ROHRTEST-4 v. 8.8

Tightness test system

for

Sewers, sewage pipes and pipe connections

acc. to EN 1610, SIA 190 / VSA

Separators, Collectors and Shafts

acc. to EN 1610, EN 858-1, EN 858-2, DIN 1999-100, DIN 4040-100, EN 12566-1, SIA 190 / VSA

Drinking water / waste water pressure pipes acc. to EN 805

MESSEN NORD GmbH
Tightness test systems/ Inspection cameras
Test vehicle equipment / Special software

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TÜVRheinland® CERT ISO 9001

0. Table of contents Side

1. Application of the test system 4

1.1. Water pressure-test / low-pressure **5**
1.2. Water pressure-test / high pressure **5**
1.3. Shaft and separator-test in the free-mirror-procedure **6**
1.4. Compressed air-test / sleeve-sample **8**

2. Technical parameters 11

3.1. General business-parameters **11**
3.2. Measuring-equipment WATER / water supply **12**
3.3. Measuring-equipment AIR / compressed air-supply **13**
3.4. Measuring-equipment VACUUM / hypotension-production **14**
3.5. Measuring-equipment HIGH PRESSURE / high pressure-production **15**
3.6. Measuring-equipment SHAFT **16**
3.7. Measuring-precision of the measuring-facilities / calibration **18**

4. Danger-prevention 20

5. Installation 21
5.1. Installation **21**
5.2. Installation of the USB-Adapters **22**
5.3. Program-configuration **24**
5.4. Formation of the individual protocol-head **25**

6. Test standards and parameters 27
6.1. Selection of the test procedure and the test standard **27**
6.2. Test with water / low-pressure **28**
6.2.1. Test parameters for tests of DIN EN 1610 (Water, low-pressure) **28**
6.2.2. Test parameters for tests of DIN 1999-100 (Water-level-tests for separators) **29**
6.2.3. Test parameters for tests of DIN 4040-100 (Water-level-tests for fat-separators) **33**
6.3. Test parameters for tests of DIN EN 805 (Water, high pressure) **36**
6.4. Test parameters for tests with compressed air **37**
6.5. Test parameters for special-tests **37**
6.6. Test parameters for sleeve-tests **38**
6.6.1. Tester administration **39**
6.6.2. Sleeve-test with reference-measurement **40**
6.6.3. Sleeve-tests of ATV/DWA M 143 slices 6 **41**

7. Test-transaction 42
7.1. Tests with measuring-equipment WATER **42**
7.1.1. Preparatory works **42**
7.1.2. Test with measuring-equipment WATER **43**
7.2. Tests with measuring-equipment HIGH PRESSURE **44**
7.2.1. Preparatory works **44**
7.2.2. Test-transaction with measuring-equipment HIGH PRESSURE **45**
7.3. Tests with measuring-equipment AIR **46**
7.3.1. Preparatory works **46**
7.3.2. Transaction of the test with compressed air **47**
7.3.3. Test of tube-connections / sleeve-test **48**
7.4. Tests with the measuring-equipment SHAFT **49**
7.4.1. Preparatory works **49**
7.4.2. Transaction of the test with the measuring-equipment SHAFT **50**

8. Data-concept 51
8.1. Storage of the test reports **51**
8.2. Project-administration **52**
8.2.1. Transferred by data-continuances, updating of the project-administration **52**
8.2.2. Summary from test reports to lists and overview-tables **52**
8.3. Preparation and alteration of test report forms **55**
8.3.1. Saving hierachy of test report forms **55**
8.4. Data take over from test reports **58**
8.5. Configuration of the option "GPS" **59**

9. Appliance-maintenance, calibrations and function-tests 60
9.1. Appliance-check **60**
9.2. Cleaning of the filter of the measuring-equipment WATER **60**
9.3. Changeover to winter-business **61**
9.4. Test of the appliance-function, own-control **61**
9.5. Cleaning of the measuring-equipment SHAFT **61**

Installation:

Test standards (tabular transcriptions, work-leaves)

A) DIN EN 1610
B) LfW 4.3-6
C) ATV/DWA M 143-6
D) DIN 1999-100 / EN 858-1
E) DIN 4040-100

1. Application of the test system

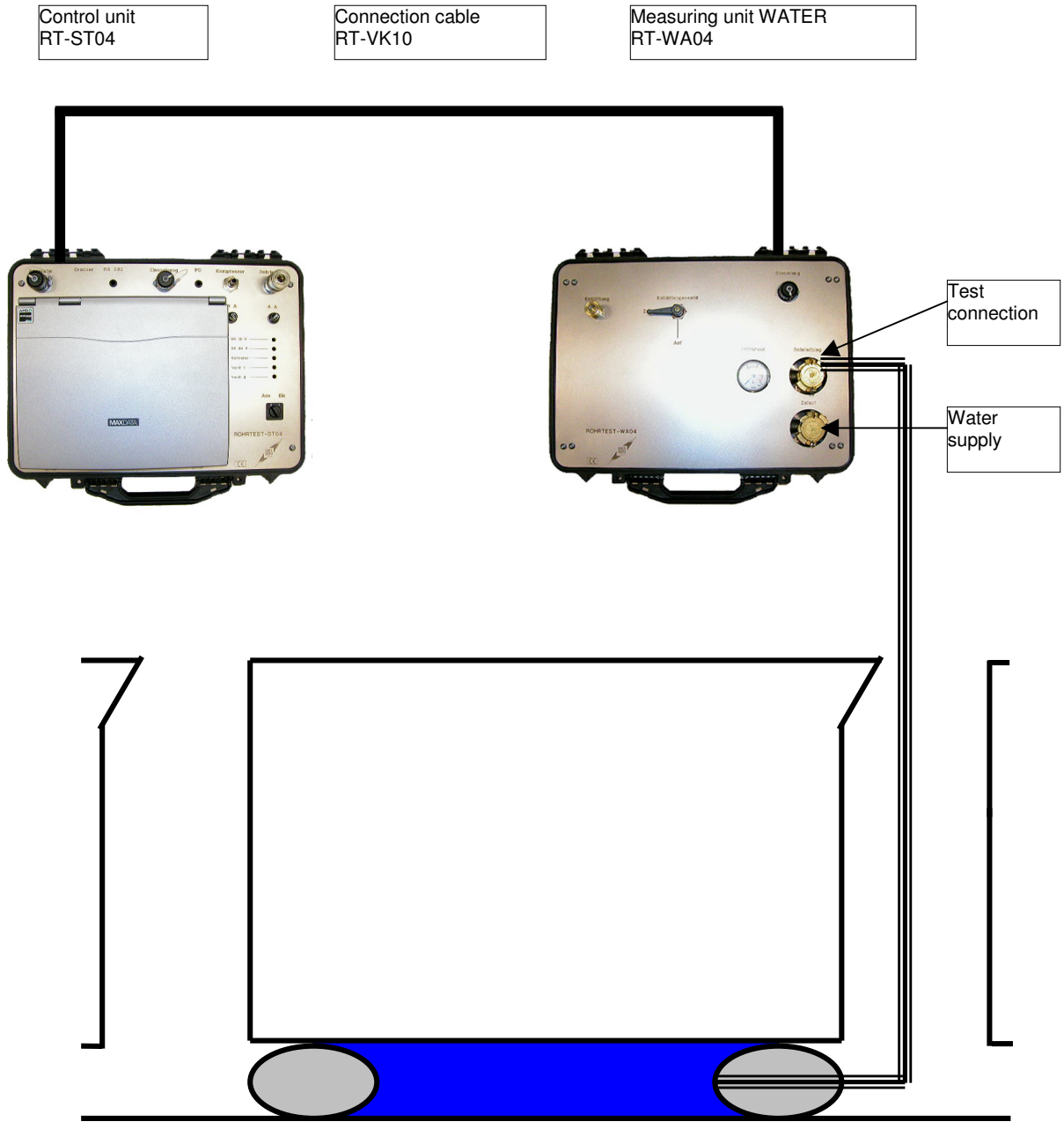
The test system ROHRTEST-4 allows the computer-aided, automated tightness test of sewage pipelines, muffs, shafts and separators after the test standards nationally binding for these installations. In the result of the test, standardized test reports are produced which document the test course and the test result.

You find a complete list of the test-specific system-components under 2. *System-components / delivery capacity:*

System-components	Test procedures
Control unit, integrated AIR/VACUUM (RT-ST04) 	This unit is required for all Test procedures, contains measuring-equipment for AIR / VACUUM tests, supplie unit, data-transformers and test controller for all measuring-facilities Tests acc. to EN 1610 (L) i.e.
External measuring equipment AIR (RT-EXTL) 	External Filling and measuring unit for testing high pipe dimensions, application directly at the pipe fastener, makes filling procedure fast and save Tests acc. to EN 1610 (L) i.e.
Measuring-equipment SHAFT (RT-SP04) 	Shaft and separator-tests acc. to EN 1610, ATV/DWA M 143/6, EN 858-1, EN 858-2, DIN 1999-100, DIN 4040-100 i.e.
Measuring-equipment WATER (RT-WA04) 	Allows water loss tests by automatic supplying and measuring the lost water. Unit can keep up a given pressure or a level in connection with external sensors. Tests acc. to EN 1610 (W) i.e.
External water pressure sensor (RT-EXTW) 	Allows in connection with RT-WA04 the water loss test by keep up the water start level. Apllication of the pressure sensor directly at the pipe fastener. Tests acc. to EN 1610 (W) i.e.
External water pressure sensor (nozzle model) (RT-EXTWR) 	Allows in connection with RT-WA04 the water loss test by keep up the water start level. Apllication of the pressure sensor at the drain outlet. Tests acc. to EN 1610 (W) i.e.
Measuring-equipment HIGH PRESSURE (RT-HD04) 	Tests of DIN EN 805 as well as. the former Norm DIN 4279 (water, high pressure)
Air-distribution-unit (RT-LV04) 	Muffs and stand-tests with compressed air after ATV/DWA M 143/6, DIN EN 1610, Control of the tests and blister-pressure for Max. 4 Fasteners as well as a Junction test fastener
Junction test fastener (RT-MU04) 	Manually driven reel with connection-management 100 m to the Junction test fasteners over only one hose-management with interior-lying main lead for measuring-sensor, air-control and observation-camera Optional fade-in of the Test parameter into the video-picture

1.1. Water pressure-test / low-pressure

Configuration A: Water pressure test at the closed system (fastened pipe)

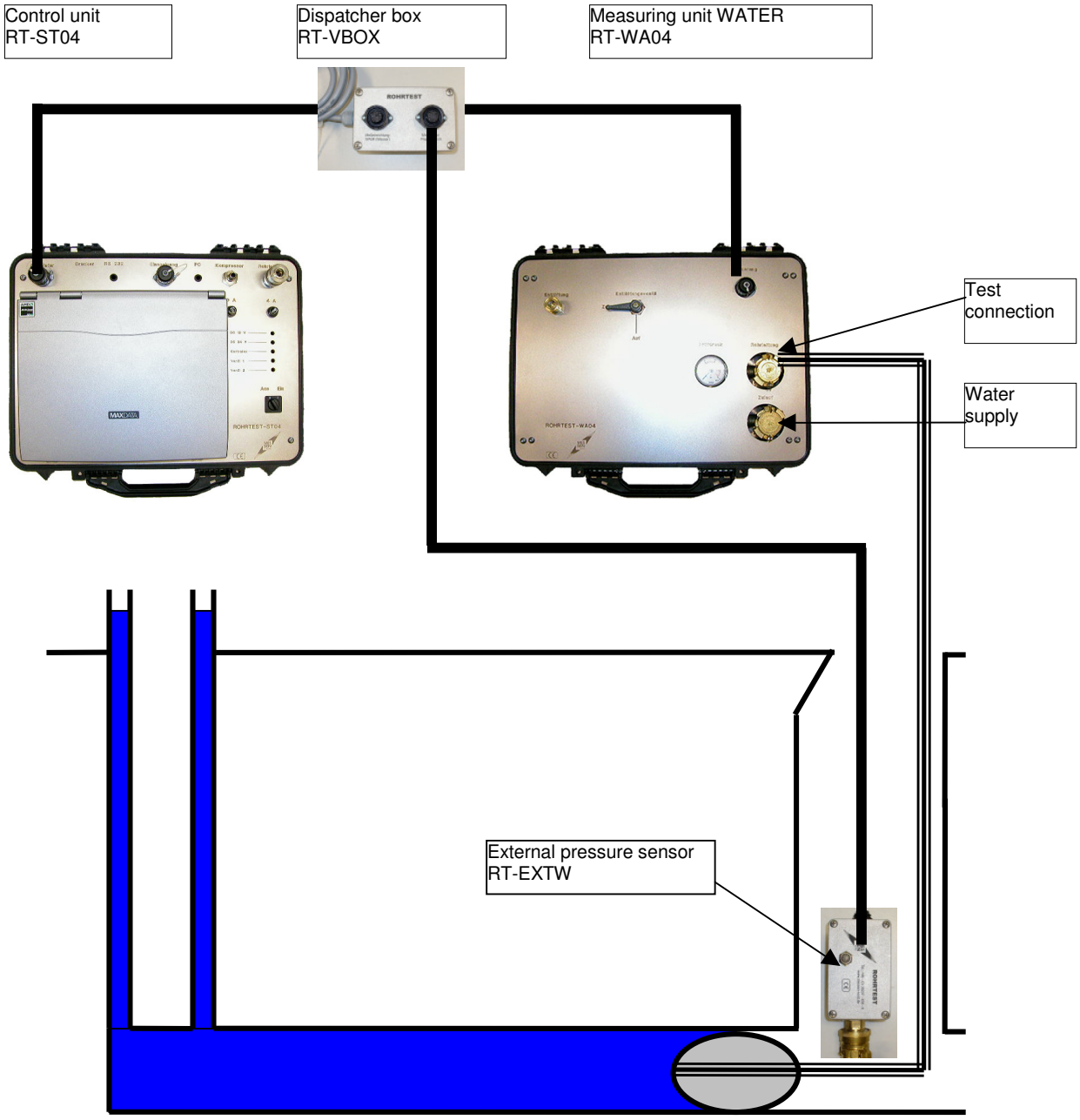


Standards:

EN 1610 „W“
DIN 1986 Teil 30
DWA M 143 Teil 6
SIA 190 / VSA
ÖNORM B2503
Special test procedure „W“

Water pressure-test / low-pressure

Configuration B: Water pressure test at the open system (open water column)



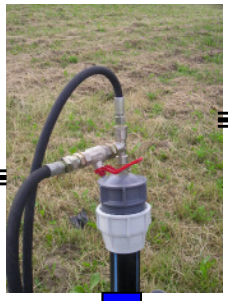
Standards:

EN 1610 „W“
DIN 1986 Teil 30
DWA M 143 Teil 6
SIA 190 / VSA
ÖNORM B2503
Special test procedure „W“

1.2. Water pressure-test / high pressure

Control unit
RT-ST04

Measure equipment HIGH
PRESSURE RT-HD04

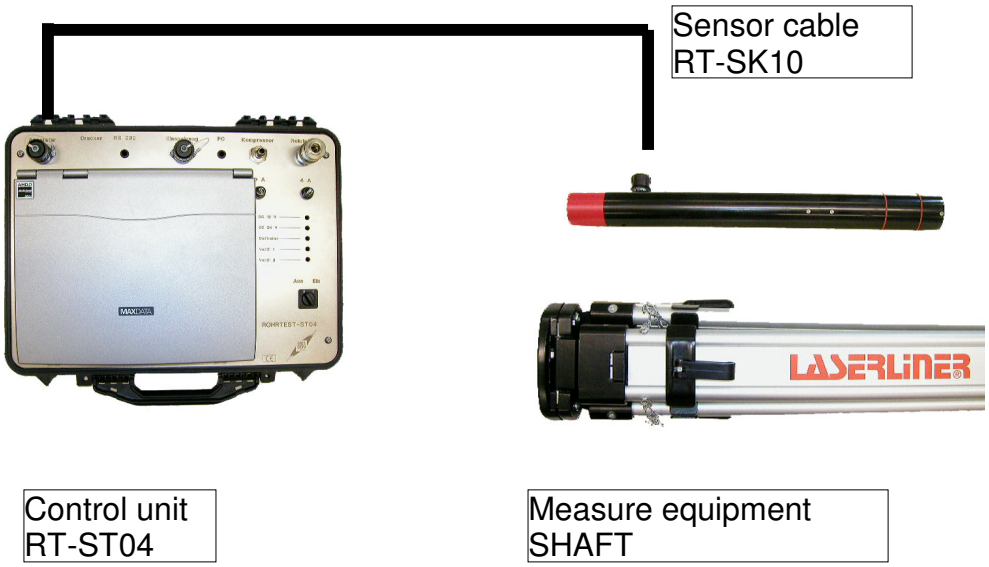


High pressure pump

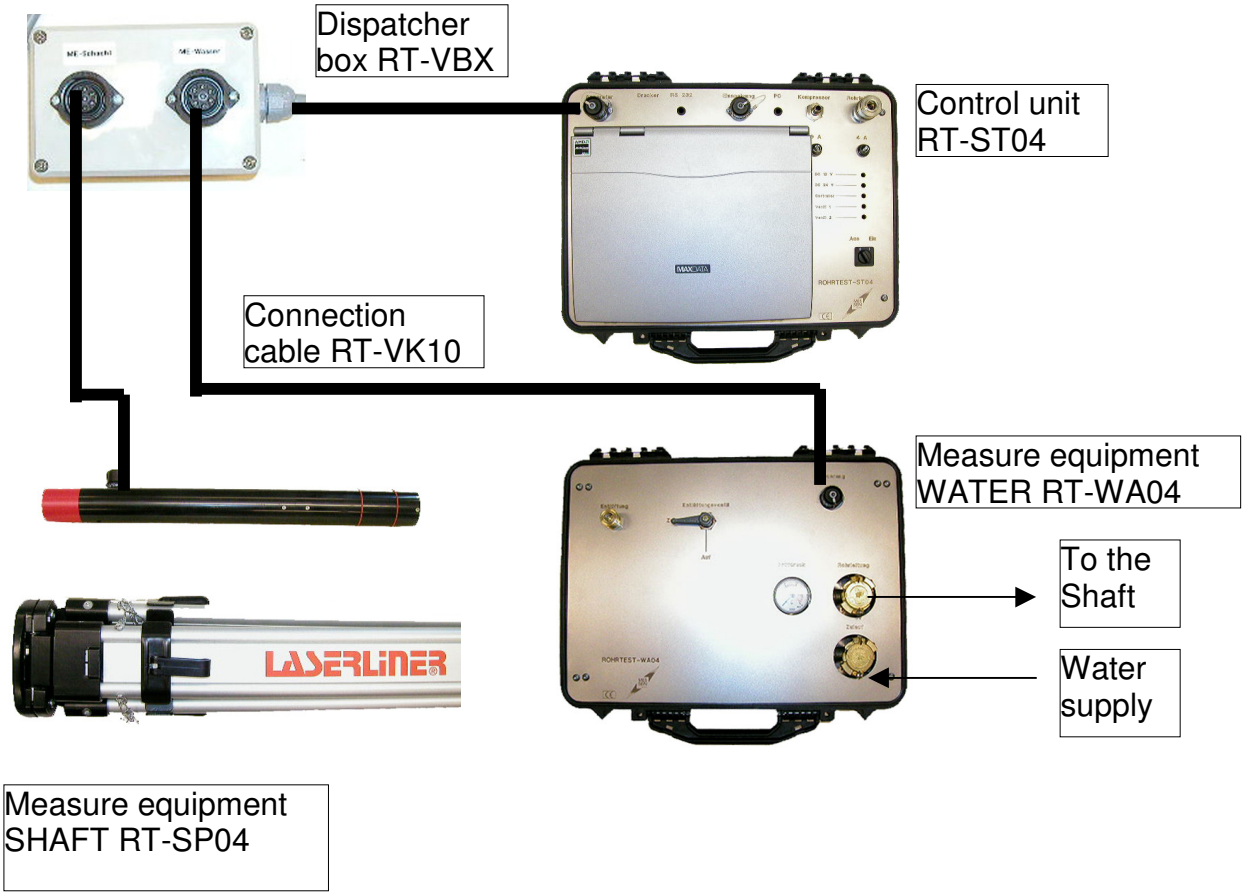
Test standards: EN 805
DIN 4279 (become obsolete)
Special test procedure "H"

