

Operating Manual

Calorimeter Heat of hydration of cement



Do not try to operate the device before reading and learning this manual in all its parts.

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1 General information

1.1 General features

- This manual is addressed to the carrier, the installer, the user, the maintenance operator, the scrapping operator.
- Please read it carefully because it informs you about the operating of the device in safety conditions.
- This manual has to be considered apart of the product and concerns only the device it is delivered with.
- Keep the manual in order during the whole life of the appliance to consult it for any needs.
- In case of sale, the manual and its enclosures should be given together with the device.
- The manufacturer assumes no liability for any damages caused by a misuse of the device.
- The manufacturer has the right to modify this technical literature as well as the devices this refers to without any previous notice.

Messages meaning:

ATTENTION	It shows the procedures that can damage seriously the device if they are not followed carefully.
DANGER	It shows the procedures that can be dangerous to the operator if they are not followed carefully.

1.2 Identification

MANUFACTURER IDENTIFICATION:
DEVICE IDENTIFICATION:

See the cover page
See the plate on the device where the complete identification data and the electrical features are to be found.

1.3 Applications

The centrifuge extractor is used for the determination of the bitumen percentage contained in bituminous mixtures. It has been designed in two different models: the model is equipped with a container having 1500 g capacity.

The same centrifuge extractor can be equipped with both the container (1500g or 300g). This appliance is made for the aim, which it has been conceived for. Any other uses are not allowed.

ATTENTION	The appliance is made to work only with non-flammable and non-explosion solvents. The use of the appliance with materials and solvents that are flammable and/or explosion type is a source of danger and risk of fire or explosion. The device can be used only and exclusively with non-flammable and non-explosion solvents. The manufacturer assumes no liability for any damages to people and things due to a lack of observance of these instructions.
	The instructions given in this operating manual are only made for the right use of the appliance. To carry out the test in the right way, the user must refer to the specific standards in force for the test itself.

1.4 Structure and operating of the device

Two main parts compose the appliance:

- An aluminium turning and removable container complete with a cover compose the appliance. A paper filter ring is compressed between the container and the cover through a knurled screw nut.
- The switch board is composed by an electronic card that controls automatically the acceleration of the speed from 0 to 3000 revolutions per minute and the time of break that allows a rapid stop of the container at the end of the test.

If further information are required please get in touch with the distributor or the manufacturer.

2 Safety information

2.1 General safety standards

The use, lifting, installation, maintenance and scrapping of the device are allowed only to qualified staff. Qualified staffs are composed by people who are authorised by the safety responsible to do any activities due to their experience and acknowledgement of the operating of the device and of the standards, rules and actions.

The user must be carefully taught about the operating of the device to avoid any misuse of it and about the safety devices, which the device could be eventually equipped with. The safety devices will have to be kept always assembled and to be daily checked.

The manufacturers offer training and assume no liability for any damages due to a misuse of the device by an unskilled staff.

The manufacturer recommends following carefully the instructions and procedures of the operating manual and the safety standards concerning the safety devices and the general rules of the work environment.

Verify the accordance of the device to the standards in force in the State where the device has to be installed.

The operating manual must be carefully read by the safety responsible, by the operators and maintenance engineers. It must always be kept near the device in order to be able to read it any times it will be necessary.

Any tampering or modifications of the device (electric, mechanical etc.) that are not allowed by a written agreement of the manufacturer must be considered as not permitted and the manufacturer will not accept to be charged for any damages.

The removal or the tampering of the safety devices will be an infringement to the EEC Safety Standards. The manufacturer assumes no liability for any damages.

The device has to be installed in places safe from fire and explosions.

We do recommend using only original spare parts and accessories; on the contrary the manufacturer assumes no liability.

Be careful that any dangerous situations won't happen during the working; stop immediately the device in the event that it will not work properly and ask the manufacturer or the Authorised Service Staff of the dealer at once.

The manufacturer assumes no liability for any damages caused to people, things and animals in case the general safety standards or if the instructions of this manual are not followed.

2.2 Safety systems

MEANING: Safety devices are all the safety measures using specific technical equipment (guards, cages etc.) to protect the operator from any danger that couldn't be avoided when the appliance was planned.

