquisition at time of delivery / production and testing of samples with date according test list.
- Automatic setting of marks for E-Modulus determination with possibility of manual adjustment.

Compression E-Modulus Tests	
Standards	DIN 1048, ÖNB 3303, SIA 262, EN 13286-43, NS 676
Samples	prisms, cubes, cylinders, cores
Determination	compressive E-Modulus

Compression E-Modulus Testing	
Standards	-
Samples	prisms, cubes, cylinders
Determination	compressive E-Modulus, breaking force, density and E-Modulus behaviours

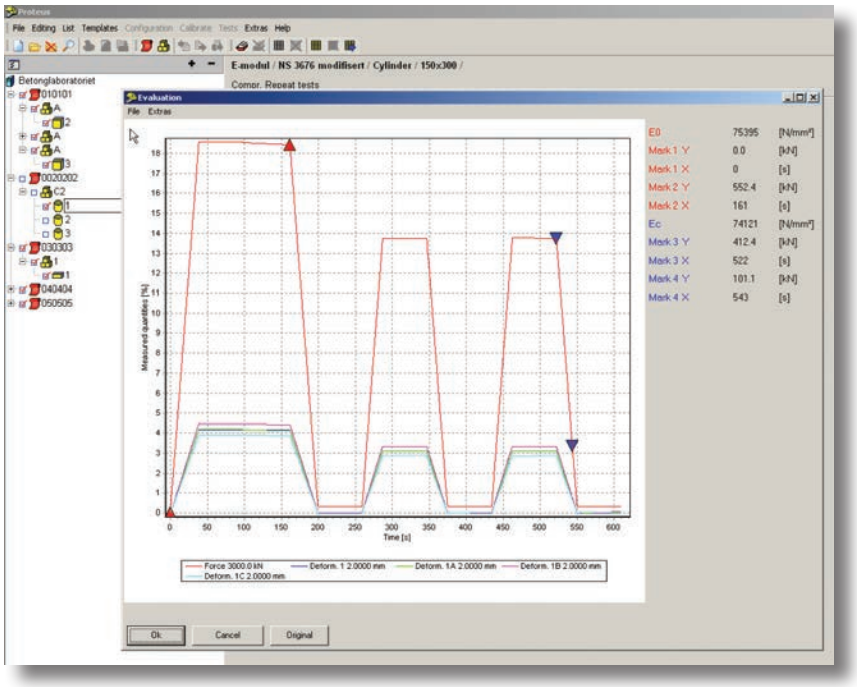
Bending E-Modulus Testing	
Standards	-
Samples	prisms, beams, platen
Determination	3- and 4-point bending E-Modulus, breaking force, density

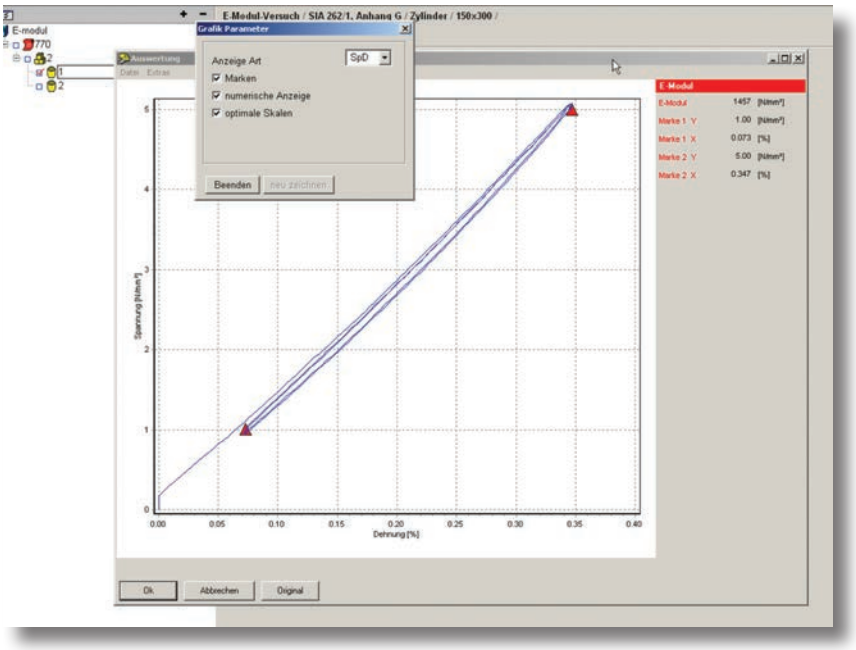
Compression and Tensile E-Modulus Testing	
Standards	EN 13286-43
Samples	core, cylinders from bounded mixtures
Determination	E-Modulus and breaking load in one test

Axial and Diametral Deformation with E-Modulus	
Standards	DIN 18555
Samples	prisms, cubes, cores, cylinders
Determination	axial and diametral E-Modulus with Poisson's ratio

E-Modulus on Cores in Horizontal Position	
Standards	-
Samples	horizontal cores and cylinders
Determination	axial and diametral E-Modulus with Poisson's ratio, break load, stress/strain