1.3. Shaft and separator-test in the free-mirror-procedure

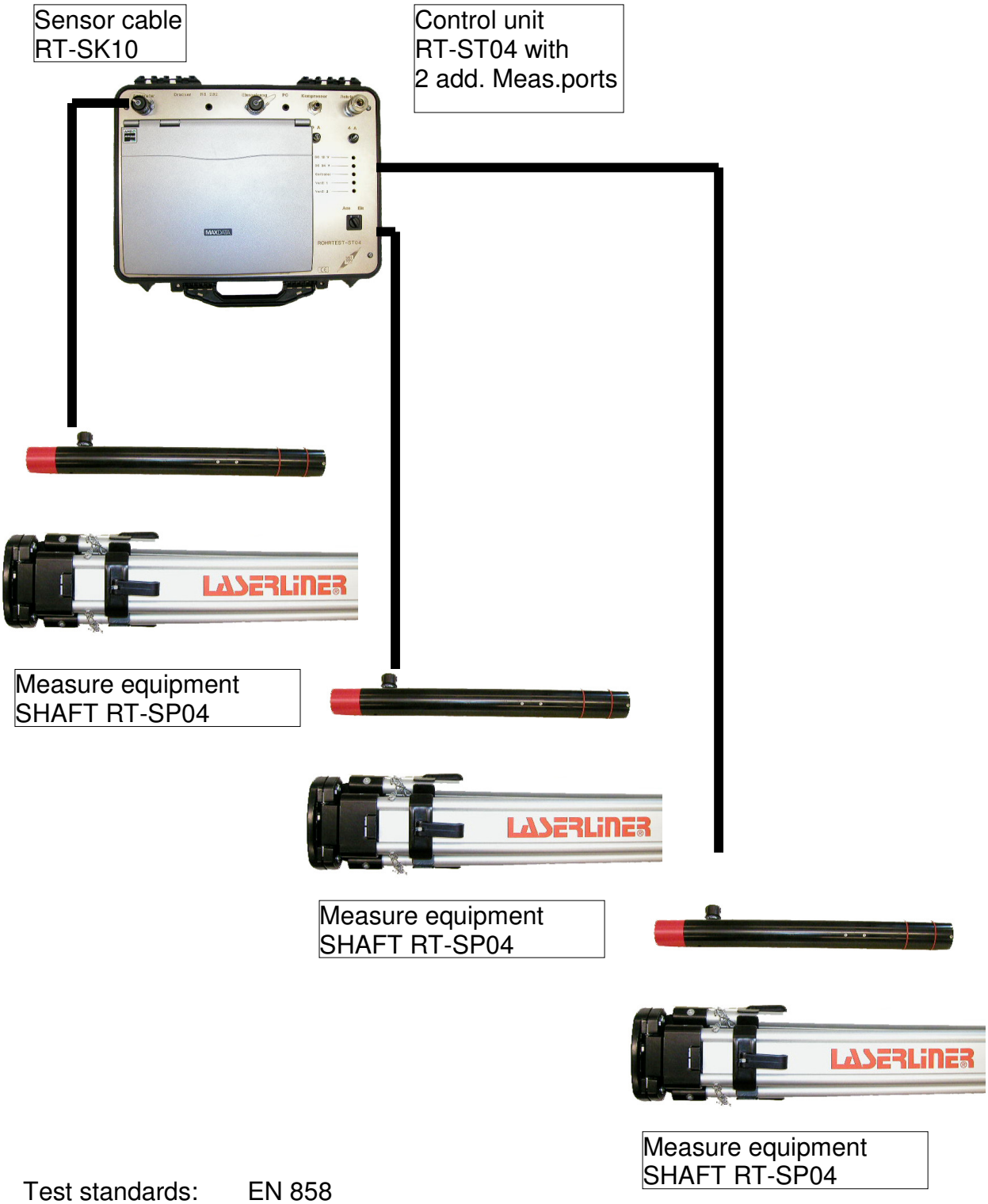
Configuration A: Shaft - / separator-test of automatic water-addition



Configuration B: Separator-test with automatic water-addition

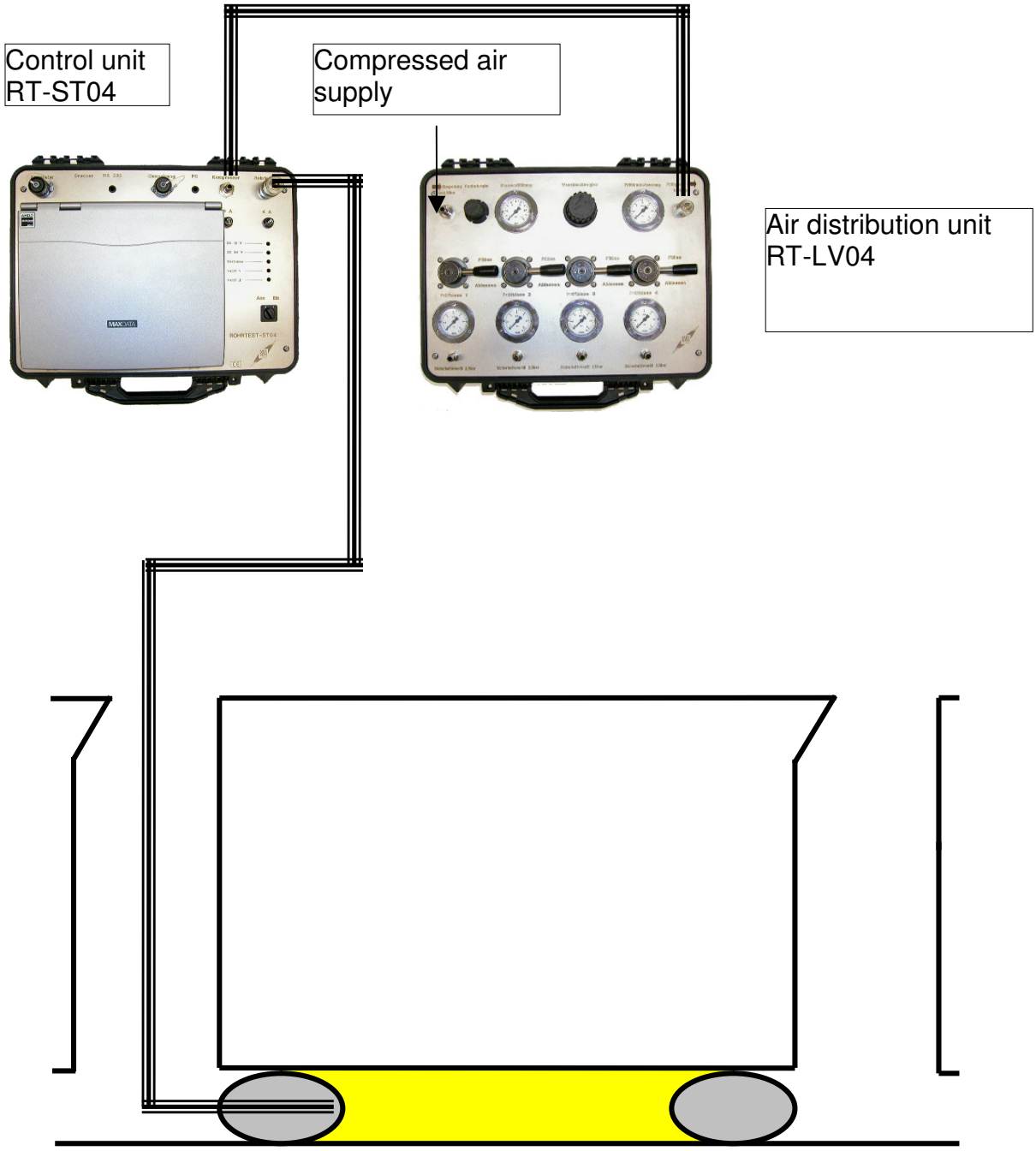


Configuration C: Separator-test with several level-probes



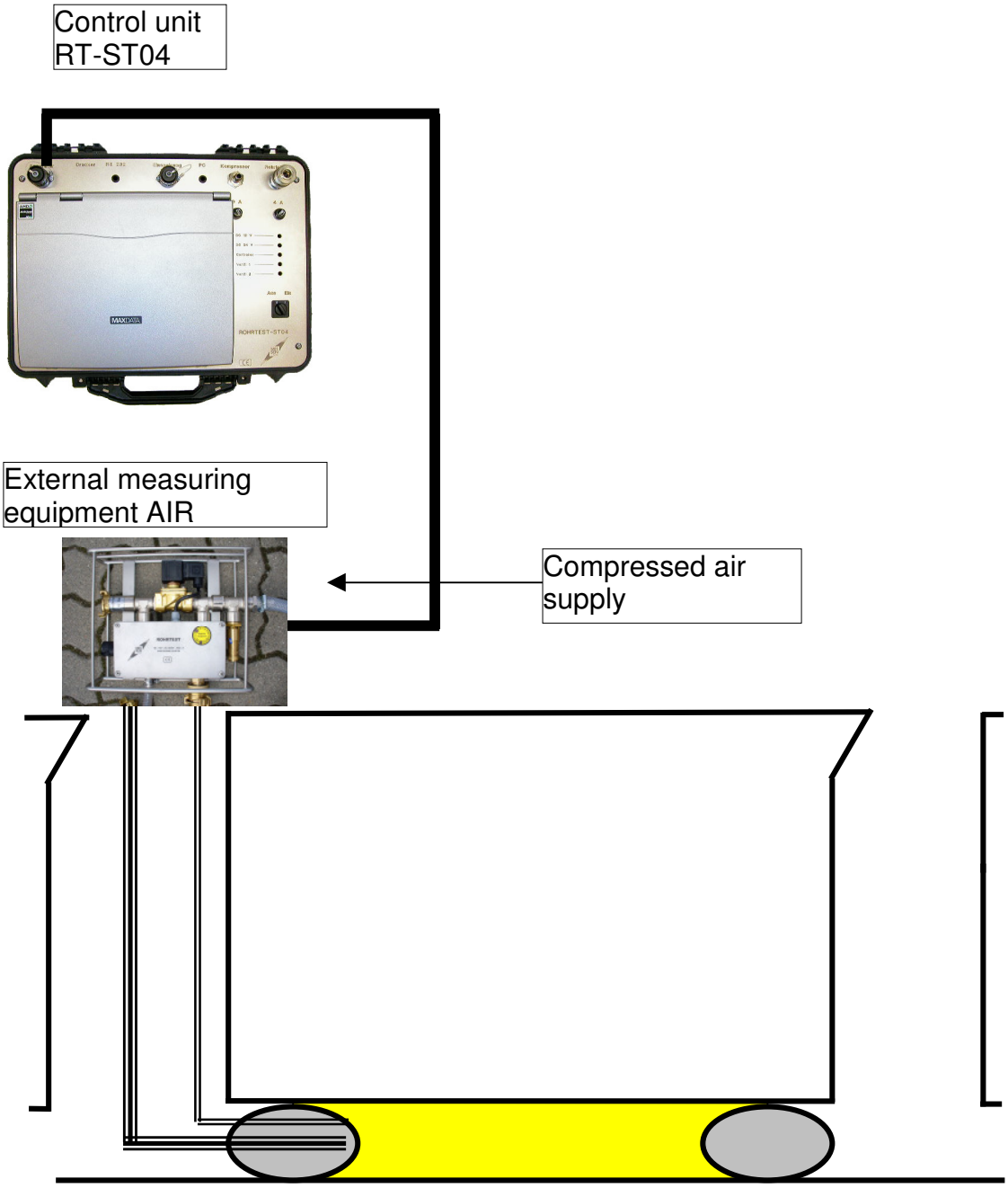
Test standards: EN 858
DIN 1999-100
DIN 4040-100
EN 1610 "W"
Special test procedure „W“

1.4. Pipe test with compressed air / measuring equipment AIR/VAKUUM



Test standards: EN 1610, Verfahren „L“
DWA M 139
DIN 1986/30, DWA M 143/6
ÖNORM B2503
SIA 190 / VSA
Special test procedure „L“

1.5. Pipe test with compressed air / external measuring equipment AIR



Test standards: EN 1610, Verfahren „L“
DWA M 139
DIN 1986/30, DWA M 143/6
ÖNORM B2503
SIA 190 / VSA
Special test procedure „L“

1.6. Compressed air tightness test for pipe junctions

Control unit
RT-ST04

Compressed air
supply

RT-LV04
Compressed air
control unit

Junction test reel
RT-MU04,
house length 100 m,
cable, meter counter and
videotextgenerator integrated

Video Data Box
RT-DBOX

Junction test
fasteners with
integratred
camera

Test standards: ATV/DWA M 139
ATV/DWA M 143-6
EN 1610
ÖNORM B2503
SIA 190 / VSA
Special test procedure „L“

1.7. Water tightness test for pipe junctions

Control unit
RT-ST04

Compressed air supply

RT-LV04
Compressed air control unit

Video Data Box
RT-DBOX

Junction test reel
RT-MU04,
house length 100 m,
cable, meter counter and videotextgenerator integrated

Junction test fasteners with integrated camera

Test standards:
ATV/DWA M 139
ATV/DWA M 143-6
EN 1610
ÖNORM B2503
SIA 190 / VSA
Special test procedure „W“

2. Technical parameters

2.1. General business-parameters for all system-components

Power supply	12V DC (motor vehicle-shelf-net, 16A) 230V 50 Hz (6 A) Supply takes place over the control unit ST04
Electric connection	12V: Motor vehicle-socket for included cables 230V: Net-socket External measuring-facilities: Connection to measuring-equipment over special-cables
Business-conditions	Temperature: 1 ... 40°C, no direct sun-radiation Humidity: Control unit until 90 percent of rel. Humidity not-condenses Measuring-facilities WATER, HIGH PRESSURE and SHAFT IP65, the function of the measuring-equipment SHAFT restricted with moisture-effect.
Transportation and camps-conditions:	Temperature: 1 ... 60°C, measuring-facilities WATER and HIGH PRESSURE can through complete emptying of water (business-means), Condensation, or through replenishing with motor vehicle-frost-protection sufficient concentration frost-certainly is done. Humidity: until not-condenses relative humidity 90 percent Package: Appliance-casings are as transportation-package (Package-service, been not suitable. Additional protection against push and pressure necessary. Stack-bar-ness: Appliance-casings are unpackaged until Max. 3 Appliances stack-bar.

2.2. Measuring-equipment WATER / water supply

Operating parameters

Business-medium:	Water, fine-filtered
Entrance-pressure-area:	- 0,1 ... + 0,5 bar
Exit-work-pressure:	Max. 1 bar
Exit-pressure-proof-ness:	Max. 2,5 bar, over it irreversible damage
Maximum-flow:	400 l/h

Water supply

Since the measuring-equipment WATER possesses an integrated pump, only a pressure-loose water-connection is required. The entrance-pressure can .0.1 bar. To suck in from until tank more deeply situated to 1 m, until +0.5 amount cash (tank lies until to 5 m higher than the measuring-equipment).

RESPECT! Infringements of the maximum entrance-pressure can lead to irreversible damages of the appliance as well as to the user's endangering.

About the capability of the installation not through pressure-garbages in the hose-managements as well as it is recommended to the connections to reduce not to exceed a maximum hose-length of 10 m and a minimal cross-section of 10 mm, not to under-stride.

2.3. Measuring-equipment AIR / compressed air-supply

Operating parameters

Business-medium:	Air
Entrance-pressure-area:	0,1 ... 2,bar 0 above atmospheric pressure
Exit-work-pressure:	Max. 0,6 bar
Exit-pressure-proof-ness:	Max. 1,5 bar, over it irreversible damage
Maximum-vacuum-stream:	500 l / min (normal-gas)

Protection against damages through over pressure

The form of the filling control unit is on Max. 2 bar to restrict cash, a form is recommended by about. 0,5-1,0 bar. The pressure-restriction takes place with a mechanical pressure control as well as. Pressure minimizer, which becomes rear for the compressor.

For the duration of the test operation, the upholding the form is necessary at the compressed air-entrance of the filling control unit.

RESPECT! Heed section 4 about the danger-prevention with the contact with compressed air.

