DIBt

**Deutsches Institut für Bautechnik**
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# General Technical Approval

**Registration centre for building projects and design**
**Technical examination authority**
Member of the European Organization for
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Phone: +49 30 78730-0
Fax: +49 30 78730-320
E-Mail: dibt@dibt.de

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Approval no.
**Z-84.2-4**

Validity period:
**11 May 2010**

Applicant:

**3P Technik Filtersysteme GmbH**
Oeschstrasse 14, 73072 Donzdorf

Approval subject:
**Plant for treatment of mineral oil containing rainwater runoff for infiltration**
**3P Hydrosystem heavy traffic**

The above mentioned approval subject is herewith generally technical approved. This technical approval includes eleven pages and ten appendices.

Translation of the German original issue, not verified by the Deutsches Institut für Bautechnik (DIBt).

## I. GENERAL PROVISIONS

1 With the general technical approval the usability or applicability, respectively, is proven according to the federal states building regulations.

2 Insofar as special requirements for expert knowledge and experience are needed in the general technical approval, from people involved in performing building construction and designs according to § 17, section 5 of the prototype building regulations, it has to be observed, that this expert knowledge and experience can also be proven by equivalent certificates from other member states of the European Economic Area (EWR) or other bilateral certificates.

3 The general technical approval does not replace the approvals, agreements and certifications required for building projects.

4 The general technical approval will be awarded regardless of any rights of third parties, especially of private protective rights.

5 Manufacturers and distributors of the approval subject must, regardless of more far-reaching regulations in the "Special Regulations", provide copies of the general technical approval to the owner or user, respectively, and must point at the fact, that the general technical approval must be available at site of usage. Copies of the general technical approval must be made available for the responsible authorities on request.

6 The general technical approval may only be duplicated completely. An extracted publication needs the approval of the Deutsches Institut für Bautechnik. Texts and drawings of advertisement material may not be in contradiction to the general technical approval. Translations of the general technical approval must contain the note "Translation of the German original issue, not verified by the Deutsches Institut für Bautechnik ".

7 The awarded general technical approval is revocable. The provisions of the general technical approval can be supplemented and changed later, especially in case this is required because of new technical findings.

## II. SPECIAL PROVISIONS

### 1 Approval subject and scope of application

**1.1** Approval subject are plants for treatment of mineral oil containing rainwater runoff from vehicle traffic areas type 3P Hydrosystem heavy traffic, according to information in Appendix 1, further referred to as waste water treatment plants. The waste water treatment plants can permanently treat rainwater runoff under specified conditions, supplied from vehicle traffic areas of up to 500 $m^2$, in a way that the water can be infiltrated into the ground and groundwater.

**1.2** The waste water treatment plants are provided with an additional outer shaft for installation in accessible and not accessible areas.

**1.3** Usage of the waste water treatment plants in different applications and/or under different conditions than it is specified in the approval, is individually possible after clarification of their admissibility of such an input or as the case may be, after clarification of additional requirements with the responsible water authorities.

**1.4** The waste water treatment plants may not be used for treatment of rainwater runoff

- from residual pollutions and suspected residual pollution areas and
- from areas on which water hazardous substances are being handled.

**1.5** With this general technical approval both requirements will be fulfilled, the building supervisory requirements and also the permissions according to the law on water according to the "Regulations of the federal states for determination of suitability according to the law on water of building projects and designs by proof according to the federal state building regulations" (WasBauPVO) .

### 2 Provisions for building projects and design

**2.1 General**

The waste water treatment plant consists of a shaft insert made of plastic with inlet and outlet, 4 filter inserts type ht and further components according to the information given in appendices 1 and 2. The filter inserts consist of filter housings filled with substrate according to the specifications in appendix 3.The substrate causes retarding of hydrocarbon and heavy metals,

**2.2 Design and characteristics**

**2.2.1 Design and characteristics of the waste water treatment plant**

The layout of the waste water treatment plant corresponds with the information given the appendices 1 and 2.

The waste water treatment plant has been tested and evaluated according to the "Approval basics for rainwater runoff treatment plants" - draft February 2010 - of the DIBt.