DANGER	The removal of the safety devices or any tampering of the device could cause risks to the operator or to any other people. The manufacturer assumes no liability for any damages to people, things or animals due to the tampering of the safety devices.
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PASSIVE SAFETY DEVICES

All those devices avoiding or reducing the risks for the operators are passive safety devices. These devices don't require any active and aware intervention to be operated. The testing device is delivered in two different models:

- The STANDARD model has no safety device or protection.
- The EUROPEAN CE model has a safety micro switch that doesn't allow the working of the centrifuge extractor if the cover of the container has not been place and properly closet. In case the container is turning (even slowly) the cover cannot be taken away.

ACTIVE SAFETY DEVICE

All those devices avoiding or reducing the risks for the operators are active safety devices. These devices require an active and aware intervention to be operated.

The switchboard has a main switch that can also be used as an emergency switch.

2.3 Dangerous parts and residual risk

The dangerous place is the space inside and around the device where the operator could be wounded or damaged.

During same procedures the operator could face same risks of danger.

The risks can be eliminated following carefully the procedures written in this manual and using suitable safety devices.

ATTENTION	In case the Manufacturer does not do the device installation, employ only skilled operators particularly trained for the lifting of heavy device .
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GENERAL INFO

- Before starting the standard use of the equipment, ensure that all the components are in good working conditions check there are no defective or damaged parts. If necessary repair or replace any damaged part.
- Pay attention to the risk of electric shocks both for direct or indirect contact, due to unforeseen failure to the electric system.
- Do not subject the equipment to violent shocks.
- Do not expose the equipment to fire, extreme temperature or weld splatters.
- Avoid corrosive substances to Game in touch with the equipment.
- Never wash the appliance using water sprays.

DURING THE USE

- In order to grant the max. safety levels for the operator, it is recommended not to touch any moving components during the test execution and always use the proper safety means.
- During the test execution always pay attention to the possibility of hands, fingers or body squeezing, cutting or trapping caused by the moving parts of the container.
- The products tested could be a risk for the operator health. As a caution do not breath steams and do not let the products be in touch with the eyes and the skin.
- Do not wear large clothes, ties, watches, rings or others, which could entangle into the moving parts of the appliance.

LIFTING

- During the lifting take care that the device is conveniently held and secured and that it cannot slide.
- Do not stand in a direct line with the application of force. Do not allow people entrance under loads that are no conveniently supported by mechanical means.

RISK OR DANGER	FORESEEN SAFETY MEASURE
finger or hands squeeze	reinforced gloves
abrasions - cuttings	reinforced gloves
steam ejections	overalls and gloves

The manufacturer assumes no liability for any damages to people and things due to a lack of observance of the instructions and the use of the safety devices. (See laws against the accidents in force)

3 Installation

DANGER	Consult DANGEROUS PARTS AND RESIDUAL RISKS before proceeding
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3.1 Lifting

The operating instructions must be respected during the moving of the appliance and particularly in the following phases:

- The lifting and the storing
- The first installation
- The further installations

The device is usually packed in a wooden case or in a carton that allow the easy moving of the same.

The device must be moved by a forklift truck suitable for the weight indicated on the plate on the device.

The moving of cases with lifting devices must be made with all cautions required and following the indications given on the packing. Never use chains to lift the cases.

ATTENTION	Pay attention to avoid impacts and turnovers
	Protect the device from the atmospheric agents. Water and humidity could oxidise it, damaging it seriously.

3.2 Unpacking

After removing the package, check that any parts of the device are not damaged. In case of doubt, DO NOT USE THE DEVICE and ask the manufacturer.

DANGER	The materials used for the package (plastic, polystyrene, screws, nails, wood etc.) have to be kept far from children. They must be thrown away in a proper collection centre.
ATTENTION	Pay attention to avoid impacts and turnovers.
	Before throwing away the package, pay attention that any accessory, manuals, documents, s are arts are not inside.

3.3 Installation

The device has to be placed in an environment suitable for the aim it has been conceived for (laboratory protected by any atmospheric agents). Skilled operator must do the installation.

ALLOWED TEMPERATURE	from + 5°C to + 40°C
ALLOWED HUMIDITY	from 30% to 75%
O.S.L. MAXIMUM HEIGHT	1000 m

GENERAL RECOMMENDATIONS

- The device must be installed so that it is free from each side in order to be able to carry out easily the maintenance operations
- No authorised people and no dangerous objects must be near the device.
- The device must be placed on a desk in order to be able to work at a proper height for the user.
- The device must be placed in a place properly aired in order not to accumulate any noxious gas.