2.4. Measuring-equipment VACUUM / hypotension-production

Operating parameters

Business-medium:	Air
Entrance-pressure-area:	0,0 ... 1,bar below atmospheric pressure
Exit-work-pressure:	Max. 1,bar below atmospheric pressure
Maximum-vacuum-stream:	500 l / min (normal-gas)

Hypotension-production

The production of the hypotension can be gone in for which with customary pressure (so-called ejectors, jet-procedures) with compressed air or water as energy-bearers or but with vacuum-suction pumps takes place.

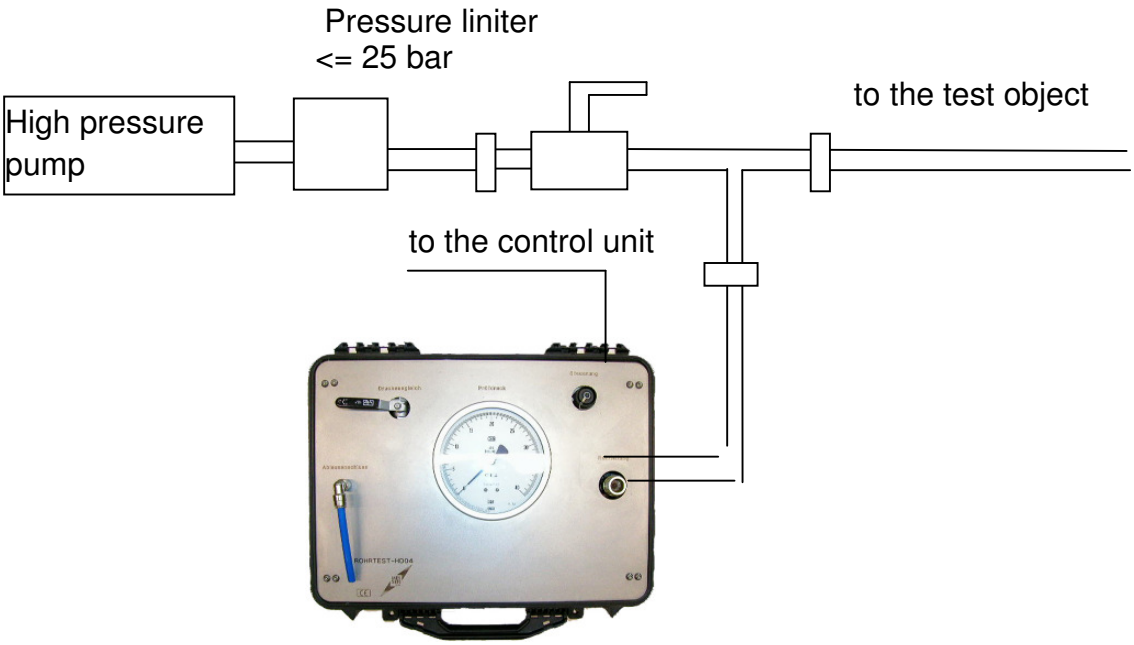
2.5. Measuring-equipment HIGH PRESSURE / high pressure-production

Operating parameters

Business-medium:	WATER, fine-filtered
Work-pressure-area:	0 ... 25 bar
Pressure-proof-ness:	Max. 40 bar, over it irreversible damage as well as. Endangering

High pressure-production

The connection to the measuring-equipment HIGH PRESSURE takes place accordingly following illustration:



2.6. Measuring-equipment SHAFT

There are two different test procedures for the use of the ROHRTEST-measurement uipment SHAFT:

a, level-alteration-measurement

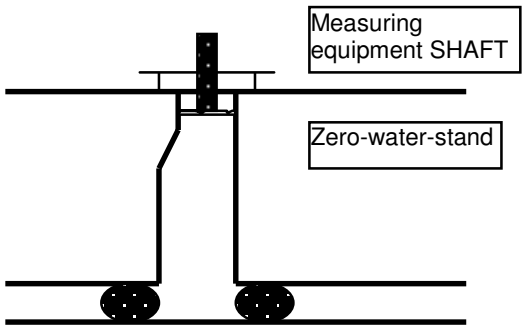
On this occasion the level-alteration is recorded opposite the zero-water-stand at beginning of the test and is calculated the water-loss-quantity with help of the shaft-geometry. The pressure-alteration yielding itself through the level-alteration amounts to at most 5 mbar.

Measuring-area: 50 mm level-alteration
Appliance-technology: Control unit ST04,
Measuring-equipment SHAFT

b, water-loss-compensation

With this Test procedures, the water-level is stopped steadily at the zero-water-stand over the entire test procedure. The addition of water-losses takes place automatically, the loss-installment is recorded over the test procedure.

Measuring-area: 0.02 .. 400 l/h loss-installment (loss of 0 is recognized)
Appliance-technology: Control unit ST04,
Measuring-equipment WATER,
Measuring-equipment SHAFT



Technical parameters

Connection:	over connection-cables at reason-appliance ROHRTEST 4, Supply with protection-small-tension of the reason-appliance, maximum cable-length 80m
Denseness-tests: DIN 1999-100	DIN EN 1610, method "W" DIN 4040-100 DIN 4261-1 DIN EN 12566-1 Special-tests (free parameters)
Measuring-area:	Max. 50 mm level-alteration entspr. Max. 39 l loss of DN 1000 entspr. Max. 25 l loss of DN 800
Dissolution:	0.01 mm level-alteration
Precision:	+/-0.2 mm with expired or not existing calibration +/-0.1 mm with valid calibration, See section 3.7 +/-0.03 mm with parallel temperature measurement and valid calibration, See section 3.7 **Please heed:** The stated measuring-precision is gained by the measuring instrument under unfavorable conditions only 15 min after positioning and switching on in the span required for this stabilization-process being main from the temperature-difference between the place of the storage as well as the transportation and the place of the use dependent.
Delivery capacity:	Measuring-equipment "shaft" with tripod and level unit, extension-tubes 0,5 m and 1,0 m, Calibration report

The measuring-equipment SHAFT (ROHRTEST SP04) possesses the admission of the LGA Würzburg for the test of fusible-ness-separators of the Prüfnorm DIN in 1999-100.

We like to send you a copy of the certificate on demand.

2.7. Measuring-precision of the measuring-facilities / calibration

Measuring-equipment	Einstellgenauigkeit Test pressure / level	Measuring-precision pressure - / level-waste	Measuring-precision water-loss
AIR / VACUUM	+/- 5 mbar	+/- 1 mbar	-
WATER	+/- 10 mbar	+/- 2 mbar	5% from the measurement in the area 0,02-400 l/h
HIGH PRESSURE	+/- 200 mbar	+/- 15 mbar	5% from the measurement in the area 0,02-400 l/h
SHAFT	+/- 0,2 mm	Up to +/- 0,03 mm See section 2.6!	-

Calibration of measurement equipments AIR, WATER, HIGH PRESSURE

The measuring-facilities of the system ROHRTEST are basing on high-quality sensors for pressure and water flow which are subjected extensive tests before delivery.
In order to support the users of the installation in the proof of the precision opposite her/its/their clients, all measuring-facilities are calibrated. The Calibration reports belong to the delivery capacity of the respective installations.
Through the application of DKD-certificated calibration equipment the retracing of the measurements to the German national norm is given.

A repetition of the calibration is recommended by the manufacturer in distances of 1 years, please contact for this purpose your supplier as well as. the appliance-manufacturer.

Influence of the atmospheric pressure on the pressure-measurements

Through this, measuring-proceeding would use, the recorded test pressure remains independently from the atmospheric pressure, d.h. Weather-changes, on the agenda wind and similar factors don't have any influence on the test result.

Since the water-loss as well as. Pressure-waste from a leaky tube-wall as well as. a tube-connection dependent on the difference-pressure of inner and outside-pressure is, the test pressure (inner-pressure) should be put in relatively to the atmospheric pressure (outside-pressure).
In order to enable this, the functions "Calibration atmospheric pressure" are existing for the measurement equipments AIR, WATER and HIGH PRESSURE. By implementation of these functions, the exact reference of the test pressure to the current environment-atmospheric pressure is guaranteed directly before beginning of the tube-test.

4. Danger-prevention

Danger by electric stream

The test system ROHRTEST works with a supply of 230V AC why the danger of the injury of electric electric jolt emerges with improper application.

Run the appliance if you use the 230V-supply, only at as prescribed grounded protection-contact-sockets!

Use only the included original supply cable ! If these cable is damaged don't use it until professional repair.
Replace the electrical fuses only with such with same parameters.

The control unit is not waterproof. The appliance is only allowed in surroundings with fewer than 90 percent humidity (not-condenses).
If water penetrated into the device, so another application is forbidden.

The control unit don't contain any through the user to replacing part / modules.
With disturbances of the device function please contact the repair-service.
A usage of the device with opened casing (decreased front-plate) is forbidden.

Danger by compressed air

The test with compressed air rescues with improper handling of the devices security-risks for the user.

For the application of the Fasteners (dense-disks) are the application-rules of the respective manufacturers to heed.
All fasteners / hoses / connectors are to be checked for sure seat before pressure application.

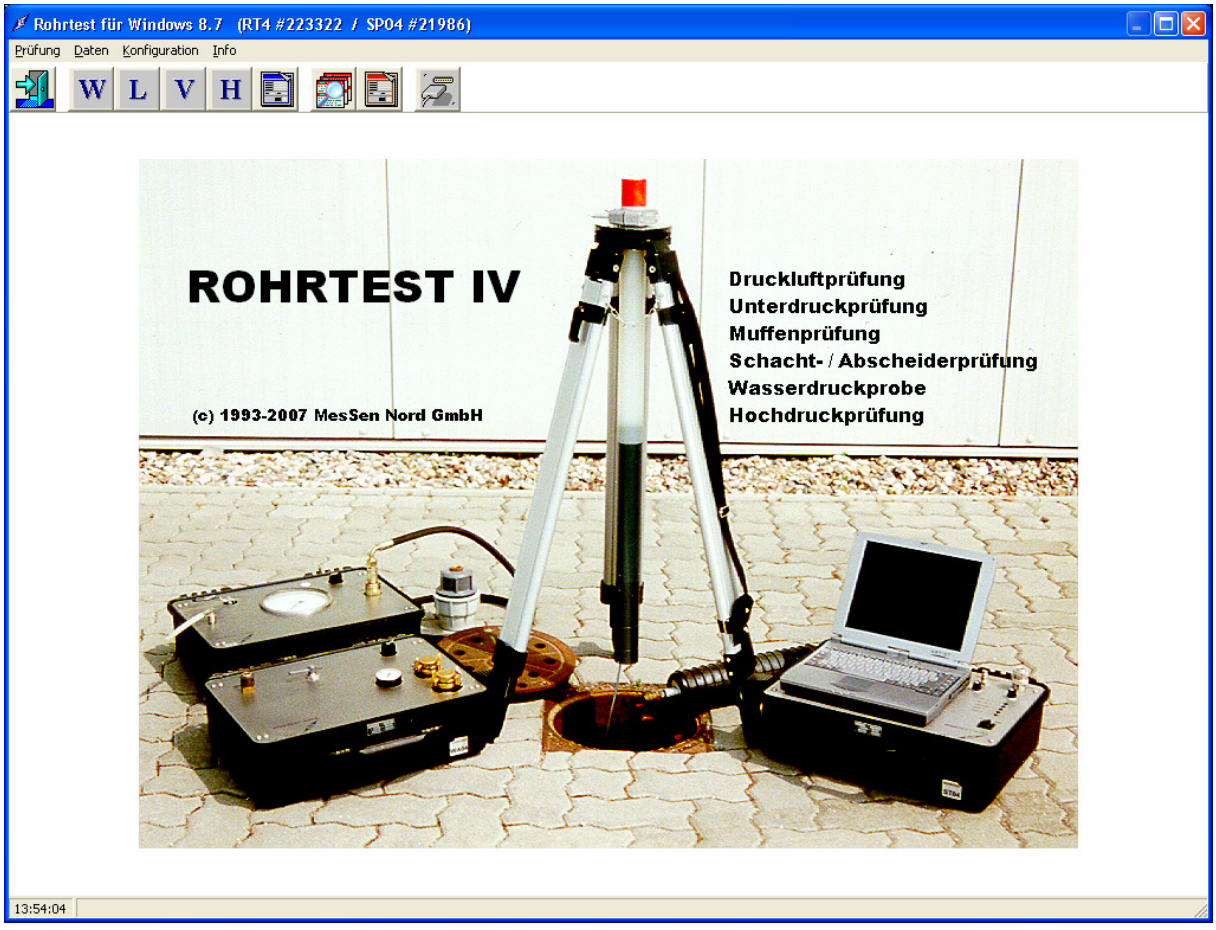
As long as the pipeline is under pressure, present people have to choose her/its/their residence so that they cannot be hurt by for example away-skidded fasteners.

Pipeline, hoses and measuring-equipment are to be aired before the solving the connections.

5. Installation

5.1. Installation and Starting up

- Put the control unit ST04 on the suitcase-acreage and open the suitcase-cover, post the suitcase-cover
- Remove the cap from the connection-socket “supply” and connect the supply-cable "230V AC", you bolt the clutch
- Connect the power plug to an as prescribed installed protection-contact-socket (230V AC)
- Switch the main-counter on position in "1", (230V AC) the control-ads "12V DC" and "24V DC" now must shine, the control-ad "controllers" must with a frequency of about. 1 Hz blink
- Now connect the measuring-equipment, which you want to use, to the connection "equipment" and proceed, as described in section 7 further



5.2. Installation of the USB-Adapters

To the installation of the drivers - software must possess you administrator-rights under Windows 2000 and Windows XP, there some files into this Windows - system-table is copied. If you don't own any administrator-right, you please turn to the person responsible for it.

Driver-installation

1.) Put the included CD into her/its/their CD-drive.
2.) Close ggf. the automatically appearing installation-window.
3.) Start the Windows-Explorer and select the CD-drive.
4.) Change 1.1 TO RS232 Converter\PC Driver" into the table "USB.
5.) Double-click the file "Setup.EXES." The installation starts.
6.) Click on "further" and "completing" is finished until the installation.
7.) Connect the USB-Adapter with the computer. Windows installs him/it corresponding drivers automatically.
8.) Windows recognizes the new hardware automatically and shows hardware him/it-Installation-assistants
9.) If you choose the automatic installation (recommended), that becomes driver, installed with the installation-assistant, possibly a latest-Art of the computer is necessary

More exact operating system-specific instructions are in the included one
To find (only in English available) installation-instruction on the Treiber-CD.

Configuration of the adapter (Windows - appliance-managers)

1.) Open the system-control (start (attitudes) system-control) and double-click on "system."
2.) Change "hardware" to the file and choose "appliance-managers."
3.) Open the section "connections COM and LPT" in that you click on the "plus-sign."
4.) You/they see to Serial adapter (COM x)" a component "USB there, with what the "x" for the currently assigned Comport - number stands. Select this Comport in the measuring-software as interface and test the communication with the connected, switched on appliance in that you start a measurement.

5.) To altering the Comport - clicks you to Serial adapters (COM x)" number on the component "USB in the appliance-manager with the right mouse-button and picks the point "qualities" you in the menu.

6.) Change "connection-attitudes" to the file and press on the button of "widening with the left mouse-button. ".

7.) Choose another free Comport below in the opened window left - number for the component from and confirms you with "O.K.."

8.) Choose him/it again in the measuring-software as well as. currently put in Comport from and tests you the communication.

Installation-hints

Windows recognizes pocketed USB - appliances like the USB-RS232-transformer automatically. But ever after in which free USB - outlet you the transformer pockets, every time becomes another Comport the appliance through the system - assigned number. In order to handle numbers constantly changing Comport, you please always use the same USB-outlet for the transformer. Then, the adapter always also becomes one and the same Comport - number assigned.

Mistake-causes

1.) The measuring instrument is not found about the stated Comport by the measuring-software.

   a) Check the put in Comport in the software and in the Windows - appliance-managers. Alter ggf., how above described, the Comport - number.

2.) The measuring instrument doesn't work despite correctly chosen Comport.

   a) Check whether another program already uses the selected Comport. Finish all applications, that evtl. block the Comport. If no further software is active, you alter the Comport - number.

   b) Was the driver properly installed with administrator-rights?

5.3. Program-configuration

You/they reach configuration / program-parameter the configuration-window to the menu-point.

COM-ports: COM-Port to the connection of the control unit ST04 with the PC

Air / vacuum-test, giving up record

After successful air or vacuum-test, the pressure balancing can be recorded as well. The record must manually with STOP is finished.

5.4. Formation of the individual report head

The report head can be defined in free font and color up to 4 graphics and 6 texts in the head-area. To the better bearings, a pressure-preview is shown. Alternatively it can be established whether the head-bow should be printed out only on the first side. For the remaining protocol-sides, the "old" protocol-head (configuration / program-parameter) then is printed out.

Hints at the individually shaped protocol-head:

- For the head-area, approximately 3 x are 16 cm available.

- The head-formation is not stored in the Test reports, she/it is merely active on the corresponding installation. Meant this, protocols are printed out on another installation without shaped head-area, so the "old" protocol-head is printed out. Therefore fill the old protocol-head over the menu-point configuration / program-parameter after your needs in any case or delete all contents (delete the contained pattern-data in any case).

Following illustration shows the dialogue-window to the formation of the individual head-area. To the application, you please activate the option "individually shaped protocol-head uses."

Furthermore, tube-test-versions can install on different PC or for different multi-sensor-variations or several users of the appliance, different protocol-heads (per installed tube-test-version one) are positioned so that every version contains an independent individual head-area.

6. Test standards and test parameters

6.1. Selection of the test procedures and the test parameters

Test procedures and test standards are usually pretended by the client.