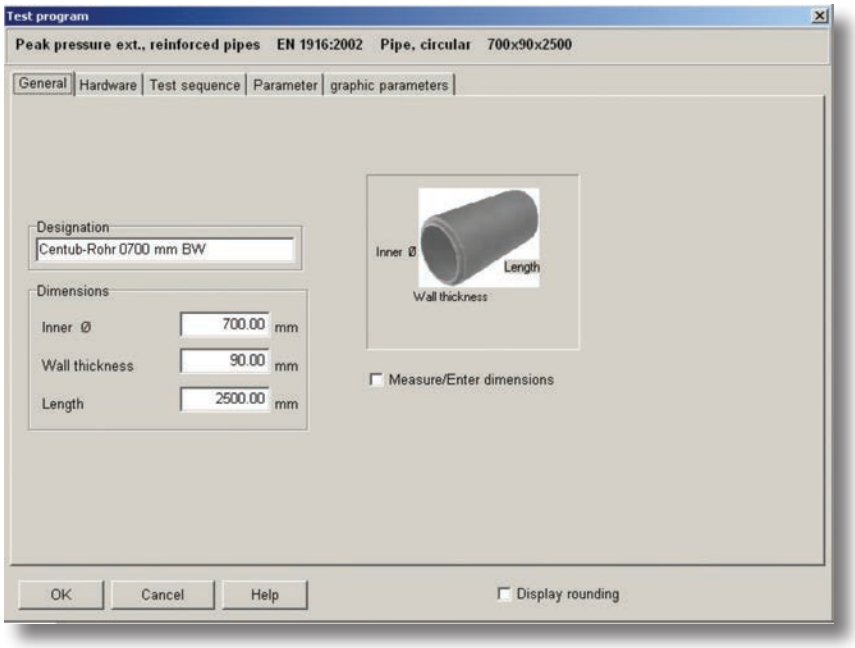
Upon request E-Modulus determination according Russian Standard and other National Standards!

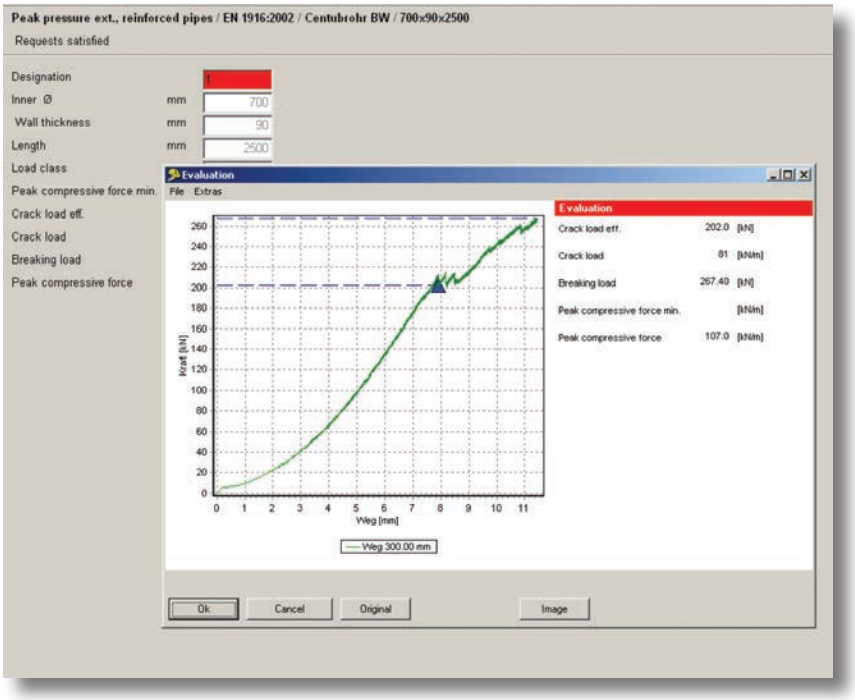

E-modul / NS 3676 modifisert / Cylinder / 150x300 /
Comor. Repeat tests
Evaluation
Ok
Cancel
Original


E-Modul-Versuch / SIA 262/1, Anhang G / Zylinder / 150x300 /
Grafik Parameter
Anzeige Art
Marken
numerische Anzeige
optimale Skalen
Beenden
Ok
Abbrechen
Original

Pipe Testing - EN 1916

- Determination of apex compression strength on pipes
- Determination of bending length of pipes
- Determination of concrete strength
- Automatic detection of crack
- Automatic calculation of load speed in dependence to the length of the pipe