During the tests the waste water treatment plant has reached the required flows. Hydrocarbonate and heavy metals (conductive parameters of copper and zinc) were retained according to specifications of the approval basics. Thus the legal requirements of soil and water protection have been fulfilled.

**2.2.2 Characteristics of the shaft elements**

The shaft inserts consist of polyethylene with manufacturer declaration and characteristics provided to DIBt. They meet the information given in appendices 1 and 2 in regards to shape and dimensions.

**2.2.3 Characteristics of the filter inserts**

The filter inserts type ht correspond with the information given in appendix 3. They consist essentially of layers in the filter housing consisting of the components zeolite and activated carbon (substrate). Information about design and composition of the substrate filling has been provided to DIBt.

The substrate meets the requirements of the "Basics for evaluating the effects of building projects on soil and ground water" in the applying version each[1] under application of insignificance threshold values of the federal state cooperative water board (see appendix I-D.1).

**2.3 Manufacturing and identification of the products**

**2.3.1 Manufacturing of the shaft elements**

The shaft elements shall be made according to the information given in appendices 1 and 2 in the factory, based on rotation sinter processes. For manufacturing only the moulding compounds may be used provided to DIBt, with detailed identification of trade name, manufacturer and specification parameters.

**2.3.2 Manufacturing and identification of the filter inserts**

The filter inserts have to be produced in the factory.

The substrate must correspond with the recipe provided to DIBt in regards to design and composition. The filter inserts may only be produced in companies denominated by the applicant.

The filter inserts must be identified by the manufacturer based on these general technical approval with the certificate of conformity mark (C-mark) according to certificate of conformity regulations of the federal states and be marked with the type identification ht. Identification with the C-mark may only be made if the provisions of section 2.4 are met.

**2.3.3 Manufactering and identification of the waste water treatment plant**

The waste water treatment plant has to be manufactered by installing the filter inserts and the other components in the shaft insert according to the information given in appendices 1 and 2.

The waste water treatment plant must be identified by the manufacturer based on these general technical approval with the certificate of conformity mark (C-mark) according to certificate of conformity regulations of the federal states and be marked with the type identification 3P Hydrosystem heavy traffic. Identification with the C-mark may only be made if the provisions of section 2.4 are met.

**2.4 Certificate of conformity**

**2.4.1 Certificate of conformity for the filter inserts**

2.4.1.1 General

Confirmation about complying of the filter inserts with the provisions of this general technical approval must be given for any production plant by a certificate of conformity based on a factory production inspection and a regular external monitoring including initial tests according to the following provisions.

For awarding the certificate of conformity and external monitoring including product tests to be conducted, the manufacturer has to involve an appropriately authorized certification agency and an appropriately authorized monitoring agency.

1 last: "Basics for evaluating the effects of building projects on soil and ground water, part 1, version May 2008 -" in "Basics and analysis procedures for evaluating the effects of building projects on soil and ground water ", leaflets of the Deutsches Institut für Bautechnik

The declaration, that a certificate of conformity has been awarded must be indicated by the manufacturer on the building projects with the conformity mark (C-mark) and provided with information about the intended use.
The Deutsches Institut für Bautechnik has to be provided with a copy of the certificate of conformity awarded by certification agency for information.
The Deutsches Institut für Bautechnik has to be provided with a copy of the initial test report for information.

2.4.1.2 Factory production inspection

An in-house production inspection has to be initiated in each factory and to be conducted. The in-house production inspection is to be understood as continuously monitoring the production, to be performed by the manufacturer, which ensures, that manufactured products by him will correspond with the provisions of this general technical approval.
The in-house production inspection shall include following measures as a minimum.