Following codification can help with the selection of the suitable Test procedures:

Object	**Sewage- Free-mirror-managements, rainwater-managements, shafts, separators**						**Drink - as well as. Sewage- Pressure- management**
Test-type	Stand-test			Muffs- Singles-test	Shaft - and Separator-test 1)		
Prüf- verfahren	Water- loss- measurement 0,5 bar	Air- Overpressure - test	Air- Under- print- test	usually air- Overpressur e- test	Water- loss- measurement (Replenish until waiters- tilt	Air- Under- print- test	High pressure- pressure- waste- Test, contraction- procedures, integrated test on air-freedom
TUBE- TEST Measure- equipment	WATER	AIR	AIR/ VACUUM	AIR	SHAFT (WATER)	AIR/ VACUUM	HIGH PRESSURE
Test standards	DIN EN 1610 ÖNORM B2503 ATV/DWA M143/6 LfW 4.3-6	DIN EN 1610 LfW 4.3-6 ÖNORM B2503 ATV/DWA M143/6	LfW 4.3-6 ATV/DWA A142 ATV/DWA M143/6	DIN EN 1610 LfW 4.3-6 ÖNORM B2503 ATV/DWA M143/6 ATV/DWA M139	DIN EN 1610 DIN 1999-100 ÖNORM B 2503 ATV/DWA M143/6 DIN 4040-100	ATV/DWA-A 142 LfW 4.3-6 ATV/DWA M143/6	DIN EN 805, DIN 4279 Divide 1 until 7

Comments:

1) Shaft-tests with air-overpressure are problematic in the implementation, there hardly mastering them/her/it on dense-elements and shaft-rings of working strengths is. The test with air-hypotension or the level-measuring-procedure is recommended.

6.2. Test with water / low-pressure

6.2.1. Test parameters for tests acc. to DIN EN 1610 (Water, low-pressure)

Measuring-equipment:	WATER	
Materials:	no specification of this norm	
Cross-sections:	Circle-form	[u=3 .14 * d]
	Oval or egg-form	[u=3 .5 * d]
	Square-form	[u=4 .0 * d]
	Special-forms	[Substitute-diameters calculates]
Prüfabschnitte:	1 to 3 sections of deceased material / cross-section	
Tube-lengths:	1..200 m	
Tube-diameters:	100..1000 mm	

Following recording-borders are placed by the measuring-equipment:

Min. Loss:	about. 0.02 l/h	= 0.005 l in 15 min
Max. Loss:	about. 400 l/h	= 100.0 l in 15 min

Adjustable pressure: 0.1 .. 1.0 bar (standard = 0.5 bar)

Height-differences between measuring-equipment and pipeline must be input in the corresponding retrieval-field "PRESSURE-SENSOR-HEIGHT" and then are automatically taken into account at the test (0.1 bar / m).
The minimal debit-pressure at the equipment amounts bar 0.1, so that itself the maximum height-difference like follows calculated:

Hmax = 10 * (test pressure - 0.1 bar)

If the height-difference amounts more than Hmax (at test with 0.5 cash is worth Hmax = 4 m) between measuring-equipment and pipeline, so the location of the measuring-equipment is to be transferred into the channel drain. The resulting height-difference is to input in the corresponding retrieval-field "PRESSURE-SENSOR-HEIGHT" of the software.

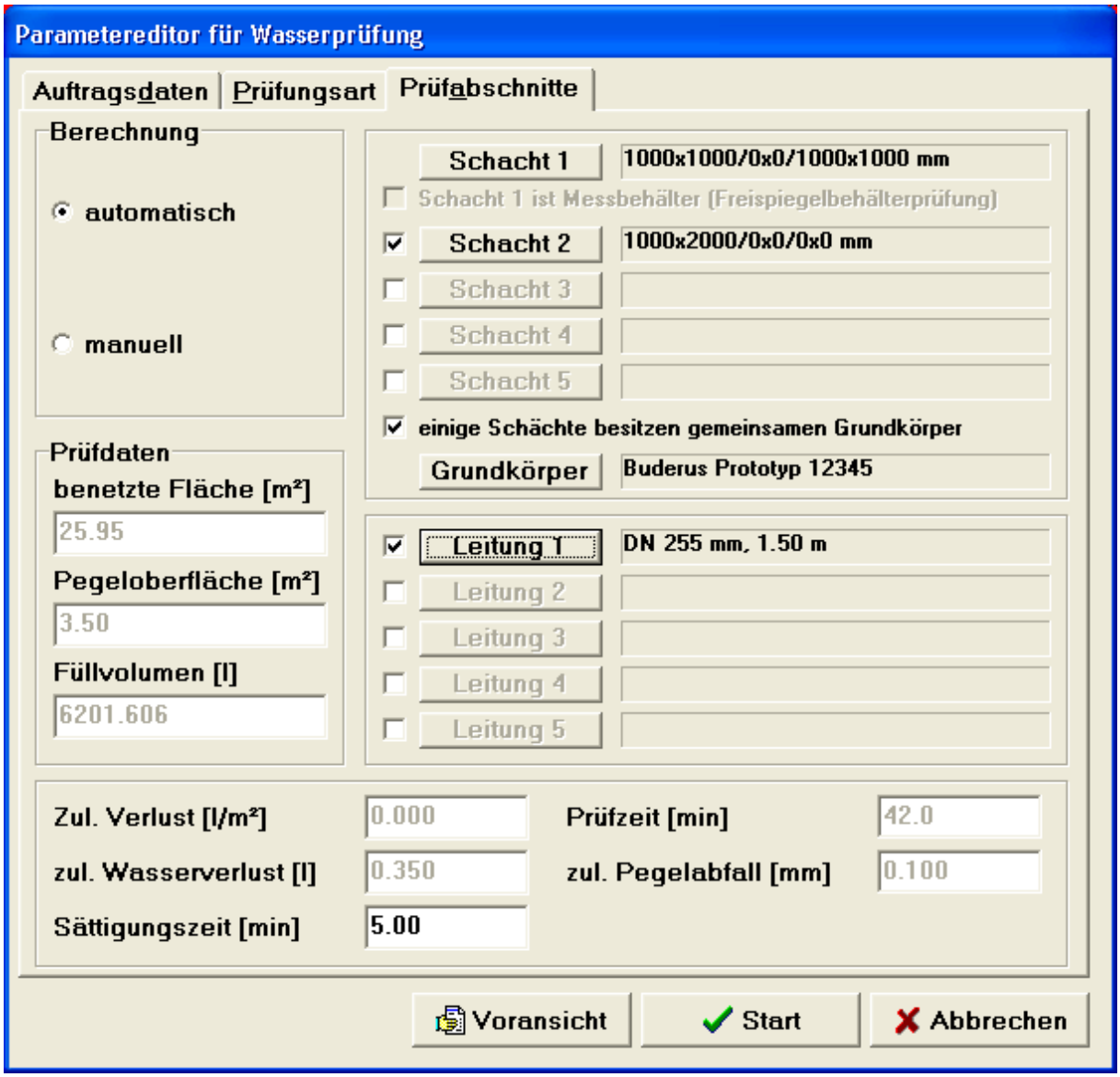
Pre-filling-times:	1 h to 24 h acc. to material
Allowable losses:	automatic calculation acc. to DIN EN 1610

6.2.2. Test parameters for tests acc. to DIN EN 1999-100 (Water-level-tests for shafts and separators)

Measuring-equipment: Variation 1: Level-sensor with manual water-addition
Variation 2: Level-sensor with automatic water-addition, dispatcher-box and measuring-equipment "water"

Test procedures: a, rule (reconstructions + old buildings)
b, special case receptacle-area (only old buildings)
c, special case shaft-area (only old buildings)
d, test of particular conditions

Test sections: 1 to 5 shaft-sections as well as
1 until 5 pipeline-sections
(Be able to be material / cross-section differently / several tubes resemble material and cross-section being able to be summarized)

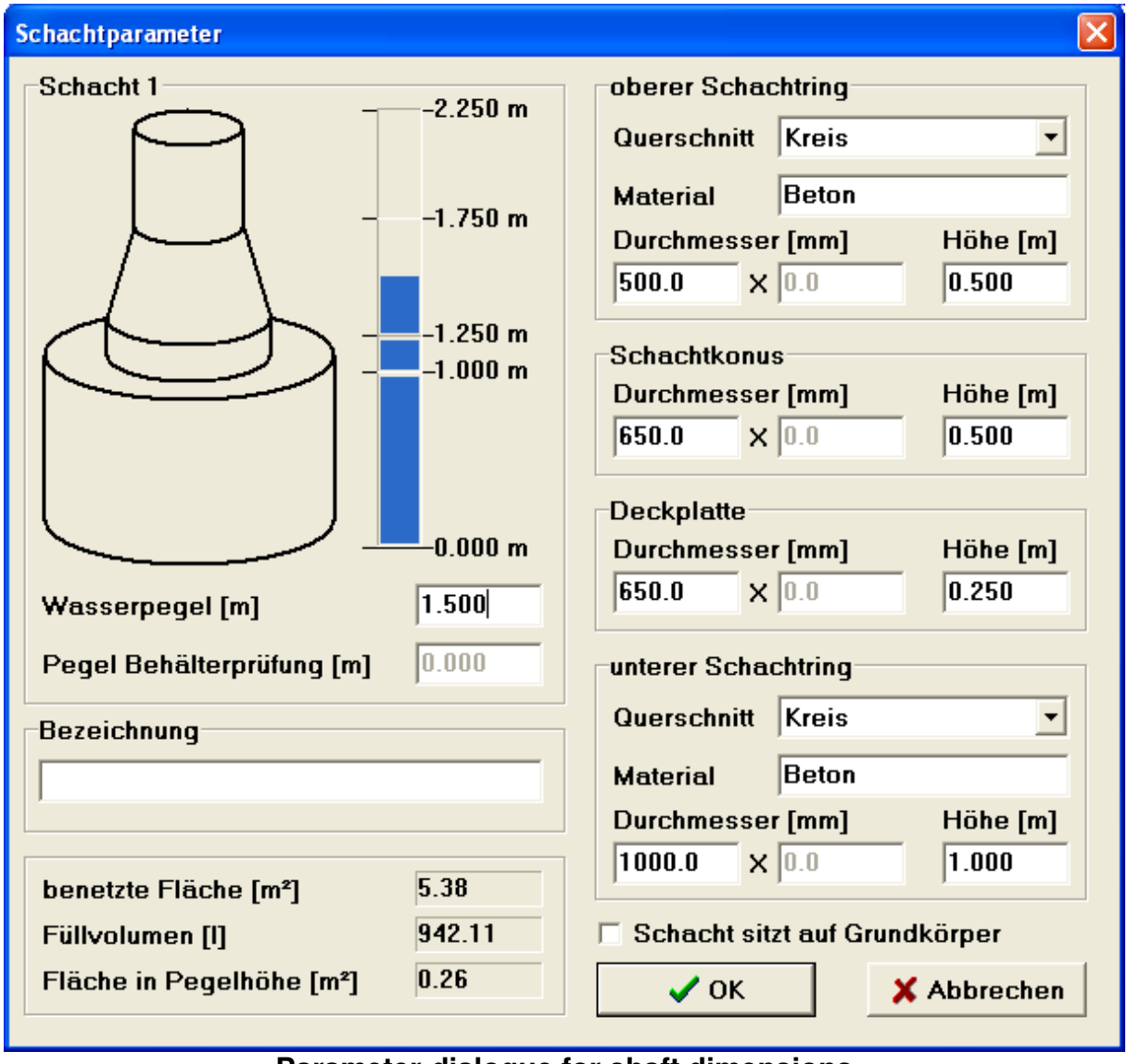


Parameter-dialogue for the test object selection

Shaft-sections: Combination from circle and rectangle-forms (court selectable for low shaft-ring, shaft-cone and upper shaft-ring

Shaft-diameters: min. 50 mm until Max. 100 m

Shaft-heights: min. 100 mm until Max. 10 m per shaft-part



Parameter-dialogue for shaft dimensions

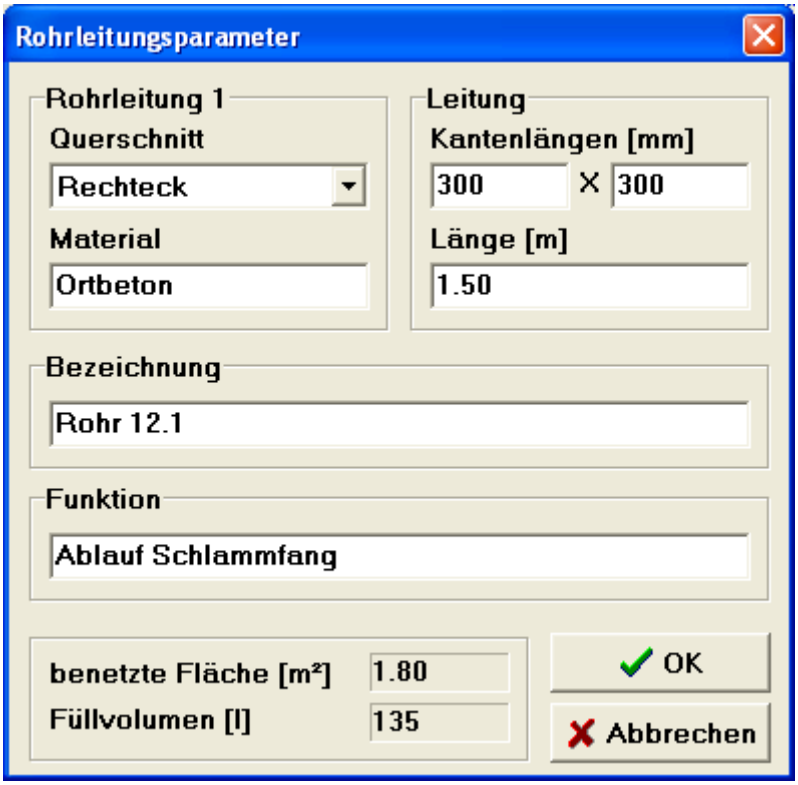
All here put in shaft-qualities are represented in the result-protocol of the test on side 2 and 3. This is applicable to all shaft and separator-tests. At tests of DIN 1999-100 and DIN 4040-100 is generated a measurement-table additionally on side 4 of the test-protocol by 30 measurements.

On the basis of the input water-level, the moistened surface of the shaft, the filling-volume and the surface are calculated automatically in level-height.

Pipeline-sections: Circle, rectangle, or special-forms

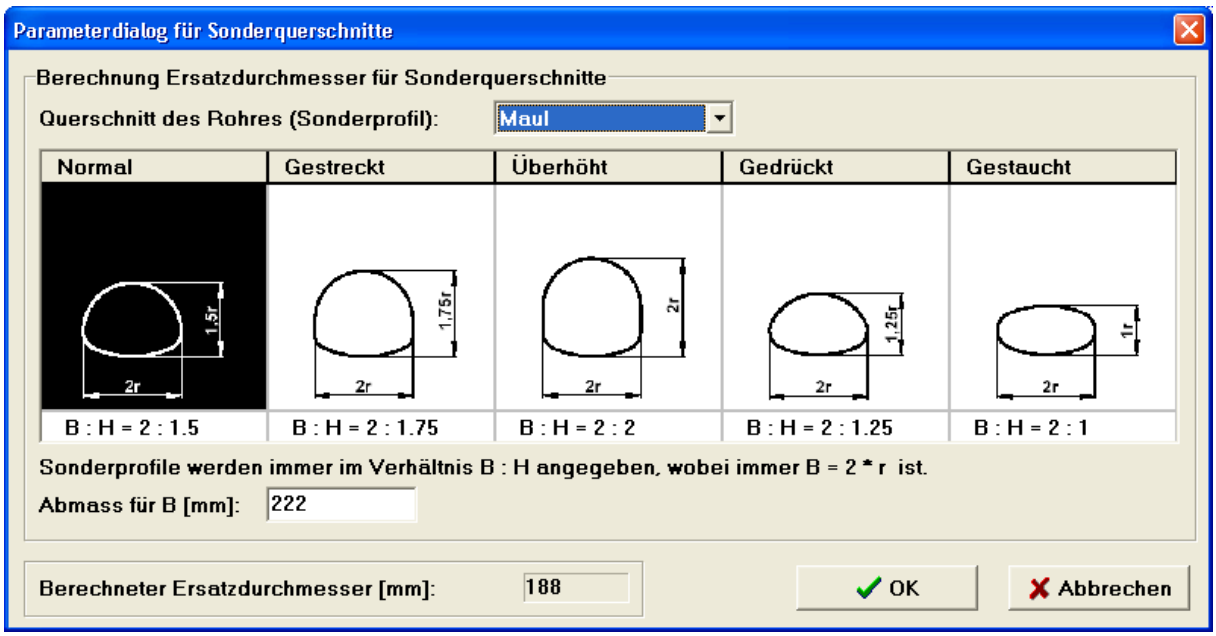
Tube-diameters: min. 20 mm until Max. 2.5 m

Tube-lengths: min. 100 mm until Max. 500 m per section



Parameter-dialogue for pipe dimensions

The input of pipe dimensions also appear on side 2 of the test report. Several tubes can resemble material and same cross-section condensed to a tube on that occasion.



Parameter-dialogue for tube-special-cross-sections

A substitute-diameter is calculated for special-cross-sections according to valid rule-work. For the cross-sections existing in the test software, corresponding graphics, that make a comfortable selection possible, are deposited.

Test procedures:

There are three basic test procedures basing on EN 1999-100. One distinguishes the rule and the two special cases test of the receptacle-area and the shaft-area on that occasion. The test of the rule is applicable to new and old buildings. The special-tests can be carried out only for alto-continuances. The test of the receptacle-area first must take place on that occasion. This is passed that the test of the shaft-area must still be carried out additionally. However, the conditions to the existence of the test fall essentially more favorably at the shaft-area-test from, as in the rule.

Formula: $$\frac{2 * Pegeloberfläche[m^2] * Messgenauigkeit[mm]}{[dm^3]} = \mathrm{Pr}üfzeit[h]$$

The calculation of the test time is the same for all tests. The minimal test time amounts to half a hour with all these tests. The maximum test time calculates from the level-surface and the measuring-precision of the level-sensor. The current measuring-precision with which calculation of test time becomes can be checked with "configuration / device check" automatically over the menu-point in the menu.
Information about the measuring-precision of the system you can find in section 3.7.

The most allowable water-loss calculates from the test time and consequently directly from the level-surface and the measuring-precision of the level-sensor. In the following one, the formulas for the individual Test procedures are expounded.