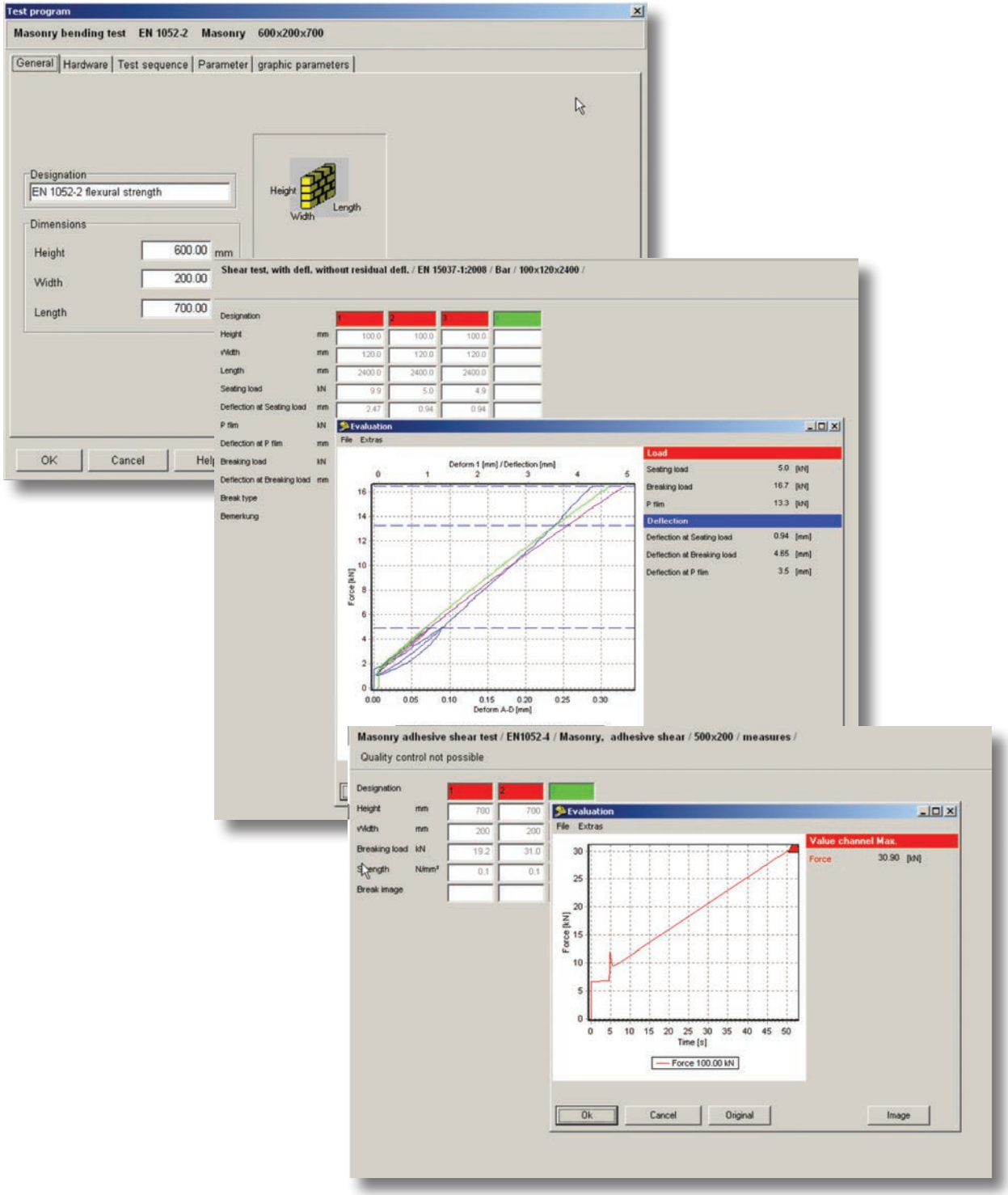


Masonry Testing - EN 1052

- Compressive strength of masonry according EN 1052 - 1, with determination of E-Modulus
- Bending-compression strength of masonry according EN 1052 - 2, with horizontal and vertical loading
- Shear strength of masonry according EN 1052 - 3 with determination of characteristic strength