- description and inspection of the filter housings and the components of the substrate: compliance of the filter housings and the components of the substrate with the composition provided to DIBt, have to be demonstrated by works certificate from the supplier of the filter housing and the components of the substrate. Delivery documents must be checked on compliance with the order at each delivery item.
- Inspections and tests to be conducted during manufacturing:

  Mixing of the components corresponding to the design of the substrate provided to DIBt, must be recorded.
  Samples of the components must be taken from running production once per batch and be mixed according to the mixing ratio in the filter insert and to be checked regarding following specifications:

  - bulk density
  - particle-size distribution
  - pH value
  - annealing loss

  Once per quarter samples of the components must be taken from the running production and be mixed according to the mixing ratio in the filter insert and the sorption capacity has to be determined.
  The tests must be conducted according to the test method specified in the inspection plan. Test values must comply with the requirements specified in the inspection plan. The inspection plan is filed at DIBt.
- Inspections and tests to be conducted on the finish filter insert:

  At each 25th filter insert weight, filling grade and layer composition of the substrate have to be checked. For this test a filter insert must be taken from the running production. The weight must be determined by weighing the filter insert. The filling grade and the layer composition must be checked by removing the individual layers of the substrate from a filter element. Layer thicknesses must be determined.

Results of the in-house production inspections must be recorded and be evaluated. Records must include following information as a minimum:

- name of filter insert or the components, respectively:
- type of inspection or test
- date of fabrication and test of substrate or components, respectively

- result of the inspections and tests and, if applying, comparison with the requirements
- signature of the responsible person for the factory production inspection

Recordings must be filed for at least five years. They must be presented to the Deutsches Institut für Bautechnik, the responsible supreme Building Supervisory Board or the responsible water authority on request.

At insufficient test results the manufacturer has to take immediate actions. After correcting the defects the corresponding test has to be repeated immediately - as far as technically possible and necessary for demonstrating correction of the defect. Substrate or components not complying with the requirements must be handled in a way that they cannot be confused with complying components.

2.4.1.3 External monitoring of production of the filter inserts

In any factory the production inspection by external monitoring has to be checked twice a year. If there are no complaints about two consecutive external monitoring the external monitoring can be reduced to once a year. If defects will be detected during the annual external monitoring, the monitoring twice a year has to be resumed. In the scope of external monitoring an initial inspection of the substrate has to be conducted.

- Initial inspection

For the factory designated for being awarding this approval, the initial inspection of the substrate can be dropped, since tests on samples from the running production have been conducted as basis for the general technical approval.

At designation of other factories or at changes of the production conditions the initial inspection of the filter inserts has to be conducted.

In the scope of the initial inspection of the components of the substrate and a finish filter insert sample from the running production have to be taken.

The components of the substrate must be mixed according to the mixing ratio in the filter insert and to be inspected with regards to following characteristics:

- particle-size distribution
- bulk density
- pH value
- annealing loss
- sorption capacity

On the filter insert weight, filling grade and layer design of the substrate must be checked. The weight must be determined by weighing the filter insert. The filling grade and the layer composition must be checked by removing the individual layers of the substrate from a filter element. The layer thicknesses must be determined.

Test methods and the requirements corresponding to the inspection plan for in-house production inspections provided to DIBt will apply.

- External monitoring

In the scope of the external monitoring the results of the in-house production inspections must be checked and samples of the components of the substrate and a finish filter insert must be taken from the running production.

The components of the substrate must be mixed according to the mixing ratio in the filter insert and to be inspected with regards to following characteristics:

- particle-size distribution
- bulk density
- pH value

- annealing loss
- sorption capacity

On the filter insert weight, filling grade and layer design of the substrate must be checked. The weight must be determined by weighing the filter insert. The filling grade and the layer composition must be checked by removing the individual layers of the substrate from a filter element. Layer thicknesses must be determined.

The test methods and the requirements corresponding to the inspection plan for in-house production inspections provided to DIBt, will apply.

Sample taking is performed by the respective authorized test agency.

Results of certification and external monitoring must be filed for at least five years. They must be presented to the Deutsches Institut für Bautechnik, the responsible supreme Building Supervisory Board or the responsible water authority, on request.

**2.4.2 Certification of conformity for the waste water treatment plant**

2.4.2.1 General

Certification of conformity of the waste water treatment plant with the provisions of this general technical approval must be made for each factory by a declaration of conformity of the manufacturer, based on an in-house production inspection. The declaration of conformity must be provided by identification of the building projects with the conformity mark (C-mark) with indication of the intended use.

In each factory an in-house production inspection has to be installed and conducted. The in-house production inspection is to be understood as continuously monitoring the production, to be performed by the manufacturer, which ensures, that erected building projects by him will correspond with the provisions of this general technical approval.