For the Test procedures a, and b, is valid:

Formula: $$\frac{\mathrm{Pr}üfzeit[h] * 0.5[l]}{[h]} = Maximalverlust[l]$$

For the Test procedures c, is valid:

Formula: $$\frac{BenetzteDifferenzFläche[m^2] * \mathrm{Pr}üfzeit[h] * 0.4[l]}{[h] * [m^2]} = Maximalverlust[l]$$

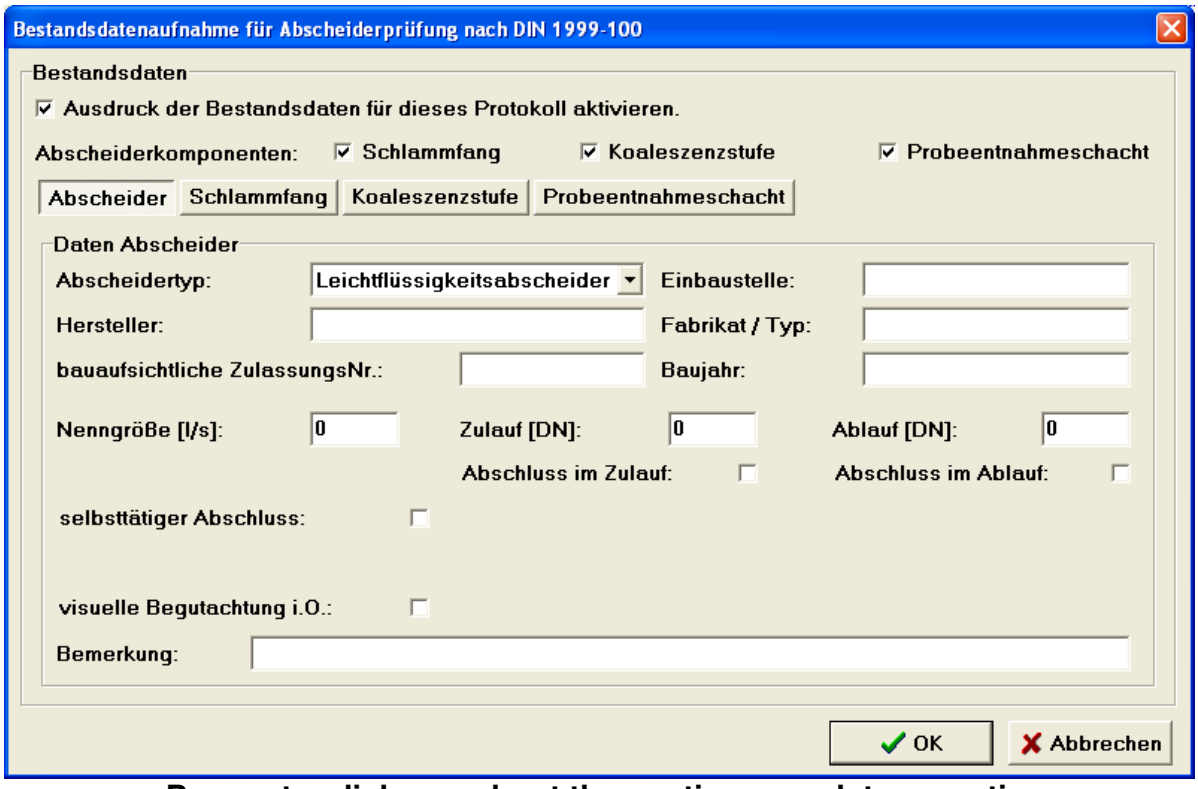
At the test of the special case "shaft-area" calculates itself the loss on the basis of the difference of the moistened shaft-surfaces of the test of the receptacle-area and the shaft-area. For this reason, the level must be declared additionally at the test of the shaft-area to the current water-level from the test of the receptacle-area as well so that the difference-surface can be determined automatically.

See work-leaf to the application of the DIN 1999-100 in the appendix.

6.2.3. Test parameters for tests acc. to DIN EN 4040-100 (Water-level-tests for shafts and separators)

Measuring-equipment: Variation 1: Level-sensor with manual water-addition
Variation 2: Level-sensor with automatic water-addition, dispatcher-box and measuring-equipment "water"

Test procedures: a, rule receptacle-area
b, rule "shaft-area" (this Test procedures)
it had to be approved by the locally responsible authority on this installation, about, to be allowed to, is applied!
c, test of particular conditions, this



Parameter-dialogue about the continuance-data-reception

To each installation part, the relevant data as well as remarks, in order to point out peculiarities, can be input. The installation parts can be separated constructions or integrated components (at compact-installations).

Following statements must be contained on that occasion according to norm:

- Mounting-place (Erdeinbringung, house-installation / both must be frost-free)
- Construction (unicameral-system, bicameral-system, fat-separators and mud-catch separated)
- Manufacturers
- Anlagentyp / nominal-size
- General construction-supervisory-like admission
- Materials
- Result of the visual test as well as judgment of the installation

The continuance-data-dialogue can be opened from the protocol-in front-view out. You push "continuance-data" on the button toward it in the right tax-strip of the protocol-in front-view (see next illustration).

Protocol-in front-view with right tax-strip

The continuance-data allowed to add at every time to the protocol or been processed. Call the protocol-opinion of the wished protocol-file about the additional adding the continuance-data, you open the continuance-data-dialogue and put you down the data. When closing the continuance-data-dialogue, the inputs are added in the protocol-file stored and automatic as side 4 of the protocol-expression. Furthermore, the continuance-data can be removed again from the protocol-expression over the same policy anytime.

The graphics on the following side show the continuance-data-expression exemplary.

MesSen Nord
Gesellschaft für Mess-, Sensor- und Datentechnik mbH

Zum Forsthof 2
18198 Stäbelow

Tel.: 038207 / 656-0 Fax: 038207 / 656-66

Abscheiderprüfung nach DIN 1999 - 100

Bestandsdaten zu Protokolldatei:

030918120911.DAT

1. Daten Abscheider (Ölabscheider)

bauaufsichtliche ZulassungsNr.:	12345/88	*Einbaustelle:*	unterirdisch
Hersteller:	Passavant	*Nenngröße:*	4
Fabrikat / Typ:	PA 5466 / PVC	*Zulauf:*	200
Baujahr:	2005	*Ablauf:*	250

Abschluss im Zulauf:	Ja		
Abschluss im Ablauf:	Ja		
selbsttätiger Abschluss:	Ja	*visuelle Begutachtung i.O.:*	Ja

Bemerkung:
Abscheider ist dicht

2. Abscheiderkomponenten

Schlammfang (bauaufsichtliche ZulassungsNr.: 12234/65)

Hersteller:	Passavant	*Nenngröße:*	4
Fabrikat / Typ:	PA S0815	*Zulauf:*	150
Baujahr:	2005	*Ablauf:*	200
Abschluss im Zulauf:	Ja		
Abschluss im Ablauf:	Nein		
selbsttätiger Abschluss:	Ja	*visuelle Begutachtung i.O.:*	Ja
Bemerkung:	Selbsttätiger Verschluss im Ablauf defekt		

Koaleszenzstufe

integrierte Koaleszenzstufe	
visuelle Begutachtung i.O.:	Ja
Bemerkung:	Koaleszenzstufe funktionstüchtig

Probeentnahmeschacht

Protocol-opinion side 4, continuance-data

Hint!
You can produce a DIN EN concurring and officially recognized general-inspection-report with the general-inspection-software (GI1999-100 and GI4040-100).

6.3. Test parameters for tests acc. to DIN EN 805

Measuring-equipment: HIGH PRESSURE

Materials: all specified

Cross-sections: Circle-form

Allowable pressure-losses: automatic calculation after norm-handicaps,
Test procedures are described in the standard

materials	test procedures	test time
Share 2 duktiles Casting-iron	Pressure-waste-test	3-24 h
Share 3 casting / steel with cement - normal-procedures mortar-lining	Accelerated	1..2 h
Communicate 4 steel-tubes / without bitumen-lining	Pressure-waste-test	3...24 h
Share 5 steel - and not prestressed concrete- if pressure-tubes realize	Water-loss-measurement	24 h pre-exam. 12...18 h
Share 6 asbestos-cement not realized	Water-loss-measurement	24 h 3 ... 24 h
Share 7 PE-HD / PE-LD PE-X	Contract-ion-proceed	1,5 h
PVC-U	Pressure-loss-proceed	15...18 h

6.4. Test parameters for tests with compressed air acc. to EN 1610

Measuring-equipment:	"COMPRESSED AIR" as well as. "COMPRESSED AIR / VACUUM"
Tube-materials:	- Concrete drily - Concrete moist and all other materials
Test sections:	1 to 3 sections of deceased material / cross-section
Tube-lengths:	1..200 m per section
Tube-diameters:	100..1000 mm

The standard gives no hints at the allowable pressure-garbages with coupling of pipeline-sections of different cross-section / material.
The software ROHRTEST realizes a physically correct calculation of the allowable total-pressure-waste for up to 3 connected management-sections.

Test pressure:	10 mbar / 50 mbar / 100 mbar / 200 mbar

Allowable pressure-losses:automatic calculation acc. to EN 1610

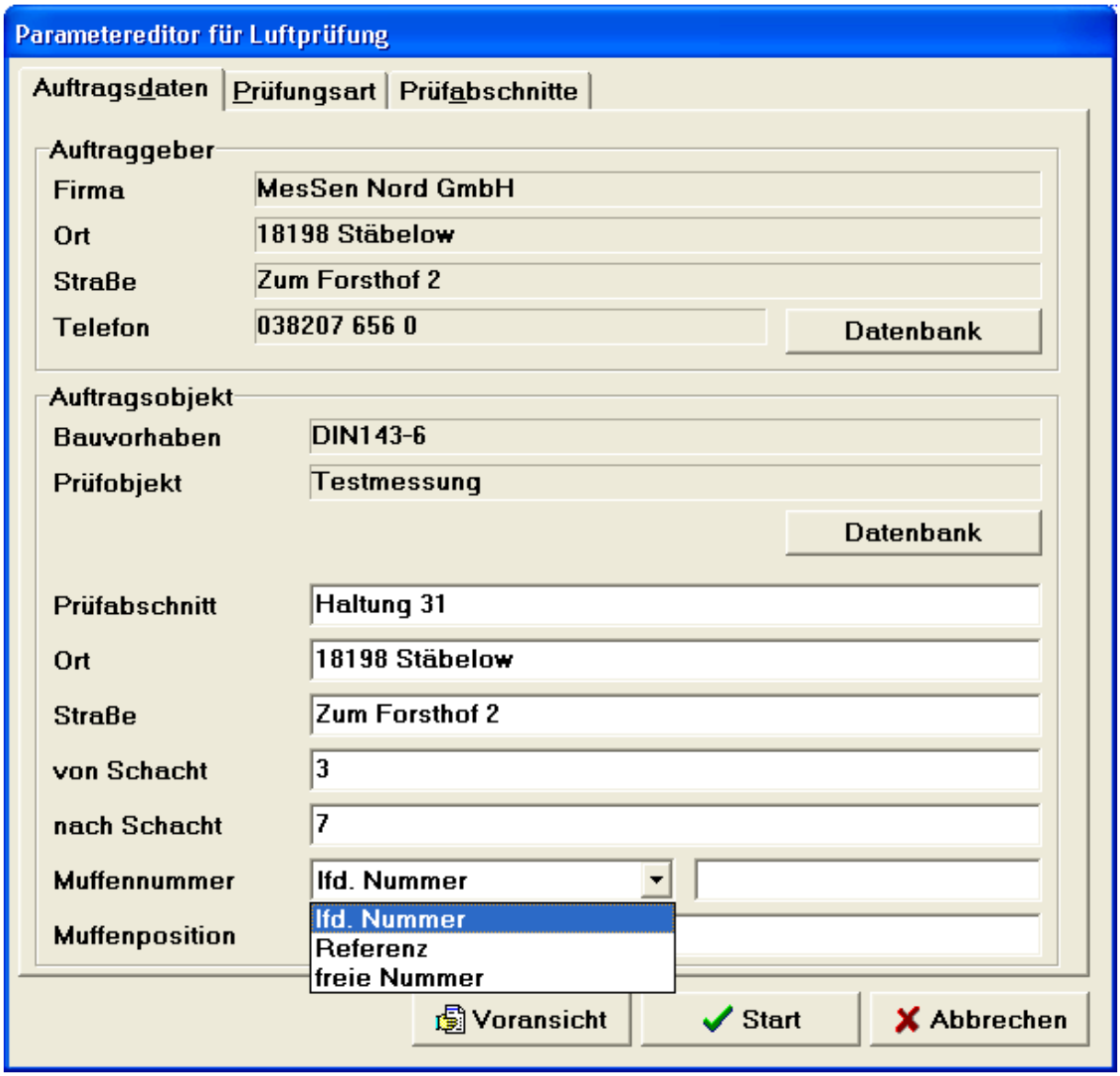
6.5. Test parameters for special-tests

For each Test procedures (air, water, vacuum, high pressure), a special-test exists. There can be chosen freely all relevant test parameters in the framework of the technical possibilities.

6.6. Test parameters for junction tests

Junction tests are used for the proof of the density of tube-connections (muffs), in contrast to the test of the entire attitude. The filling and test times are very low on that occasion on the basis of the low test volumes. In the parameter-dialogue for junction tests, following inputs can be transacted:

- Client-data (company, place, street, telephone)
- Order-data
- from shaft / after shaft (course of the stand-section)
- Sleeve-number
    - current number (it is determined automatically)
    - free number (sleeve-number must be put down itself)
    - Reference (reference-test for all sleeve-tests of the test object)



Parameter-dialogue for junction test

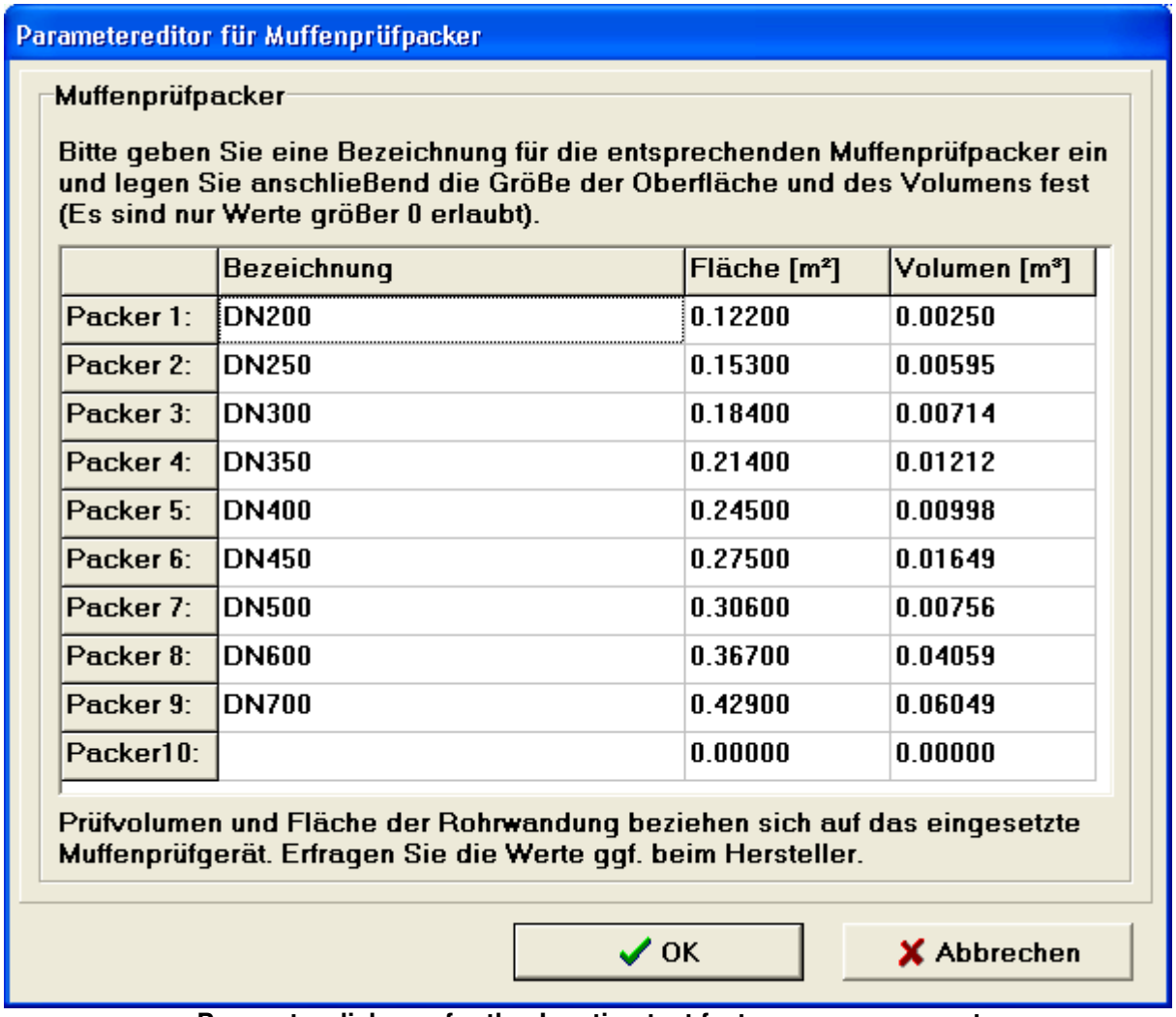
On the file "test-type" can be selected test standard, object type and the test parameters.

Parameter-dialogue for junction test (file test-type)

Junction test fasteners management

You can deposit the data of the existing Junction test fasteners in a table. From the deposited Junction test fasteners, you can select this currently used or the free parameter-input in the dialog from a list. The finally used Junction test fasteners is stored.

Over the menu-point configuration / Junction test fasteners... open the Junction test fasteners management (see following illustration).



	Bezeichnung	Fläche [m²]	Volumen [m³]
Packer 1:	DN200	0.12200	0.00250
Packer 2:	DN250	0.15300	0.00595
Packer 3:	DN300	0.18400	0.00714
Packer 4:	DN350	0.21400	0.01212
Packer 5:	DN400	0.24500	0.00998
Packer 6:	DN450	0.27500	0.01649
Packer 7:	DN500	0.30600	0.00756
Packer 8:	DN600	0.36700	0.04059
Packer 9:	DN700	0.42900	0.06049
Packer10:		0.00000	0.00000

Parameter-dialogue for the Junction test fasteners management

7. Test-transaction

7.1. Tests with measuring-equipment WATER

7.1.1. Preparatory works

It becomes implied that already locked up the pipeline-section to be tested and airs as well as fills for the stipulated duration (pre-filling-time) with water was held.