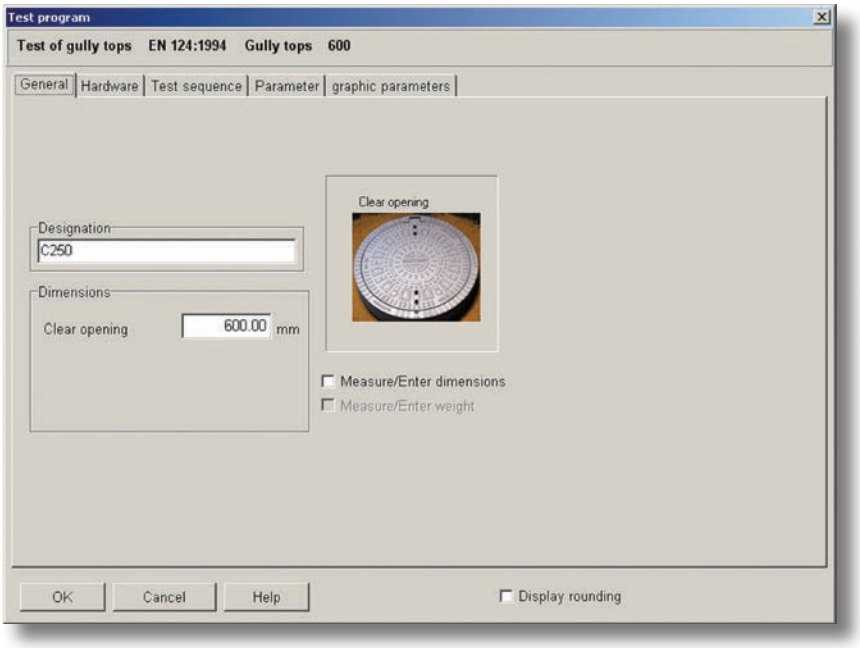
Testing of Brick - EN 772-1

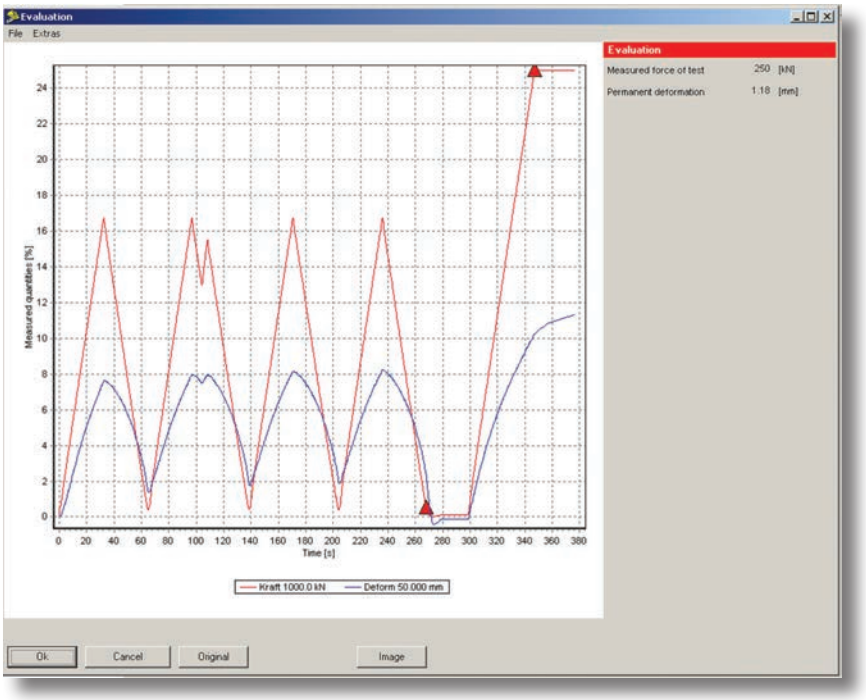
- Determination of strength with measuring or input of net area
- Selection of the Conditioning
- Included table for factor of shape with interpolation
- Calculation of equivalence and normalized strength



Gully Top Testing - EN 124

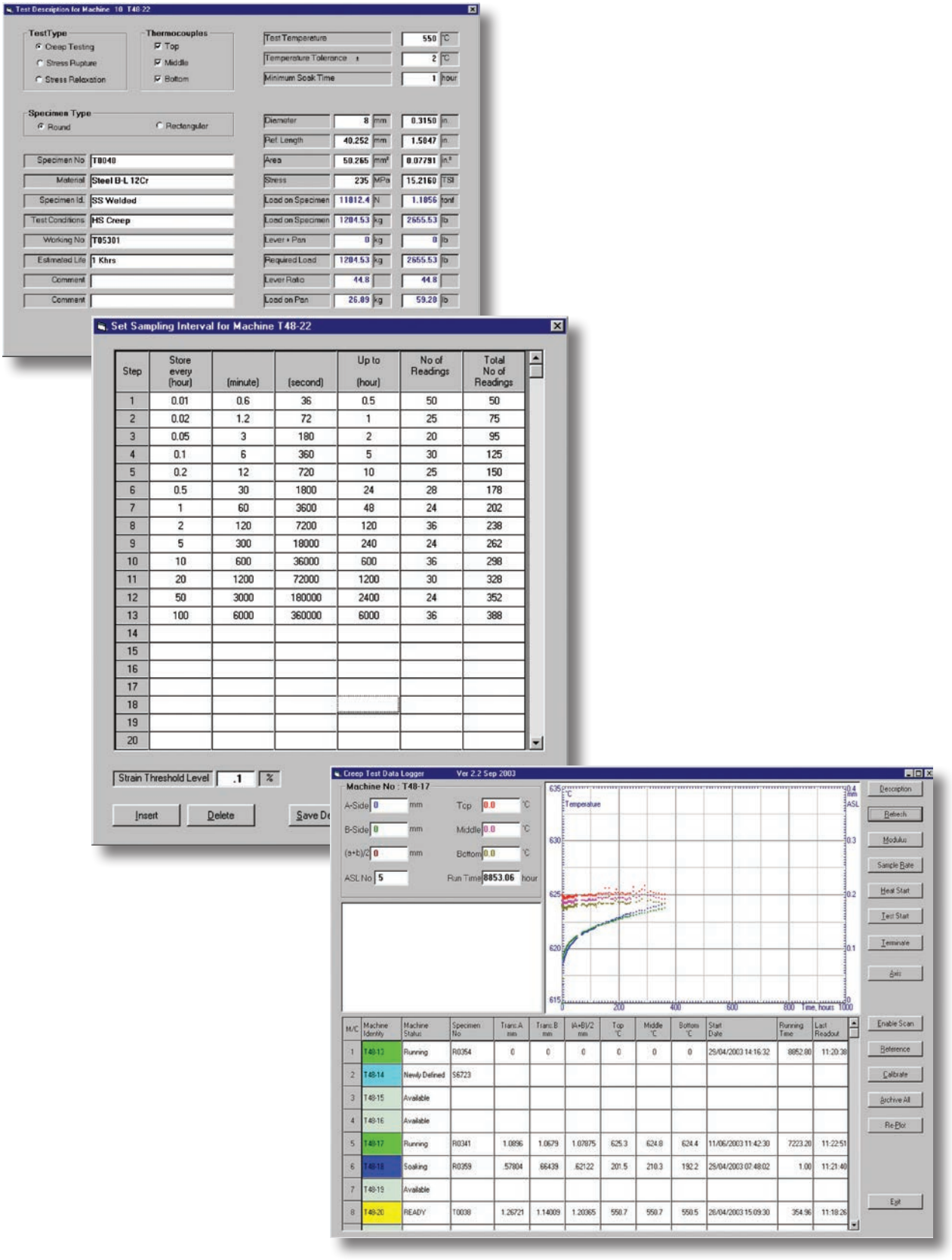
- Simple test programming with master and slave ramp
- Input of stamp dimensions
- Flexible evaluation with setting of measuring points
- Multiple graphic with preloads