2.4.2.2 Factory production inspection

The factory production inspection shall include following listed measures as a minimum:

- Description and checking of the original materials
  Manufacturer of the shaft inserts has to demonstrate, according to certification 3.1 B based on DIN EN 10204[2] manufacturing of the original materials, that the moulding compound for manufacturing the shaft inserts meets the specified requirements. As far as this moulding compound has a General technical approval the building supervisory approval mark replaces the certification 3.1 B according to DIN EN 10204. Delivery documents of the manufacturer of the waste water treatment plant must be checked on conformity with the order at each delivery.
- Inspections to be conducted on the shaft element:
  The given dimensions in appendices 2 to 4 must be checked on one element per delivery as a minimum.

  As far as the relevant DIN standards do not specify any tolerances the accuracy degree B according to DIN EN ISO 13920[3] applies. For the outer wall thickness elements a tolerance of ± 1.0 mm has to be kept.

  Any shaft element has to be checked on tightness by filling it with water up to the upper edge over a period of minimum 20 minutes. No leakages are permissible.
- Inspections to be conducted on the filter insert:

DIN EN 10204:2005-01 "Metallic products -Types of test certificates"
DIN EB ISO 13920:1996-11 "General tolerances for welding engineering: length and angle dimensions and position"

The filter inserts must be inspected on proper identification with the C-mark according to section 2.3.2 and the type-code.

- Inspections to be conducted on the finish waste water treatment plant:
  Each plant has to be checked on proper installation of filter inserts.

The results of the in-house production inspection must be recorded and evaluated. Records must contain following information as a minimum:

- Name of the product
- Inspection method
- Date of installation and inspection
- Result of inspections and as far as applying comparison with requirements
- Signature of the responsible person for the in-house production inspection

At insufficient test result the manufacturer has to take immediate actions. After correcting the defects the concerned test has to be repeated immediately - as far as technically possible and necessary for demonstrating correction of the defect. Substrate or components not complying with the requirements must be handled in a way that they cannot be confused with complying components.

Recordings must be filed for at least five years. They must be presented to the Deutsches Institut für Bautechnik, the responsible supreme Building Supervisory Board or the responsible water authority on request.

## 3 Provisions for planning and design

### 3.1 General

For planning and design the provisions specified in the technical regulations according to appendix 4 for planning and waste water technically design of plants for rainwater infiltration apply, unless nothing different is provided following.

### 3.2 Planning

The waste water treatment plants may be used under following preconditions:

- The waste water treatment plants may only be installed in/on vehicle traffic areas (roads, parking lots etc.). Drainage water is intended for infiltration.
- Drainage water is considered to be harmless according to DWA-A-138. For planning the following plant for infiltration, DWA-A 138 applies.
- Thickness of the seepage space must be minimum 1 m according to DWA-A 138. If below the drainage there is a blind drain the necessary distance between drainage of the plant and the relevant ground water level increases by the height of the blind drain.
- Installation in areas of protection of water may only be performed according to relevant regulations in individual cases, in agreement with the responsible water authority.
- Usage of the waste water treatment plant for treatment of rainwater runoff from areas, roads, places and yards with heavy pollution (e.g. by agriculture, hauling companies, weekly markets and horse stables) is only possible with permission/approval of the responsible water authority under complying with additional provisions about installation, operation and maintenance provisions, as the case may be.

### 3.3 Waste water technical design *

To a waste water treatment plant up to 500 $m^2$ vehicle traffic area space may be connected.

Otherwise the worksheet DWA-A 138 applies for the technical design of the waste water treatment plant, in connection with the enclosed appendix for rainwater infiltration and the existing ground.

In the scope of flooding proof for the area the maximum flow of the waste water treatment plant has to be considered. This has to be stated by the applicant.

**3.4 Technical dimensioning**

The waste water treatment plants can be installed in passable and not passable areas.

They must be installed in a way, that loads (traffic, soil pressure etc.) cannot affect the shaft inserts of the waste water treatment plant. For this purpose shafts must be installed made of concrete, type 2 according to DIN EN 1917[4] in connection with DIN V 4034-1[5] (example see appendix 5) or generally building supervisory approved plastic shafts (example see appendix 6).