4 Device feature

4.1 Dimensions and mass of the appliance

LENGTH	250 mm
WIDTH	350 mm
HEIGHT	680 mm
WEIGHT	12 kg

5 Devices

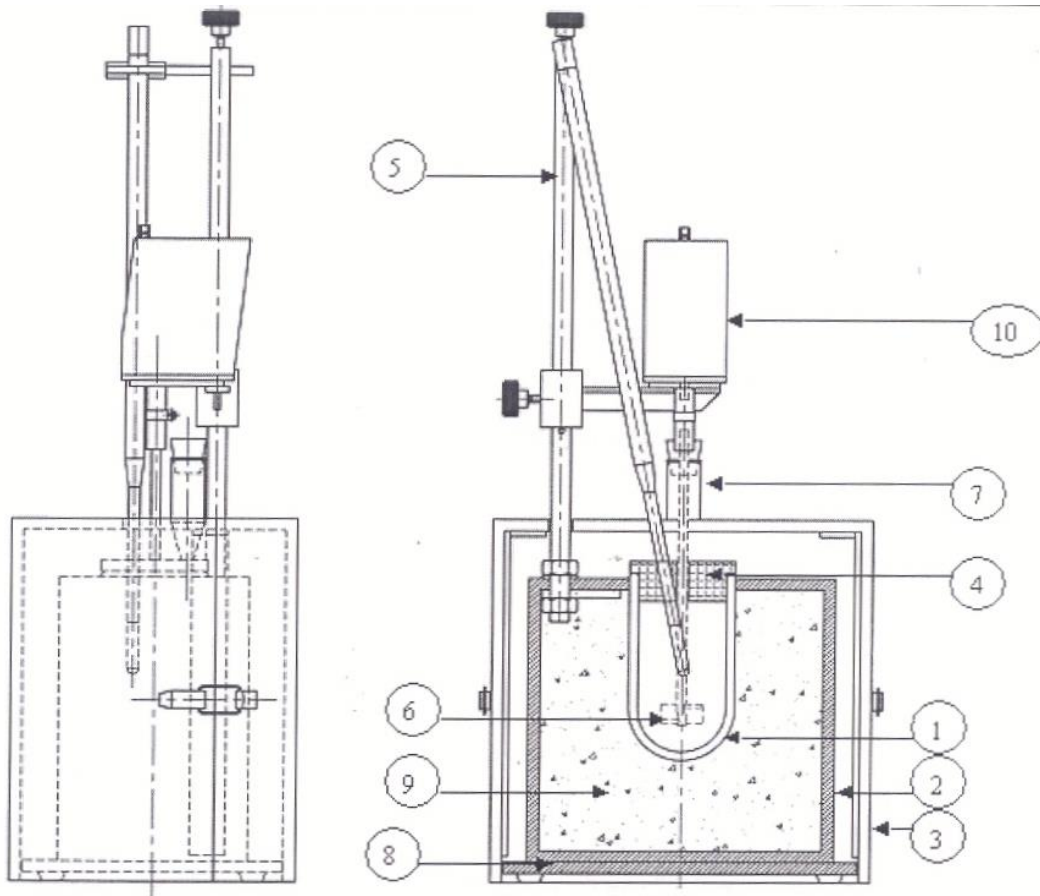
Calorimeter

The suitable calorimeter is composed as follows (see the enclosure hereto attached):

a) - Container of dissolution, composed of: an insulated flask (1) (i.e. Dewar flask) placed in a thermo - insulated case (2) inside a container (3) of isolated material (i.e. wood, plastic) or submerged in a thermostatic bath regulated at: $\pm 0.2^{\circ}\text{C}$;
- an insulating cap (4) (i.e. cork or plastic) with holes suitable for the location of the thermometer (5), the stirrer and the funnel (7) used to put the specimen into the case (2).
The calorimeter's insulation (9) must ensure that the coefficient of thermal loses k (determined in accordance with the instructions at point 6.3) is smaller of 0,06 Kelvin for 15 minutes for each Kelvin degree above the environment temperature.