Creep Testing Software

This application software is available for data sampling, visualization and evaluation of up to 8 creep testing machines. The package offers you both, rapid and productive testing but also specialised applications for advanced testing requirements. The creep testing software and hardware package scans each test machine regularly to read load and if equipped with electronic extensometer also the deformation. It provides graph (force against time with additional deformation in combination with electronic extensometer) and test report print out. All measuring values are permanent available with real-time graph.



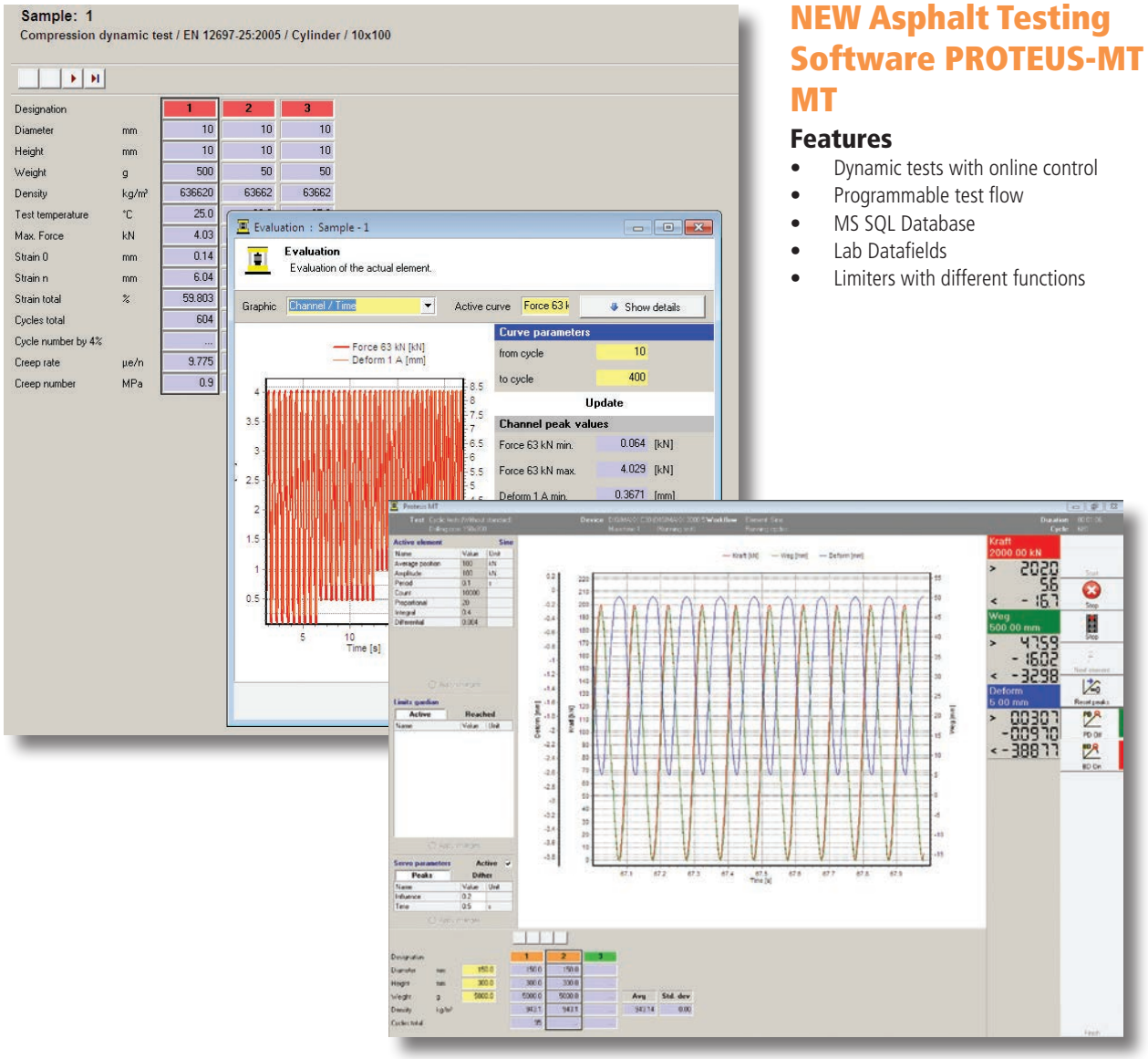
Asphalt Testing

Marshall Compression Test	
Standards	EN 12697-34
Samples	hot asphalt
Determination	adjusted stability with height / volume, stability, flow values, Marshall Quotient