Control unit RT4-ST04	Measuring equipment WATER

As in the corresponding norms executed, the pipeline is to be anchored expediently.

- Connect control unit to power supply and to measuring equipment WATER
- Connect Water-supply and test object to measuring equipment
- Pick "W" for water pressure-tests from the menu-strip of the test software and input the client and order-object-data in the first appearing file-card.
- Choose the Test standard and the Test procedure
- Input the object dimensions on the third file-card.

7.1.2. Test with measuring-equipment WATER

- Over the start-button, you reach the test window.
- In the diagram, the test pressure is recorded during the pre-filling-phase. This on the right screen-half gives percent-ad the current loss positionierte, covered on the loss allowed for a positive test-result exactly in% at (relative loss).
- At beginning of the pre-filling, the pressure amounts about in the pipeline. 0 bar, the pump works. The ventilation-cock is for about.
- The end of the pre-filling-process is marked through it that
  a, the Test pressure the debit-value reached
  b, itself the relative loss no more serious alters.
  If with conditions are complied both, the tube is completely filled and the necessary test pressure prevails in the entire tube.

  If the test pressure is not reached over a longer time period, is to be tested, whether:
  - the entrance-page water supply is secured
  - the lighting hight not 1 m exceeds
  - the filters a free flow allow
  - Hoses of enough cross-section are used

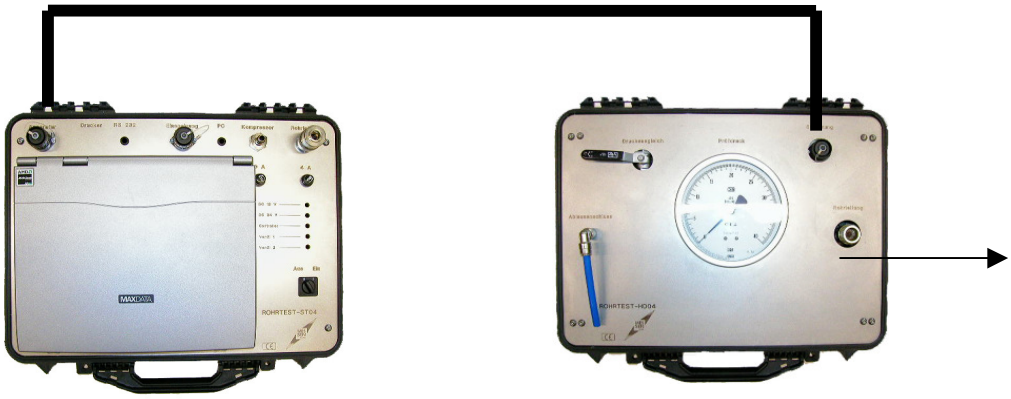
  Big leakages in the pipeline to be tested can make that the necessary Test pressure cannot be reached also with continuous water-addition. To the proof of the negative Test results, the test like subsequently is described to start.
  If the start is not meaningfully for before named reasons, so the Test procedure can be left.
- If the pre-filling-phase is finished, so the actual measuring-process can be avtivated with START.
  The status-window in the low part of the screen gives information over it whether the measurement immediately begins, or whether the program determines a too big difference between debit pressure and actual pressure in the tube and therefore delays the measuring-beginning until the achievement of the debit-pressure.
- If the test began, so the Test pressure and the loss are recorded in the diagram, which later is also component of the protocol.
  At most allowable and actual water-loss as well as test-time and Test pressure are shown. A premature demolition of the test is with STOP possible, a protocol is produced in this case only with not-existence of the test.
- If the test-time ran out, so this is signalled acoustically. An input-mask, which makes the adding a remark about the protocol possible, appears afterwards, the produced test report is shown on the screen.

7.2. Tests with measuring-equipment HIGH PRESSURE (DIN EN 805)

7.2.1. Preparatory works

It becomes implied that already cut off the pipeline-section to be tested, with water filled and was aired.

Since the high pressure-test one-closes a checkup on air-freedom in general, is to be dedicated special attention to this criterion in order to avoid verifications.



Control unit RT4-ST04	Measuring equipment HIGH RESSURE

As in the test standard executed, the pipeline is to be anchored expediently.

- Connect the control unit to the power supply and to mesuring equipment
- By the menu-point "H" from the menu-strip, the high pressure-test is selected.
- Test parameters in accordance with the input-masks write down, after confirmation, the test windows appears

7.2.2. Test-transaction with measuring-equipment HIGH PRESSURE

Under continuous aware control of the software-pressure-ads and the pressure gauge of the measuring-equipment, the Test pressure is found on the pipeline with help of the external pump.
Follow the instructions of the software on that occasion.

Usually test pressure is reached fast, then however immediately collapses again on a lower value.
Therefore fill slowly or in several short pushes, until the pressure remains approximately constant in the tube-performance also after end of padding.

After achievement of the Test pressurees, the denseness-test starts fully automatically.
High pressure-denseness-tests under-are divided into the phases in general:

- Pressure-construction
- Preaudit
- Test and air-freedom
- Main-test

One of the part-tests is not passed that so the test procedure with negative result finishes.

After completion of the test, the test result is formed automatically and can be printed the test report.

7.3. Tests with measuring-equipment AIR acc. to EN 1610

7.3.1. Preparatory works

It becomes implied that the pipeline-section to be tested already was locked up.

RESPECT!

The test with compressed air rescues with improper handling of the test devices security-risks for the user. A damage of the test objects is the further one possible with an infringement of the stipulated Test pressurees. We refer 1610 to the pertinent work-protection-rules and the Test standards DIN EN, LfW 4.3-6 as well as. ÖNORM B 2503.

For the professional handling of the appliance-technology as well as the observance of the current rules, the user is responsible, the manufacturer of the Test devices takes over no liability.

!!! All fasteners / hoses / connector are on sure seat to checks and to anchor or to support.

!!! While the pre-filling and the test procedure (as long as the pipeline under Pressure stands), present people have to choose her/its/their residence so, that they are can not hurt by for example away-skidded fasteners.

Following works are to be executed to the preparation of the test:

- Connect the control unit to power supply
- Connect compressed air-plugs with the labeling "compressor" with a compressed air-source with a pressure of Max. 2,0 bar connect. See section 3.3. *Measuring-equipment AIR / compressed air-supply.*
- Pick "L" for air-test from the menu-strip of the test software and input the client and order-object-data in the first appearing file-card.
- Choose the test standard, the Test procedures on the second file-card the Test pressure
- Input the object dimensions on the third file-card.

7.3.2. Transaction of the test with compressed air

Change over the start-button to the test-screen. It becomes a diagram and shown on the right side of the currently measured Test pressure, you are in the phase of the pressure-construction.

- In the diagram, the Test pressure is recorded during the pre-filling-phase. This on the right screen-half gives percent-ad the current loss positionierte, covered on the loss allowed for a positive test-result exactly in% at (relative loss).
- At beginning of the pre-filling, the pressure amounts about in the pipeline. 0 bar, the magnet-valve is opened.
- The end of the pre-filling-process is marked through it that
  a, the Test pressure the debit-value reached
  b, itself the relative loss no more serious alters.
  If with conditions are complied both, the tube is completely filled and the necessary Test pressure prevails in the entire tube.

  If the Test pressure is not reached over a longer time period, is to be tested whether:
  - the compressor right was connected and works
  - The air-loss / time of the performance of the used compressor corresponds

  Big leakages in the pipeline to be tested can make that the necessary Test pressure cannot be reached also at continuous compressor-business. To the proof of the negative Test results, the test like subsequently is described to start.
  If the start is not meaningfully for before named reasons, so the Test procedure with CLASPS can be left.

- If the pre-filling-phase is finished, so the actual test can be introduced with START. The status-window in the low part of the screen gives information over it whether the measurement immediately begins, or whether the program determines a too big difference between debit pressure and actual pressure in the tube and therefore delays the measuring-beginning until the achievement of the debit-pressure.
- If the measurement began, so the Test pressure is recorded in the diagram, which later is also component of the protocol.
  At most allowable and actual pressure-loss as well as test-time and Test pressure are shown. A premature demolition of the test is with STOP possible, a protocol is only produced when the test already "failed" unequivocally.
- If the test-time ran out, so this is signalled acoustically. With CLASPS, the window is closed. An input-mask, which makes the adding a remark about the protocol possible, appears afterwards, the produced protocol is shown on the screen.

7.3.3. Test of tube-connections / junction-test

The test of individual tube-connections, in the next junction-proof named, is possible in different appliance-constellations with the Test system ROHRTEST.

Following appliance-constellations are supported for the junction-proof:

a, test with standard pipe fasteners:

Closing off of the test volume	Pipe fasteners
Pressure-sensor	In the control unit ST04
Filling control of fasteners	Manually, connection z.B. over twin-hose-reel RT-MUPZ
Filling control of Test volume	Automatically over control unit ST04
Remarks	Disadvantage: big test volume, hose is "with-tested"

b, test with special junction test device

Closing off of the test volume	Particular junction test device
Pressure-sensor	In the control unit ST04
Filling control of fasteners	Manually, connection z.B. over twin-hose-reel RT-MUPZ
Filling control of Test volume	Automatically over control unit ST04
Remarks	Disadvantage: Hose is "with-tested"

c, test with control at the special junction test device

Closing off of the test volume	Particular Muffenprüfgerät
Pressure-sensor	Directly at the Muffenprüfgerät
Filling control of fasteners	Manually, connection with RT-MUPT
Filling control of Test volume	Automatically directly at the junction test device
Remarks	Minimized test volume, shortest test time

With application of the variations, b (and c) results in the problem that itself the test volume reduces directly after the filling. This especially then leads, if is done in the upper nominal-wideness-utilization-area of the junction test devices, therefore e.g. with the RT-PP400 with a nominal-diameter of 500, to an increase of the Test pressurees directly after the filling. This pressure-increase is in this case to be necessarily waited, before is begun with the pressure-waste-test.

The following stabilization-times are recommended:

Nominal-wideness	Packer-size	Filling-pressure	Stabilization-time
DN 200	200	4 bar	1 min
DN 250	200	4 bar	3 min
DN 300	300	4 bar	1 min
DN 400	400	4 bar	2 min
DN 500	400	4 bar	6 min
DN 500	600	4 bar	1 min
DN 700	600	4 bar	8 min

7.4. Tests with the measuring-equipment SHAFT

7.4.1. Preparatory works

It becomes implied that already drained the receptacle to be tested, cleaned, locked up and with clear water was replenished.

RESPECT! The measuring-equipment SHAFT is water admitted exclusively for the test with the test medium water. It doesn't possess any admission for the ex-area, it's not specified for explosive liquids or gases.

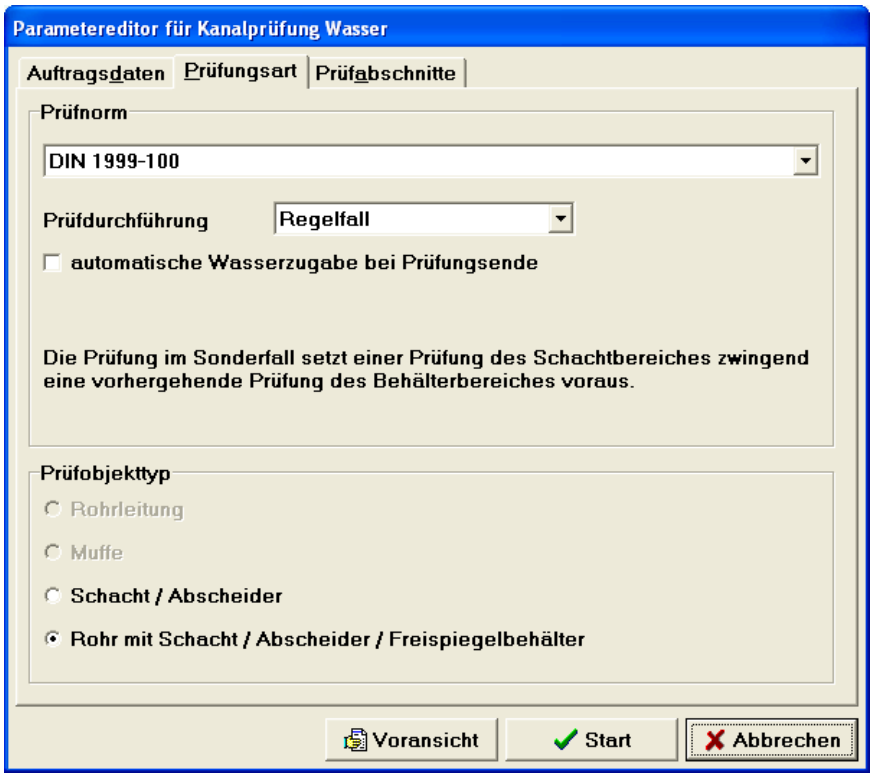
According to material and condition of the object material, a repletion-phase must be put in front the test.

The device is set up over the opening of the receptacle to be tested with the tripod and the level-probe, extends harnessed with the required tube-extensions in the tripod. The sensor-main lead is connected with tuner-amplifier and level-probe and is switched on the control unit.

Drove with automatic water-addition over measuring-equipment WATER: In this case over the dispatcher-box, level-sensor and measuring-equipment WATER are connected (see point 1.3, B) with the control unit simultaneously.

The test software is started, and the water-test (W) chosen. After the order-data were input, becomes on file-card 2 as test object shaft / chosen separators with or without connected pipeline.

The input of the object parameters takes place in accordance with section 6.2.2.



7.4.2. Transaction of the test with the measuring-equipment SHAFT

After conclusion of the data input, the actual test-screen is started. Doesn't yet start the actual test but the screen-ad at first putting in of the beginning-water-stand as well as the control of the attitudes allow.

This water-levels should be at beginning of the test between the two rings of the level-sensor, what through variation of the water-stand or through beginning / sinking of the level-probe can be reached.

RESPECT! Avoid out the sinking the sensor over the upper ring! A exposition of the sensor-lensis can lead to measuring-mistakes at a subsequent test!

In the status-window of the test window, hints are given to the attitude of the test level, in principle it should at beginning of the test of the upper third of the measuring-area of 50 mm lies.

After conclusion of the water-level-attitude, the actual test is started by clicking the start-button. Going out, the level-change becomes from the so-called zero-water-stand captured to the post-time-point as well as. the water-loss over the test time clung.

With application of the automatic water addition with the measuring-equipment WATER, the behavior directs "automatic water-addition toward him/it at test-end" for itself after the attitude of the counter in the section 7.4.1. represented parameter-windows.
If this counter is active, so the water-addition takes place on the test-end (d.h). the zero-water-stand is restored, he/it is inactive, so the level is held virtually steadily through continuous water-additions. So, also tests with allowable level-loss can be carried out over 50mm.

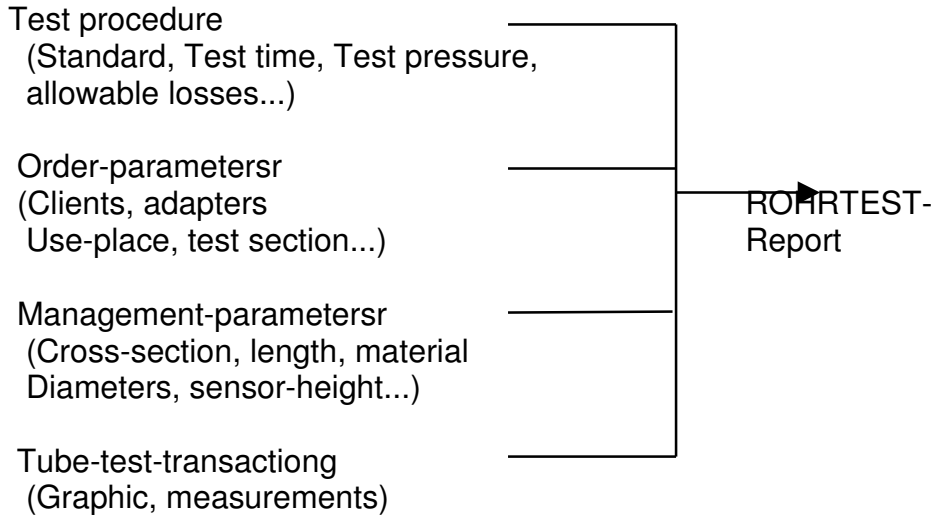
With application of the automatic water addition without the measuring-equipment WATER, the test is not stopped after the actual test time. The record is continued explicitly until the user on the button "STOP" presses. During this additional measuring-phase, the water-addition can take place manually. After the pressing the Stop-button over an input-window, the user must declare the manually added water-quantity.

The value of the water-addition appears at activation in both cases in the test-protocol.

8. Data-concept

8.1. Storage of the Test reports

The following scheme shows the flow of information, which emerges at the preparation of a test report.



All test-parameters for a taken place test are set aside (instead of C:\RT, an alternative installation-table can be declared during the Setup) on the hard disk of the PC under automatically forgiven protocol-numbers in the standard-data-table C:\RT\DATEN. The data-path can be picked configuration / program-parameter freely over the menu after the installation.

The protocol-numbers (file-names) become after the scheme JJMMTTHHMMSS.DAT from the date and the time formed. The protocol-file 020306141530.DAT gets along z.B. for an test at the 06.03.2002 14:15 o'clock and 30 seconds.

The data-table is generated automatically in following manner:

C:\RT\DATEN\ [clients 1] [construction-intents 1] [protocol 1]oll 1]

——[Clients 2] [construction- intents 2] [protocol 2] 2]—

——— ... ——— ... ___ ...

Over the knowledge of the protocol-number as well as. for the client and project, it is possible to find the data of an already cast off test and to load again, to represent the protocol and to print out.

8.2. Project-administration

All clients as well as all construction-intents and test objects are grasped automatically in an internal data base of the test software and stand in the case of the re-application without retyping of the data about the disposal so.