External shafts must be selected according to traffic loads to be expected. They must meet the relevant technical regulations.

Structural evidence for external shafts made of plastic has to be provided according to the provisions of the applying general technical approvals for shaft systems made of plastic.

## 4 Provisions for installation

**4.1 General**

For installation of the plant the technical regulations according to appendix 4 must be observed, unless nothing different is provided following.

**4.2 Installation instructions**

Manufacturer of the plant must provide installation instructions together with the plant (see appendices 7 and 8). Installation must be performed according to installation instructions and following provisions.

**4.3 Requirements for installer of the plant**

Installation of the plant has to be made by persons having the necessary professional skills.

**4.4 Installation**

Installation has to be performed based on the planning according to section 3.2. The plant must be installed in external shafts according to section 3.4, based on the information given in appendices 5 and 6. Flow-in to the waste water treatment plant must have a plunge of 250 mm to 500 mm.

The installer has to confirm the correct installation.

## 5 Provisions for maintenance

**5.1 General**

The throughput and treatment efficiency can only be ensured permanently if maintenance works are conducted according to following provisions.

4 DIN EN 1917:2003-04 "Manhole and inspection shafts made of concrete, steel fibre concrete reinforced concrete "

5 DIN V 4034-1:2004-08 " Shafts made of concrete, steel fibre concrete, reinforced concrete for sewages and ducts, type 1 and type 2 - part 1: Requirements, tests and evaluation of conformity.

Maintenance instructions must be provided by any contractor to the customer to be handed over to the operator. Maintenance instructions must comply at least with the provisions according to section 5.2, and the appendices 9 and 10.

Maintenance has to be performed by professionally skilled persons [6]. The operator of the plant has to sign an appropriate maintenance contract with the responsible person.

Federal state regulations for inspections, maintenance and checking of the plants (method and scope of activities, required qualification for performing the works) remain unchanged.

The responsible person has to record the respective times and results of conducted inspections and maintenance works, as well as removing possibly detected defects. The maintenance contract and documentation about performed inspections and maintenance works must be filed by the operator and be presented to the responsible local authorities on request.

**5.2 Maintenance**

In minimum time intervals of 12 months or in case the plant is flooded more frequently than provided in the dimensioning, the plant has to be inspected on proper condition. For doing this following activities must be performed:

- check on permeability of the filter inserts, cleaning and replacing if required
- measurement of position of solids level, emptying if required
- re-filling of the plant with water

Filter inserts must be replaced every 3 years as a minimum. As spare filter inserts only items with conformity mark according to section 2.3.2 are permissible.

Prior to first operation and thereafter in regular intervals of no more than 5 years the waste water treatment plant has to be inspected on proper condition and appropriate operation, after prior complete drainage and cleaning by a specialist.

Following points must be checked or tested, respectively, at that time:

- information about the test location, the owner of the plant under mentioning the inventory data, the customer, the tester and the responsible authority.
- state of repair of the waste water treatment plant,
- proof of proper replacement of the filter inserts and disposal of the solids collection chamber contents,
- presence and completeness of the required approvals and documentation (approvals, drainage plans, operating and maintenance instructions etc.),
- dimensioning, suitability and performance capability of the waste water treatment plant in regards to actual waste water supply.

For conducting the inspection a test report has to be made with stating the inventory data and possible defects. Defects must be removed in agreement with the responsible authority, as the case may be.

6 Competent persons are employees of independent agencies, experts or other institutions having the required specialist knowledge for operation, maintenance and checking waste water treatment plants and can prove such expertise in the here stated scope of technical equipment. In individual cases these inspections can also be conducted in larger plants by internally independent specialists in regards to their own area of responsibility, and are not subject to directives of the owner, with same qualification and having equal technical equipment available.