Bituminous Test according LEUTNER	
Standards	LEUTNER
Samples	cylinders with bituminous mixtures
Determination	absolute bond shear strength

Dynamic Uniaxial Asphalt Compression Test	
Standards	EN 12697-25
Samples	asphalt
Determination	deformation, total and persistent strain, cycle/time, creep rate/creep number
Extras	free programmable test procedure with preload

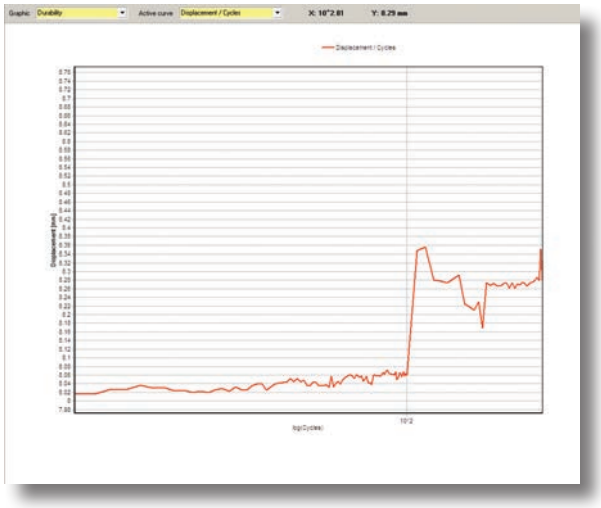
Indirect Tensile Test	
Standards	EN 12697-24, AL-SP Asphalt 09
Samples	asphalt
Determination	indirect tensile strength, max. force/deformation, tensile deformation and tensile strain, correlation coefficient between several tests
Extras	Haversine test with automatic parameters from preload, cyclic limit value for observation of max. load

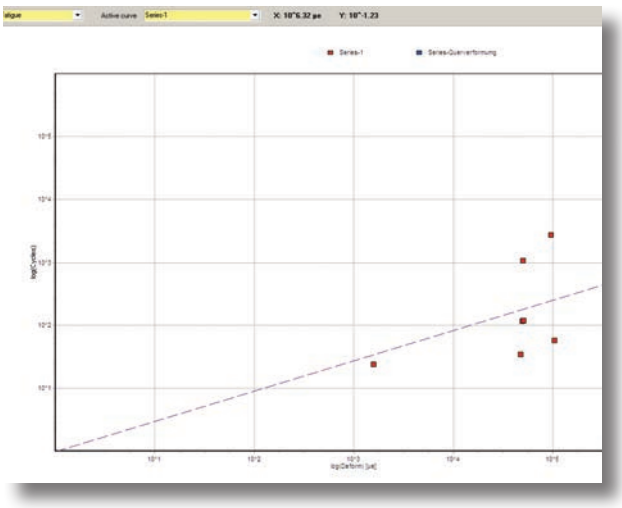


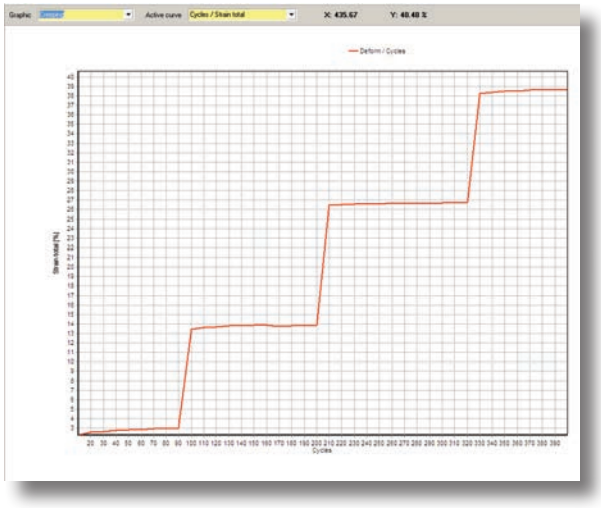
NEW Asphalt Testing Software PROTEUS-MT MT