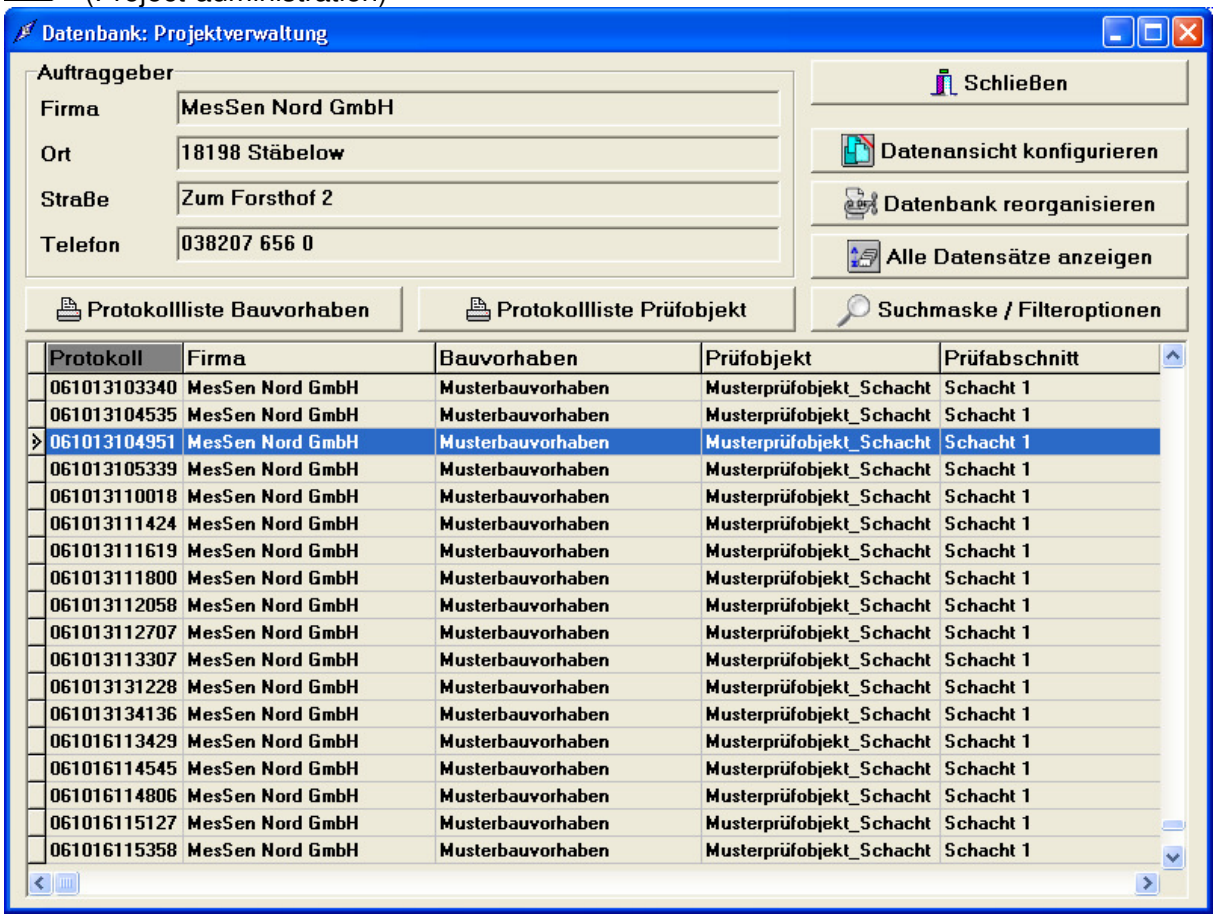
8.2.1. Transferred by data-continuances, updating of the project-administration

Changes are carried out at the data-continuance, like this z.B. with the erasure or postponing of protocol-files over the Windows-Explorer or but when adding Test reportsn (z.B). when transferring of Test parameter on the office-calculator, happens, so data base and test protocol pool agree no more.
In this case, the menu-point should reorganize" "project-administration been executed "data" in the menu. It is scanned the entire data-continuance on that occasion automatically in the data-table of the Test software, and the data base updates.

8.2.2. Summary from Test reports to lists and overview-tables

Over the menu-point "project-administration" of the menu "data" as well as. the corresponding symbol in the menu-strip can be called the project-administration.


(Project-administration)



The project-administration makes it possible, as well as to find Test reports again comfortably and to open, to produce also as lists and overview-tables of the tests after different order-criterions.

With a double-click on a line of the project-administration, the protocol-opinion of the respective protocol is called. With the right mouse-button on a line clicked, a menu opens. Can show the pressure-preview so, a protocol-list-opinion generates or the Test parameter of the protocol are taken over for a new test.

Over the button "search-mask / filter-options" can be searched the data base freely after certain criterions like Prüfnorm, test result, client-name, place, Test procedures and many further ones. In the project-administration, the results of the search are only shown then. A click on the button "universe records shows" shows the complete content of the data base again.

Which columns should be shown in the project-administration, can configure been established over "data-opinion."

The user can choose the sequence of the columns freely, in that positioniert he/it the columns through traction of the column-head. The column-width can be set freely. The layout of the user-defined opinion is stored by the software automatically. Consequently, one is seized optimally on the user of cut data-opinion.

A click on the column-title sorts the data-opinion after this column. The decisive column-title is deposited dark-gray.

Over the buttons "protocol-list construction-intents" and "protocol-list Test object" can be generated overview-lists of the protocols about a project. It had to be marked however exactly one line of the project-administration previously. The lists can contain only the before filtered data or all protocols of the project. A corresponding retrieval leaves this decision to the user. Before the representing the protocol-list, the user can establish up to 4 Sortierkriterien simultaneously. So, the protocols can z.B. first after Prüfnorm, then after test result and is sorted simultaneously after Prüfzeit. Furthermore, the Sortierrichtung (rising or descends) can be established for every criterion. So, a maximum at flexibility is guaranteed.

Especially for users, which execute stand and sleeve-tests, this type of the reports essential advantages produces. Complete test reports overviews, in which the most important test parameters sorted tabulated, can be generated been listed.

Beside the printing out the lists, it also is possible to let printed out all singles-protocols of a chosen overview-level.

Order-criterion	Uses
Construction-intents	Ad and expression of all Test objects of a Procet in both list-form and as singles-protocols, therefore z.B. the overview over a whole building site or property
Test object	Ad and expression of all Test reports of a Test objectss in both list-form and as singles-protocols, therefore z.B. all junction test reports of an attitude or the protocols of the tests before / after a redevelopment

The following example shows an excerpt from such a list-representation for a chosen Test object.

MesSen Nord
Gesellschaft für Mess-, Sensor- und Datentechnik mbH
Zum Forsthof 2
18198 Stäbelow
Tel.: 038207 / 656-0 Fax: 038207 / 656-66

Muffen-Sonderprüfung (Verfahren Luft)

Auftraggeber:	MD-Tiefbau GmbH		
Straße:	Jägerstraße 10		
Ort:	44145 Dortmund	Telefon:	0231/8189 - 75 / -76
Bauvorhaben:	Dortmund, Mergelteichstraße		
Prüfabschnitt:	in Fließrichtung		
Straße:	Mergelteichstraße		
Ort:	Dortmund		
Prüfobjekt:	Schacht B - 0071		
Prüfverfahren:	Muffenprüfung	Prüfdruck:	500.0 mbar
Prüfzeit:	1.0 min		

Nr.	Datei	Position	Beginn der Prüfung	bei Druckwert [mbar]	Druck-abfall [mbar]	Prüfdruck [mbar]	Nennweite [mm]	Länge [m]	Prüfungs-ergebnis
001	070129101307	1.0	29.01.07 10:17	570.128	-	500	-	-	bestanden
002	070129102015	2.0	29.01.07 10:22	536.948	1.29090	500	-	-	bestanden
003	070129102438	3.0	29.01.07 10:26	543.197	1.59961	500	-	-	bestanden
004	070129102941	5.5	29.01.07 10:31	541.428	1.12863	500	-	-	bestanden

Prüfgerät: RT4 #060508 Prüfer: Schwartz / Knoche Seite: 1 / 2
Projektordner: C:\RT\DATEN\MD-TIEFBAU GMBH\DORTMUND, MERGELTEICHSTRAßE\SCHACHT B - 0071

Datum ..... Prüfer ..... Auftraggeber .....

Protocol-list for sleeve-tests side 1

8.3. Preparation and alteration of Test report forms

The preparation of the Test reports takes place through the Test software under application of protocol-presentations. On this occasion, it is about text files, which describe the format and the content of the Test reports. Protocol-presentations exist for all Test standards and Test procedures.

8.3.1. Saving system of the Test report forms

The Test report forms are stored like follows:

Standard-version "C:\RT"

Table	Description of the existing data
C:\RT\	- Program-files (EX and INI-files) - Data bases (client and project-data base)
C:\RT\Deutsch\	- individually shaped protocol-presentations (*.PER - files, if existing
C:\RT\Deutsch\ Standard_Protokolle	- Standard-protocol-presentations (*.PER - files
C:\RT\Deutsch\ GPS_Protokolle	- Standard-protocol-presentations (*.PER, files, with activated GPS, option

Tube-test-appliance with several ports and standard-installation-table "C:\RT"

Table	**Description of the existing data**
	Black program-version (1).port
C:\RT\DBRT41	- Program-files (EX and INI-files) - Data bases (client and project-data base)
C:\RT\DBRT41\Deutsch\	- individually shaped protocol-presentations (*.PER - files, if existing
C:\RT\DBRT41\Deutsch\ Standard_Protokolle	- Standard-protocol-presentations (*.PER - files
C:\RT\DBRT41\Deutsch\ GPS_Protokolle	- Standard-protocol-presentations (*.PER, files, with activated GPS, option
	Red program-version (2). port
C:\RT\DBRT42	- Program-files (EX and INI-files) - Data bases (client and project-data base)
C:\RT\DBRT42\Deutsch\	- individually shaped protocol-presentations (*.PER - files, if existing
C:\RT\DBRT42\Deutsch\ Standard_Protokolle	- Standard-protocol-presentations (*.PER - files
C:\RT\DBRT42\Deutsch\	- Standard-protocol-presentations (*.PER, files, with

GPS_Protokolle	activated GPS, option
	Yellow program-version (3). Messport
C:\RT\DBRT43	- Program-files (EX and INI-files) - Data bases (client and project-data base)
C:\RT\DBRT43\Deutsch\	- individually shaped protocol-presentations (*.PER - files, if existing
C:\RT\DBRT43\Deutsch\ Standard_Protokolle	- Standard-protocol-presentations (*.PER - files
C:\RT\DBRT43\Deutsch\ GPS_Protokolle	- Standard-protocol-presentations (*.PER, files, with activated GPS, option

Individually changed protocol-presentations must be copied into the corresponding table. These presentations then are treated preferentially, d.h. as far as an individual protocol-presentation exists, this is also used.

The following list allows the assignment of the protocol-presentations to the Test standards and .verfahren, you please order a list of the used data fields with demand with the manufacturer.

File-name	Prüfnorm
1.per	Denseness-special-test (procedures air)
1m.per	Sleeve-special-test (procedures air)
12562s.per	Denseness-test of DIN EN 12566 – 1
1391.per	Denseness-test of ATV/DWA 139 (procedures air)
1391m.per	Sleeve-test of ATV/DWA 139 (procedures air)
1392.per	Denseness-test of ATV/DWA 139 (procedures water)
1392f.per	Denseness-test of ATV/DWA 139 (W)
1392s.per	Shaft-denseness-test of ATV/DWA 139 (W)
1393.per	Denseness-test of ATV/DWA 139 (procedures hypotension)
142.per	Denseness-test of ATV/DWA A 142 (procedures hypotension)
1431.per	Denseness-test of ATV/DWA M 143-6 (procedures air)
1431m.per	Sleeve-test of ATV/DWA M 143-6 (procedures air)
1432.per	Denseness-test of ATV/DWA M 143-6 (procedures water)
1432f.per	Denseness-test of ATV/DWA M 143-6 (W)
1432s.per	Shaft-denseness-test of ATV/DWA M 143-6 (W)
1433.per	Denseness-test of ATV/DWA M 143-6 (procedures hypotension)
1433m.per	Sleeve-denseness-test of ATV/DWA M 143-6 (procedures hypotension)
16111.per	Denseness-test of DIN EN 1610 (procedures air)
16111m.per	Sleeve-test of DIN EN 1610 (procedures air)
16112.per	Denseness-test of DIN EN 1610 (procedures water)
16112f.per	Denseness-test of DIN EN 1610 (W)
16112s.per	Shaft-denseness-test of DIN EN 1610 (W)
19991f.per	Denseness-test of DIN 1999 – 100
19991s.per	Separator-test of DIN 1999 – 100
1999f.per	Denseness-test of DIN 1999

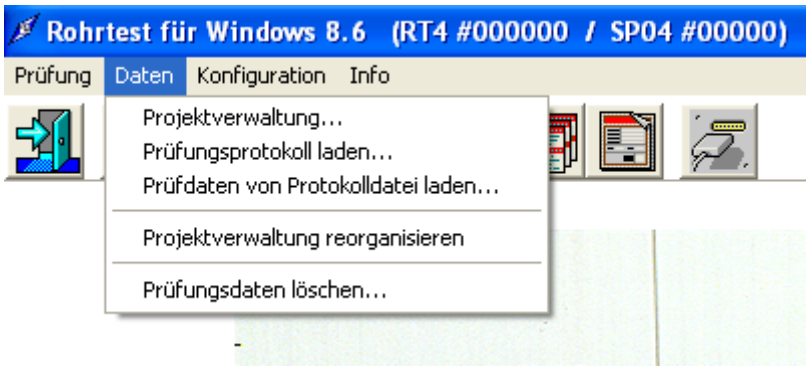
1999s.per	Separator-test of DIN 1999
2.per	Denseness-special-test (procedures water)
File-name	Prüfnorm
2f.per	Denseness-special-test (procedures water)
2s.per	Shaft-denseness-special-test (W)
25031.per	Denseness-test of ÖNorm B 2503 (procedures air)
25031m.per	Sleeve-test of ÖNorm B 2503 (procedures air)
25032.per	Denseness-test of ÖNorm B 2503 (procedures water)
3.per	Denseness-special-test (procedures high pressure)
4.per	Denseness-special-test (procedures vacuum)
4033.per	Denseness-test of DIN 4033 (procedures water)
40401f.per	Denseness-test of DIN 4040 – 100
40401s.per	Separator-test of DIN 4040 – 100
4261s.per	Denseness-test of DIN 4261 – 1
438.per	Denseness-test of LfW 4.3-6 1992 (procedures air)
438m.per	Sleeve-test of LfW 4.3-6 1992 (procedures air)
4381.per	Denseness-test of LfW 4.3-6 1999 (procedures air)
4381m.per	Sleeve-test of LfW 4.3-6 1999 (procedures air)
4382.per	Denseness-test of LfW 4.3-6 1999 (procedures water)
4382f.per	Denseness-test of LfW 4.3-6 1999 (W)
4382s.per	Shaft-denseness-test of LfW 4.3-6 1999 (W)
4383.per	Denseness-test of LfW 4.3-6 (procedures hypotension)
792.per	Inner-pressure-test of DIN 4279 part 1 and DIN 4279 part 2
793.per	Inner-pressure-test of DIN 4279 part 1 and DIN 4279 part 3
794.per	Inner-pressure-test of DIN 4279 part 1 and DIN 4279 part 4
797.per	Inner-pressure-test of DIN 4279 part 1 and DIN 4279 part 7
8053.per	Inner-pressure-test of EN 805

Table 1: Overview over the protocol-files and her/its/their appropriate measuring-rule

Through the new storage-concept, a maximum at flexibility becomes possible. Individual protocol-presentations are not entitled with new installation, and the application nevertheless uses the most current protocol-presentations with entire new functionality.

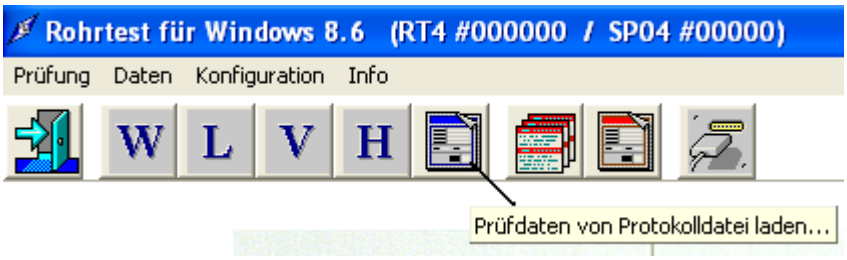
8.4. Test parameter getting from Test reports

Since the program-version 8.6, the Test parameter can be loaded already by carried out measurements, about the corresponding configuration from the last test of this object, to read. Client-data, Test objectdaten, parameters and object-parameters first are adopted on that occasion and can, with demand, is edited afterwards. The corresponding protocol-file can load "Test parameter of protocol-file over the menu-point". in the menu "data" is selected.



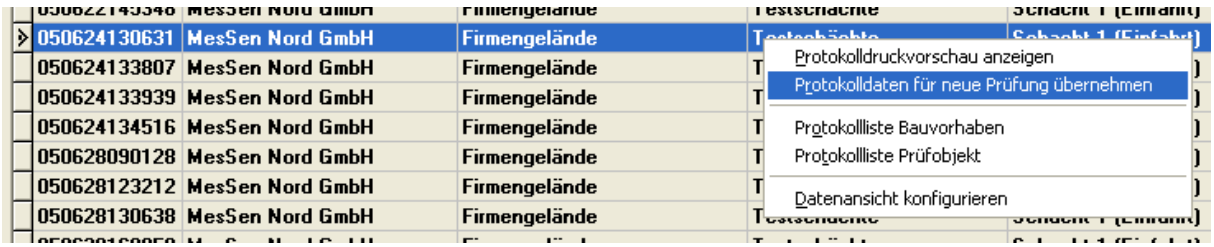
Menu "data" in the main-application-window

Alternatively, loading can take place (see following illustration) over the corresponding ToolButton in the control-strip.



Toolbar of the tube-test-software

From the version 8.7, the Test parameter can also be taken over from a protocol selected in the project-administration for a new test. The corresponding line with the right mouse-button must be clicked on to it and the entry adopts" "protocol-data in the context-menu for a new test is selected.