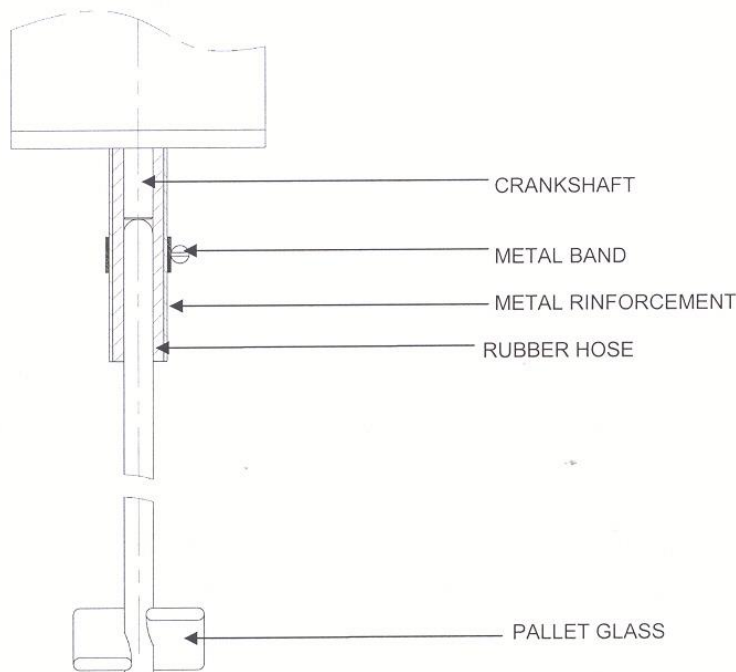
Accessories not supplied with the equipment but necessary for the performance of the test.

- Glass stirrer (6)
- Thermometer (5): it could be a Beckman thermometer or a digital model.



LEGEND:

- | | |
|---|--|
| 1- Dewar flask | 6- Stirrer, an accessory not supplied with the equipment |
| 2- Case | 7- Funnel |
| 3- Container | 8- Support |
| 4- Cap | 9- Insulating material |
| 5- Beckman thermometer or digital thermometer, an accessory not supplied with the equipment | |
| 10- Stirrer engine | |



- We recommend to check the complete centering of the stirrer (6) with the hole of the cap (4) in order to avoid any forces on the sides of the Dewar flask (1) that may cause its breaking.
- Insert the thermometer (5) and check that it doesn't get in contact with the stirrer (6) into the flask (1).
- Put the tunnel (7) with its relevant rubber Gap into the third hole placed on the cork cap (4), then check that the tunnel doesn't get in contact with the stirrer (6) into the flask (1).
- Now it is possible to start the test by acting on the on-off switch.
- At the end of the test disassemble the equipment by following the same operations in reverse order.

5.1 Test start up

ATTENTION	We recommend , protecting the glass parts placed inside the dewar vessel (stirrere and funnel), from possible corrosion caused by the acidic solution , covering those parts with a protective film of grease or Vaseline oil
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- Extract the Dewar flask (1) and fill it with the prescribed quantity of acid mixture. Put the flask into the case (2)
- Close the flask (1) with the insulating cap (4) including the stirrer (6).
- Fix the stirrer on the engine
 1. Fix the suitable rubber tube on the drive shaft
 2. Insert the stirrer (6) into the other edge of the rubber tube until it gets in contact with the drive shaft.
 3. Put the appropriated metallic additional support on the rubber tube, then fix a metallic clamp on the additional support in order to block off all parts.

6 Calorimeter calibration

General features

The calorimeter's calibration is done in order to determine the termic capacity and the coefficient of thermal loses. These characteristics are determined through zinc oxid cal-cined dissolution in the acid mixture and by measuring calorimeter's temperatures with prefixed range.

The acid mixture temperature must be planed so that after the dissolution reaction, the calorimeter's temperature is at least 0,5°C below the ambient's temperature. When it's used a bath of water, the bath's temperature is considered like the calorimeter's ambient temperature.

Procedure

Measure a quantity of acid mixture in mass or volume, at $\pm 0.2\%$ so that the liquid's level is about 2 cm below the calorimeter's cover. Introduce the acid mixture in the flask. Just before the determination of thermic capacity, to lime zinc oxide at $(950 \pm 25) ^\circ\text{C}$ for 5 min maximum, then let it chill in a desiccator until the ambient temperature is reached.

The zinc oxide quantity to use, weighed at $\pm 0,0001\text{g}$ is requested in order to satisfy the following equation:

$$\text{Acid mixture mass/zinc oxide 's mass} = 60 \pm 1$$

Perform the following procedure:

1- preliminary period

Mix the acid mixture for a period between 40 and 50 min.