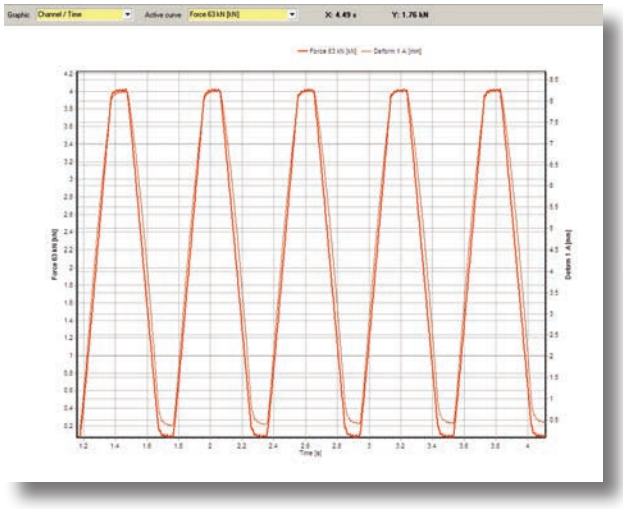
Features

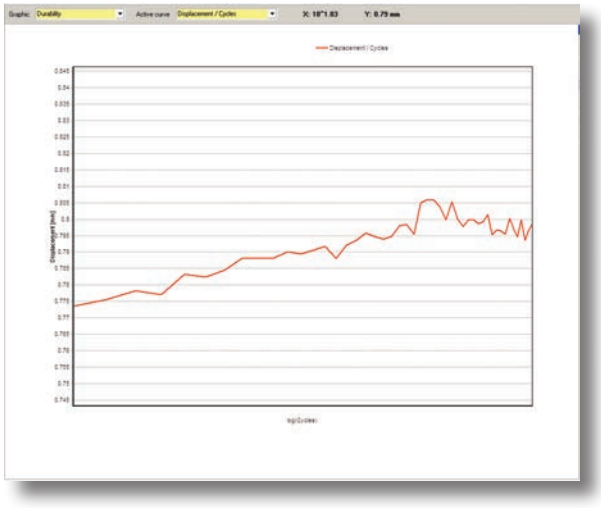
- Dynamic tests with online control
- Programmable test flow
- MS SQL Database
- Lab Datafields
- Limiters with different functions

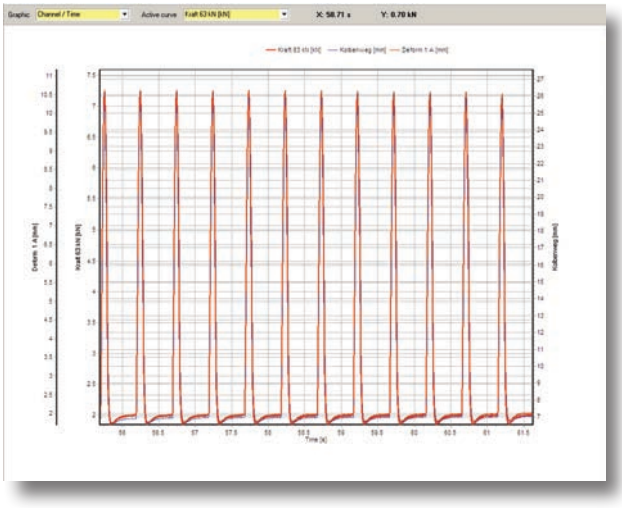












Rock Mechanics Testing

Uniaxial Tests	
Standards	DIN 18136
Samples	rock and soil samples in cores or cylinders
Determination	compressive strength, Force/displacement, strain/compressability
Extras	Test speed in relation to initial length, programmable limit for the compressibility in %,

Triaxial Tests	
Standards	DIN 18137
Samples	rock and soil samples in cores or cylinders
Determination	compressive strength/compressibility, displacement, radial compression, volume
Extras	synchronization of axial and radial deformation in test procedure, optional with extension to 16 measuring channels

Premium Rock Mechanics Tests

Standards

DGGT Ak. 3.3 No. 1, DGEG Ak. 19 No. 12, ASTM 7012, ISRM 20 Type I/II, EN 1926
DGEG Ak. 19 No. 10