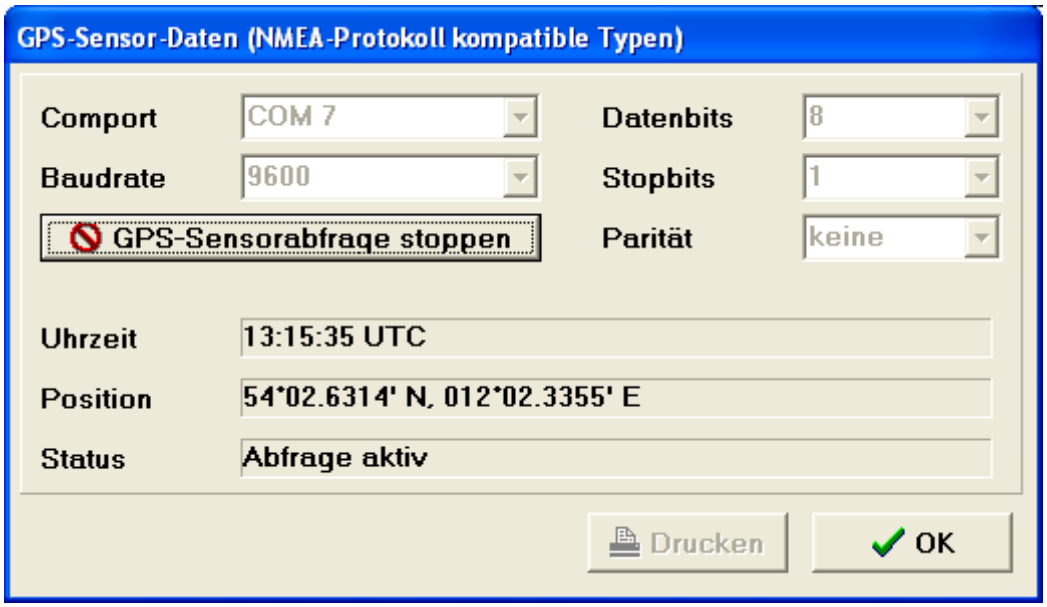
Context-menu in the project-administration

8.5. Configuration of the option "GPS"

With a connected GPS-Sensor, the current GPS-Position is entered automatically into the test report. The required driver (with USB - appliances) of the sensor is included by the manufacturer and must be installed after manufacturer-handicaps.

The sensor must the NMEA, protocol supports, so that they tube-test, software the current position can finish reading. The interface-parameters please infer you from the documentation of the GPS-Sensors would use by you. All required attitudes can be given a talking to "GPS-Sensor-Daten" in the dialogue-window. The dialogue-window can "GPS-Sensorcheck" over the menu-point. in the menu "configuration" is called.

Please heed that the sensor after switching on requires a certain time to the determining the current position. You/they can observe the sensor-status directly in the configuration-dialogue. The UTC-time, the GPS-position as well as status-news are shown with it.



GPS-Sensor configuration-dialogue with current position and time-ad

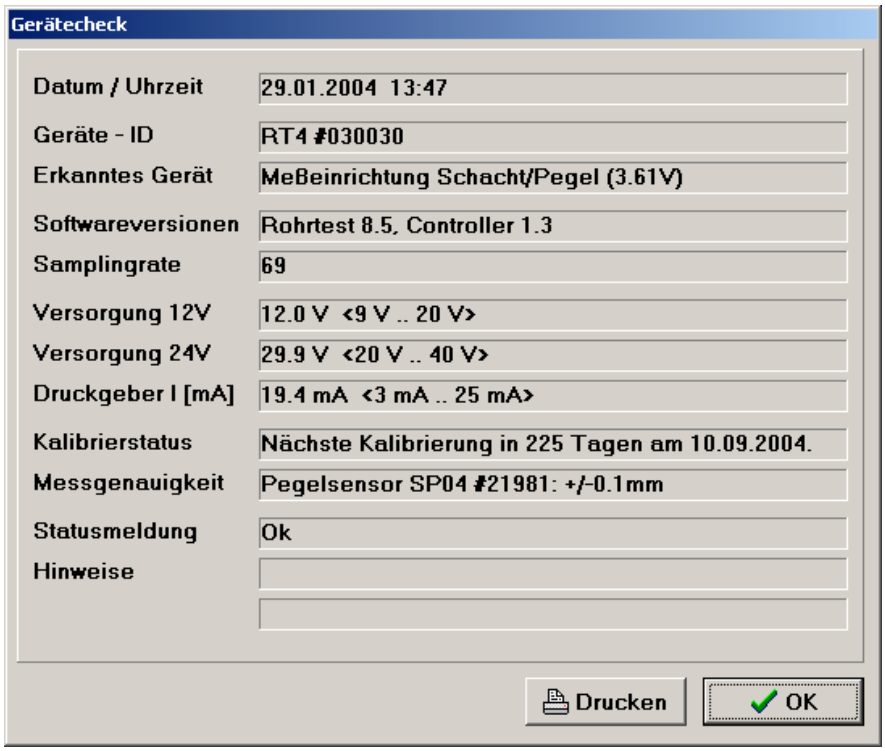
The retrieval of the GPS-data can starts / stops" started over the button of "GPS-Sensorrequest and is broken. In order to get a valid GPS-Position in the protocol, the retrieval must have started. The start of the test is tried to determine a valid GPS-Position. If this doesn't succeed, the user is asked, whether he/it would like to repeat the attempt, otherwise the test is started, and the entry takes place "no GPS-Position available" in the protocol.

9. Maintenance and function-test

9.1. Appliance-check

If doubts of the correct function of the test device exist the software supports you with the mistake-orientation. With the menu-point of "appliance-checking" in the menu "configuration" is called a routine, which determines the internal appliance-parameters and shows on the screen.

Lists or please prints you the there spent information before you establish contact with our service.



9.2. Cleaning of the filter of the measuring-equipment WATER

* Take away the 4 outer srews which fortify the front-plate at the suitcase
* Take the front-plate with the entire measuring-construction from the suitcase out
* Take away the 4 srews as well as the valve-levers, the front-plate can be removed after it
* This water-filters is beside the pressure gauge left. Solve them/her/it Filter-fortification.
* Solve the hose-bell at the end directed to the hand-valve of this Filter, you remove the hose.
* The filter-nozzle lets itself now unscrew. Take the filter-use and clean this with a brush. If you possibly rinse them/her/it Filter-nozzle from.
* The montage of the measuring-equipment takes place in reverse sequence

9.3 Changeover to winter-business (all measuring-facilities)

The ROHRTEST-devives are for the business with air-temperatures below 0, C doesn't specify. In order to prevent a damage of the Prüftechnik with camp-temperatures below 0, following points are to be heeded:

* Measuring-facilities WATER and HIGH PRESSURE empty and with Frost-protection (z.B). Motor vehicle-cooler-frost-protection, in accordance with the required camp-temperature replenishes
* Condensations from the measuring-equipment AIR take away
* LCD-screebs (Notebook) never with temperatures below - 15, C camp

9.4. Test of the appliance-function, own-control

The manufacturer recommends, the test device also within the calibration intervalls (z.B). weekly, to subject a control on proper function.

Test the appliance-denseness ST04, measuring-equipment AIR / VACUUM

For the pressure test devices, this test involves the general measuring-function z.B. with a comparison-measuring instrument as well as the test of denseness of the Test systems.
A sample turns into the control of the denseness of the Test devices at a guarantees to dense test-construction executed. A pipeline DN proved itself 100 to it with a length of 1 m, which locked densely on both sides and is interconnected with the Prüfgerät. With a Test pressure of 200 mbar, the pressure-loss can amount to at most 1 mbar in 3 min.

9.5. Cleaning of the measuring-equipment SHAFT

Since the level-sensor of the measuring-equipment SHAFT has direct contact with the Prüfmedium water, he/it is regular on impurities to tests, ggf. these are to be taken away. All statements refer upright to him/it, with the screw thread-connection upward standing level-sensor. The cleaning takes place only with a mild household-clearer (z.B) in principle. Washing liquids.

a) Cleaning of the strainer-element: The 3 screws of the lowermost screw-ring are to be taken away, the strainer is ggf. with a brush, to clean.

b) Cleaning of the swimmer: The 3 screws of the middle screw-ring are to be taken away, the interior as well as the swimmer are to be cleaned

c) Cleaning of the sensor-head: The 3 screws of the upper screw-ring are to be taken away, the lentil of the sensor-head is to be cleaned carefully and to dry afterwards.

Changes of the sense of a technical development keeps
itself the manufacturer before.
Heed please corresponding documentation-supplements.

With hints and questions, you please turn to them/her/it

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Denseness-tests of DIN EN 1610 conditions Octobers 1997

Air: (Procedures "L")

Material	Procedures	p0 (mbar)	(p (mbar))	Prüfzeit in min						
				DN 100	DN 200	DN 300	DN 400	DN 600	DN 800	DN 1000
Concrete drily	LA	10	2,5	5	5	5	7	11	14	18
	LB	50	10	4	4	4	6	8	11	14
	LC	100	15	3	3	3	4	6	8	10
	LD	200	15	1,5	1,5	1,5	2	3	4	5
Concrete moist and all	LA	10	2,5	5	5	7	10	14	19	24
	LB	50	10	4	4	6	7	11	15	19
other materials	LC	100	15	3	3	4	5	8	11	14
	LD	200	15	1,5	1,5	2	2,5	4	5	7
Measuring-precision pressure-waste 10 percent (p)				Pacification-time about. 5 min				Pressure-waste is to be recorded!		

Water: (Procedures "W") p0 = 0,1... 0,5 bar

Pre-filling-time :	1 Hour until 24 hours (concrete), if necessary	Pressure-waste and water-addition are to be recorded!
Duration :	30 min	
Pressure-precision :	10 mbar	
Water-loss:	0,15 l/m2 in 30 min for tubes (inner surface) 0,2 l / m² in 30 min for pipelines einschl. Shafts 0,4 l/m2 in 30 min for shafts at singles-test	

Denseness-tests of the leaflet of the estate 1.7.1999
Bavarian regional-office of water-economy
LfW 4.3-6

Air: (Procedures "L")

Material	Procedures	p0 (mbar)	(p (mbar))	Prüfzeit in min						
				DN 100	DN 200	DN 300	DN 400	DN 600	DN 800	DN 1000
All materials	LC*	100	15	2,5	4,5	7	9	14	18	23
	LD*	200	15	1,5	3	5	6	10	13	16
Measuring-precision pressure-waste 10 percent (p)				Pacification-time DN / 100 in min				Pressure-waste is to be recorded!		

Hypotension-test

Material	Procedures	p0 (mbar)	(p (mbar))	Prüfzeit in min						
				DN 100	DN 200	DN 300	DN 400	DN 600	DN 800	DN 1000
All materials		-100	11	2,5	4,5	7	9	14	18	23
		-200	11	1,5	3	5	6	10	13	16
Measuring-precision pressure-waste 10 percent (p)								Pressure-waste is to be recorded!		

Water: (Procedures "W") p0 = 0,1... 0,5 bar, hydro-did. Print through shaft-filling until waiter-edge

Pre-filling-time :	1 Hour until 24 hours (concrete), if necessary	Pressure-course and water-addition are to be recorded!
Duration :	30 min	
Pressure-precision :	10 mbar	
Water-loss:	0,15 l/m2 in 30 min for tubes (inner surface) 0,2 l / m² in 30 min for pipelines einschl. Shafts 0,4 l/m2 in 30 min for shafts at singles-test	

Denseness-tests of leaflet ATV/DWA M 143, part 6 stand 1996
Test of existing sewage-systems

Air-overpressure-test

Material	Test pressure p0 (mbar)	(p (mbar))	Prüfzeit in min									
			DN 100	DN 200	DN 300	DN 400	DN 500	DN 600	DN 700	DN 800	DN 900	DN 1000
All materials	100	15	1	2	3	4	5	6	7	8	9	10
Measuring-precision pressure-waste 10 percent (p)			Pacification-time DN / 100 in min				Pressure-waste is to be recorded!					

Hypotension-test

Material	Test pressure p0 (mbar)	(p (mbar))	Prüfzeit in min									
			DN 100	DN 200	DN 300	DN 400	DN 500	DN 600	DN 700	DN 800	DN 900	DN 1000
All materials	-100	12	1	2	3	4	5	6	7	8	9	10
Measuring-precision pressure-waste 10 percent (p)			Pacification-time DN / 100 in min				Pressure-course is to be recorded!					

Water pressure-test p0 = 50 mbar over tube-vertexes of the topmost-situated point,
at higher business-water-stand until Max. 500 mbar

Pre-filling-time :	1 Hour until 24 hours (concrete), if necessary	Pressure-course and water-addition are to be recorded!
Duration :	15 min	
Pressure-precision :	10 mbar	
Water-loss:	0,2 l/m2 in 15 min for tubes (inner surface)	

DIN 1999 - 100

Prüfung nach besonderen Bedingungen:
(nur mit behördlicher Genehmigung und nur für Altbestände)

Wie Regelfall, aber nur Auffüllung des Behälterbereiches

Regelfall: Neubau

Auffüllung bis 20mm
unter OK Schacht

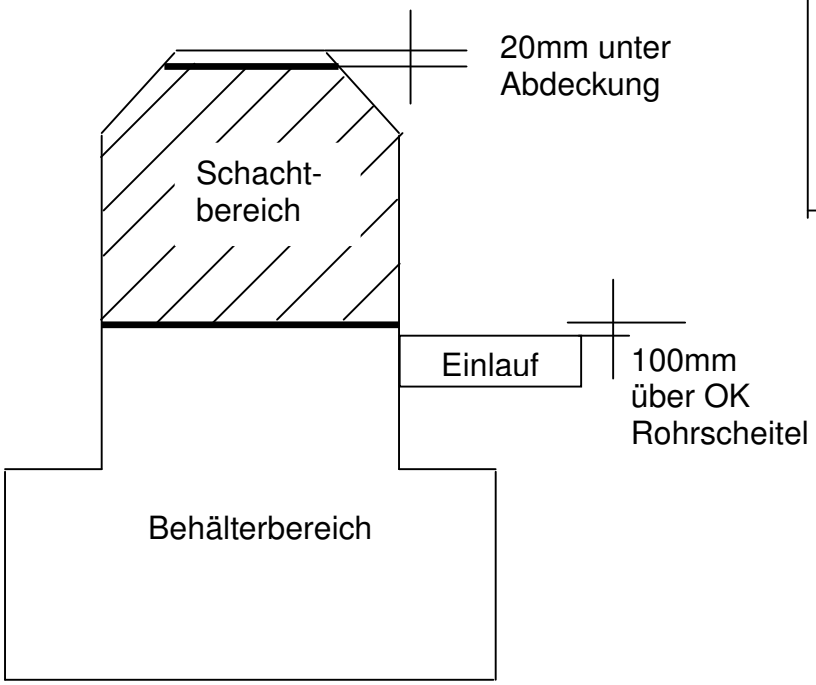
max. Verlust 500 ml/Stunde

Sonderfall: Altbestand

Behälterbereich

Auffüllung bis 100mm
über OK Rohrscheitel

max. Verlust 500 ml/Stunde

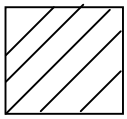


Schachtbereich

Auffüllung bis 20mm
unter OK Schacht

max. Verlust 400 ml
(je m² und Stunde
Prüfzeit)

benetzte innere
Oberfläche
des Schacht-
bereiches



Prüfdauer: $t = \frac{2h}{dm^3} \bullet$ Pegeloberfläche $[m^2] \bullet$ Messgenauigkeit [mm]
[h]

Mindestprüfdauer: 0,5h
bzw. 0,1h • Pegeloberfläche

DIN 4040 - 100

Prüfung nach besonderen Bedingungen:
(nur mit behördlicher Genehmigung und nur für Altbestände)

Ausführung wie Regelfall Behälterbereich

Regelfall: Behälterbereich

Auffüllung bis 100mm
über OK Rohrscheitel

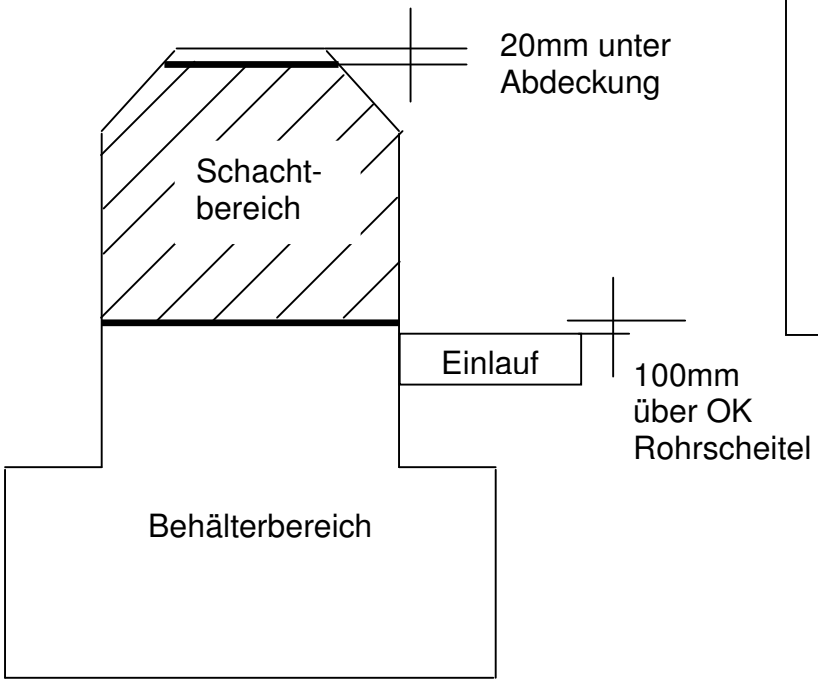
max. Verlust 500 ml/Stunde

Regelabfall: Schachtbereich

Auffüllung bis 20mm
unter OK Schacht

max. Verlust 400 ml
(je m² und Stunde
Prüfzeit)

benetzte innere
Oberfläche
des Schacht-
bereiches



Prüfdauer: $t = \frac{2h}{dm^3} \bullet$ Pegeloberfläche $[m^2] \bullet$ Messgenauigkeit [mm]
[h]

Mindestprüfdauer: 0,5h
bzw. 0,1h • Pegeloberfläche