2- pre period

When the speed's increase is constant, start to count times using a chronometer and register the starting temperature T_{-15} .

3- Specimen's introduction

Register the temperature after 15 min, T_0 , and immediately add the zinc oxid specimens to the acid mixture, not using more than one min time.

4- dissolution period

Mix the mixture for 30 min, afterward the dissolution is considered complete, then register the temperature T_{30} .

Register the ambient temperature, T_a . If the difference between T_a and T_{30} is lower than $0,5\text{ }^\circ\text{C}$, repeat the test.

5- Following post period

Register the final temperature T_{45} after other 15 min

In order to reduce reading mistakes, determine the temperatures T_{-15} , T_{30} and T_{45} as a result of five different readings registered with one minute break in the period of time of two min before and two min after the established time, T_i (i.e. T_{1-2} , T_{i-1} , T_1 , T_{i+2}). Determine the value of T_0 extrapolating the temperature's function respect at the break time between T_{-4} and T_{-15} . If the value extrapolated is different from the reading T_0 with the value extrapolated.

If more than one zinc oxide trace is found on the funnel's point and on the cover when the calorimeter is opened, repeat the calibration.

Note: The temperature's lectures begin 17 min before introducing specimens of zinc oxide and the last reading will be 47 min after its introduction. The total calibration duration is 64 min.

7 BECKMAN thermometer operation

A Beckman thermometer is a differential thermometer displaying a temperature change in a range comprised in the absolute range of the thermometer itself.

It is important to point out that the Beckman thermometer does not display an absolute temperature but only a variation in comparison to a reference value. This value must be defined by using a reference thermometer that will also be used to calibrate the Beckman thermometer.

The Beckman thermometer must be set-up and calibrated each time we change the reference temperature tram which a variation must be measured.

The thermometer is composed of the following main parts:

Bulb

Differential range

Absolute range

Reservoir-coil

Bulb (A) allows to detect a temperature .

Differential range (B) allows to read the temperature change detected by the bulb

Absolute range (C) allows to read the reference temperature at which the thermometer has been calibrated

Reservoir-coil (D) contains, after the calibration, the mercury exceeding the reference point

Before using the Beckman thermometer, the mercury must be correctly compacted and the thermometer calibrated.

7.1 Compaction of Mercury

The thermometer must be set-up so that the mercury is positioned as per Pic. 1

The mercury must be as shown (in the capillary), must be continuous from the bulb to the reservoir-coil and must not present interruptions

Very likely a brand new thermometer will be received with a different mercury position, therefore the first operation to carry out is to compact mercury and restore its cohesion.

A right position-cohesion can be found only through a correct and careful manipulation of the thermometer, this operation requires patience and some experience and familiarity with this product typology.

We must tilt the thermometer to let the mercury reach the above mentioned correct position by gravity. This operation may require more than one trial, considering that the gravity may also cause interruptions of the mercury's cohesion in the capillary.

Interruptions in the mercury cohesion do not mean that the thermometer is damaged, since mercury is contained in a vacuum capillary; a correct cohesion will be obtained through a patient a accurate manipulation.

We recommend the following procedure:

1) Position the thermometer vertically with the bulb on top (Pic. A), so that the mercury leaves the bulb, goes through the capillary and reaches the rest of the mercury contained in the reservoir-coil

2) Leave the thermometer in this position until the mercury has achieved a complete cohesion through the capillary and up to the reservoir-coil

3) Slowly rotate thermometer to a tilted position with the bulb downwards (Pic. B) and place it in a firm position on a support. In such a position the mercury will flow down by gravity from the reservoir-coil to achieve a correct positioning as per Pic. 1

In such a position the mercury in the reservoir-coil will display the current temperature detected by the bulb, in comparison with the absolute range.

Remark	If, during the above described sequence, the mercury loses cohesion in the capillary, you will need to repeat the operation until the expected cohesion result is achieved.
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7.2 Thermometer calibration

To set the mercury in the right way and allow the thermometer to measure and display the temperature change, in comparison with the reference temperature, we recommend proceeding this way:

1) Supply to the bulb with a temperature of 2 - 3°C higher than the reference temperature from which the variation must be measured

To do this and to measure temperature you need a good precision reference thermometer

2) Let temperature settle so that the exceeding mercury flows up to the reservoir-coil

3) Supply the bulb with the reference temperature (still measured using the precision thermometer) from which the variation will then be measured. In this way the mercury in the capillary will abandon the reservoir-coil, flowing down to the differential range

4) Mark the correct position of the mercury in the capillary in comparison with the differential range. This position corresponds to the temperature measured by the reference thermometer. All variations read on the differential range correspond to a temperature change of the bulb

7.3 Decommissioning

Should it be decided that the machine is to be no longer used so dispose of according to the standards in force.