Tests

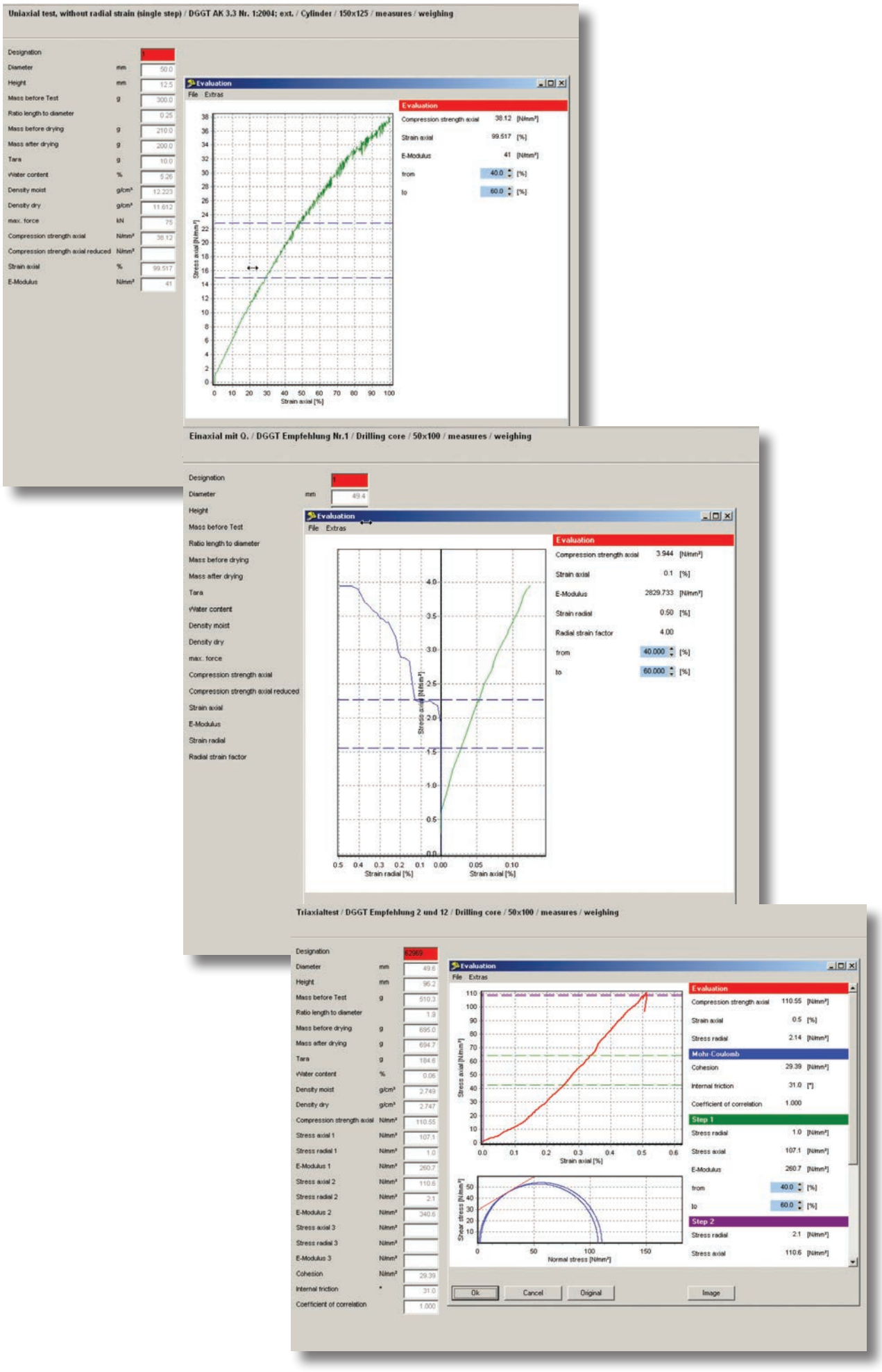
- Single and multi step uniaxial test with/without radial deformation
- Triaxial test with or without radial deformation
- Uniaxial compression tests of natural stones
- Indirect tensile test (tensile splitting) on rock samples

Recording

- several tests (of a series),
- several steps of a single test (of a sample)

Calculations

Compressive strength, E-Modulus / Young Modulus, Creep elongation, Poisson's Ratio, Shear modulus, Bulk modulus, Apparent Cohesion, Internal friction etc.


Uniaxial test, without radial strain (single step) / DGGT AK 3.3 Nr. 1:2004; ext. / Cylinder / 150x125 / measures / weighing
Evaluation
Compression strength axial 38.12 [N/mm²]
Strain axial 99.517 [%]
E-Modulus 41 [N/mm²]
Einaxial mit Q. / DGGT Empfehlung Nr.1 / Drilling core / 50x100 / measures / weighing
Evaluation
Compression strength axial 3.944 [N/mm²]
Strain axial 0.1 [%]
E-Modulus 2829.733 [N/mm²]
Strain radial 0.50 [%]
Radial strain factor 4.00
Triaxialtest / DGGT Empfehlung 2 und 12 / Drilling core / 50x100 / measures / weighing
Evaluation
Compression strength axial 110.55 [N/mm²]
Strain axial 0.5 [%]
Stress radial 2.14 [N/mm²]
Mohr-Coulomb
Cohesion 29.39 [N/mm²]
Internal friction 31.0 [°]
Coefficient of correlation 1.000
Step 1
Stress radial 1.0 [N/mm²]
Stress axial 107.1 [N/mm²]
E-Modulus 260.7 [N/mm²]
Step 2
Stress radial 2.1 [N/mm²]
Stress axial 110.6 [N/mm²]
Ok
Cancel
Original
Image

Wood and Timber Testing

Wood Tests

- Bending E-modulus EN 310
- Elevating strength EN 311
- Cross tensile strength EN 319
- Pullout test of screws EN 320

Wood and Timber Construction Testing - EN 408

- Test of construction and laminated boards
- Determination of local bending E-modulus
- Input of the area moment 2. gradient and max. force
- Determination of global bending E-modulus
- Calculation of the linear regression
- Evaluation of loads, deformation, E-Modulus