8 Maintenance

DANGER	Consult "DANGEROUS PARTS AND RESIDUAL RISKS" before proceeding
	All the maintenance operations must be carried out with the device turned off and unplugged from the knife switch.
	Skilled operators instructed about the purposes the device is made for must carry any kind of maintenance operations concerning the components of the device and of the electric components, even those that may seem very simple.
	Only original spare parts are allowed. The Manufacturer assumes no liability in the event that non - original parts are used.

8.1 Routine maintenance

In order to maintain good working of the device for a long time, clean periodically all the parts and oil the parts that are not painted.

Do not use solvents, which may damage the painting and the parts made of synthetic materials.

After each test check that all the parts of the appliance are not damaged. In case something is damaged get in touch with the After Sales Service.

Ensure that all procedures described in the Chapter "PERIODICAL INSPECTIONS" and "PERIODICAL OPERATIONS" are correctly and punctually executed. This care will help preventing failures and dysfunctions.

8.2 Special maintenance

In case of special maintenance operations (repairs, replacement of parts and any other operation not described in this manual) ask directly to the manufacturer.

Recycling notice for the disposal of electrical and electronical devices.

A symbol, placed on the device or on the package and/or on the documentation, suggest that the device shouldn't be dispose together with other home garbage at the end of its life cycle.

To avoid further environment, or health-care damages, caused by the unsuitable disposal of garbage, we kindly recommend the user to separate this device from other different types of garbages and to recycle it in a responsible way to avoid the arguable reuse of material resources. Indeed users must take care at the disposal of the equipment that have to be discarded, taking them away to the next recycling site for the appropriate recycling treatment for electrical and electronical devices. Gathering and Recycling deplete devices allow the preservation of natural resources and grant for them the adequate treatment respecting health and environment.

For further information about your local recycling site please contact your local city hall or city waste treatment department. The developer, as producer of electrical and electronical devices, will provide to finance the recycling and treatment services for deplete devices that will come back through these recycling site, accordingly the local statement.

9 After-sales service and spare parts

A great deal of care has been taken to ensure that this Operating Manual is correct. We cannot, however, guarantee that it is without mistakes or errors, or that all information contained herein will continue to remain valid in the event of technical changes.

9.1 Date of issue of this Operating Manual

Edition no. 4
Date of issue: September of 2018

9.2 Copyright

The copyright to this Operating Manual remains with the company

TESTING Bluhm & Feuerherdt GmbH.

This Operating Manual is intended only for the Operator, the User, and his staff. The information in this Operating Manual may not be:

- Reproduced, or
- Distributed, or
- Provided to any other persons.

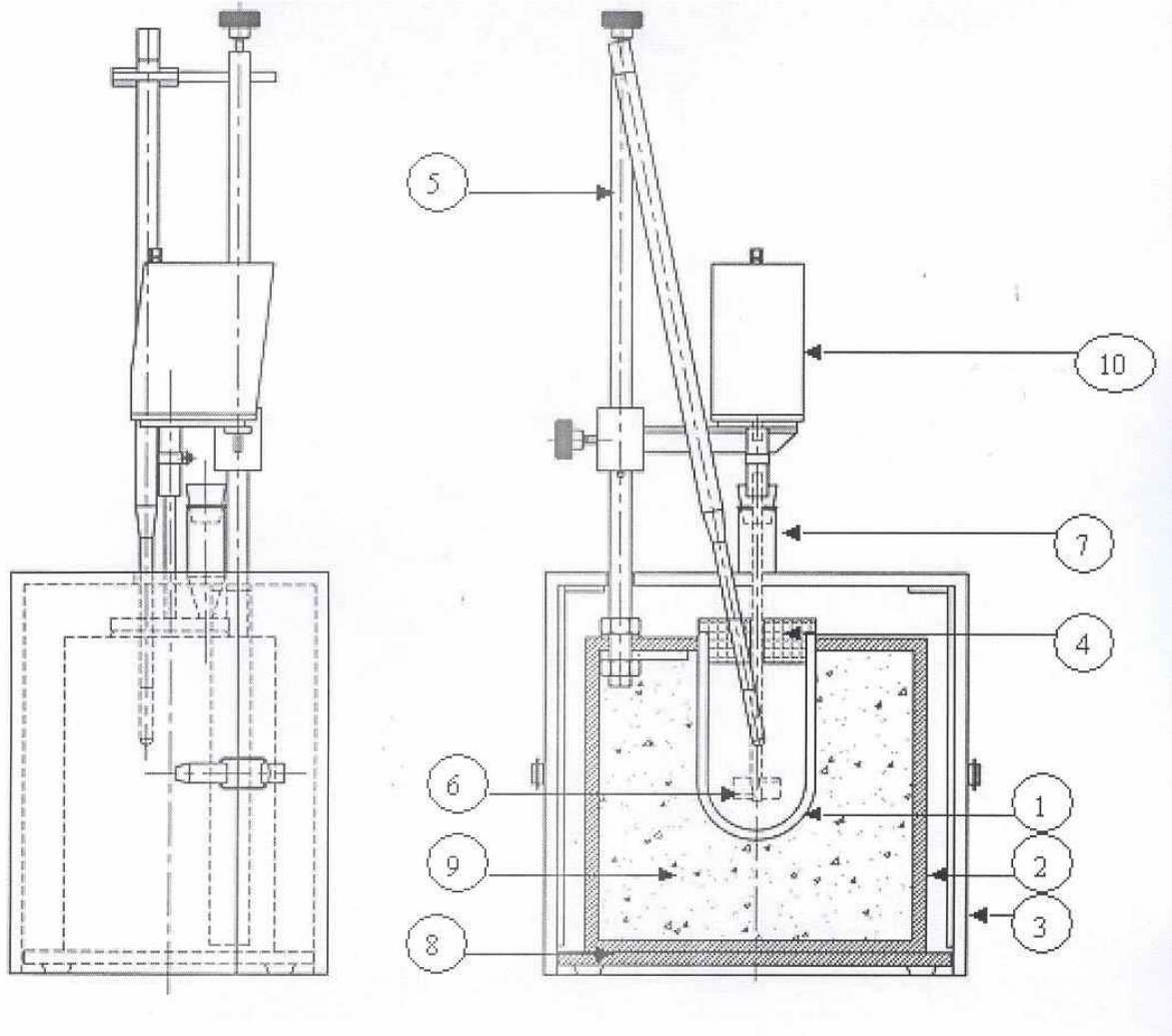
Any person acting in violation of the above stipulations may be prosecuted before a court of law.

9.3 Contact for help and spare parts

If you have any technical questions, or if you require spare parts, please get directly in touch with the following address:

TESTING Bluhm & Feuerherdt GmbH
Motzener Str. 26b
DE – 12277 Berlin
Germany

Tel. +49 30 (0) 710 96 45-0
Fax: +49 30 (0) 710 96 45-98
E-mail: info@testing.de
www.testing.de



Legend:

- 1 Flask
- 2 Container
- 3 Container
- 4 Cork
- 5 Thermometer
- 6 Stirrer
- 7 Funnel
- 8 Support
- 9 Insolating material
- 10 Stirer's motor

In copy
**EC Declaration of Conformity in accordance with the Machinery Directive
2006/42/EC Appendix II 1.A**

The authorised representative established in the community,

Mr. Feuerherdt

hereby declares that the following product

Manufacturer: TESTING Bluhm & Feuerherdt GmbH
Motzener Str. 26b
12277 Berlin

Product designation: 1.0235

Serial number: continuous

Serial/Type designation: Calorimeter

complies with all of the relevant provisions of the above named guidelines as well as the additional applied guidelines (following) - including any of the amendments thereto which are in force at the time of the declaration.

The following additional EU Directives have been applied:

Low Voltage Directive 2014/35/EC
electromagnetic compatibility – 2014/30/EE

The following harmonised standards have been applied:

DIN EN 60204-1 The Safety of Machines - Electrical Equipment of Machines - Part
1: General Requirements (corrigendum 2010)

The name and address of the person who has been authorised to compile the technical documentation:

Mr. Metge

Location: Berlin

Date: 28/02/2014



(Signature)
Managing Director



(Signature)
Technician