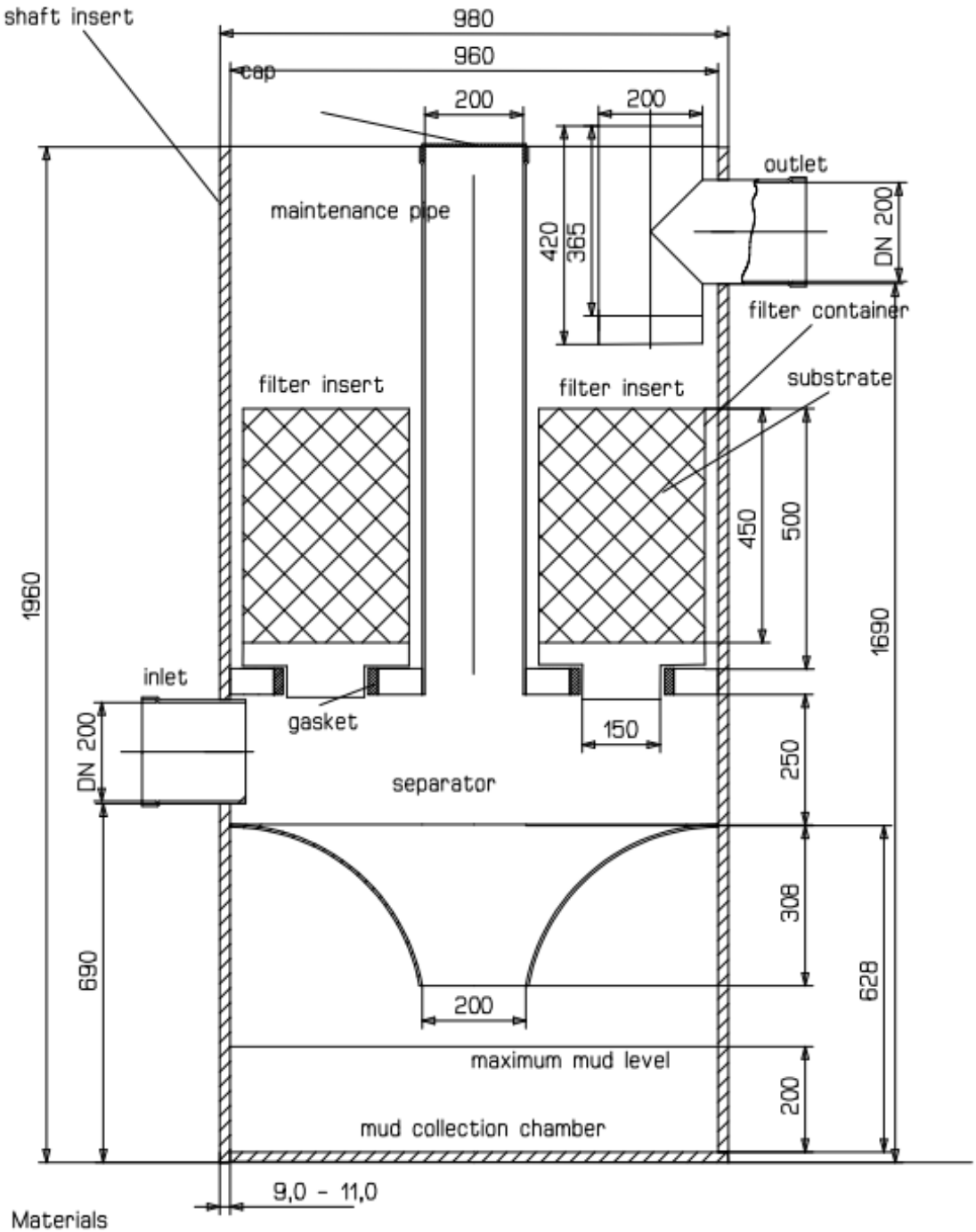
**5.3 Disposal**

Used filter inserts must be returned to the filter supplier. The contents have to be disposed properly.
The solids taken from the mud collection chamber contains hydrocarbonates and heavy metals and must be properly disposed of according to applying legal regulations.

Herold

Certified

(Signature)




Materials
shaft insert: polyethylene (PE)
filter insert: polyethylene (PE), stainless steel 1.4016, substrate
gesket: styrole-butadiene-rubber (SBR)
other components: polyethylene (PE)

3P Technik Filtersysteme GmbH
Oschstraße 14

73072 Donzdorf

Fon +49 (0) 71 62 94 60 7 - 0
Fax +49 (0) 71 62 94 60 7 - 99

plant for treatment
of rainwater runoff

3P Hydrosystem
heavy traffic

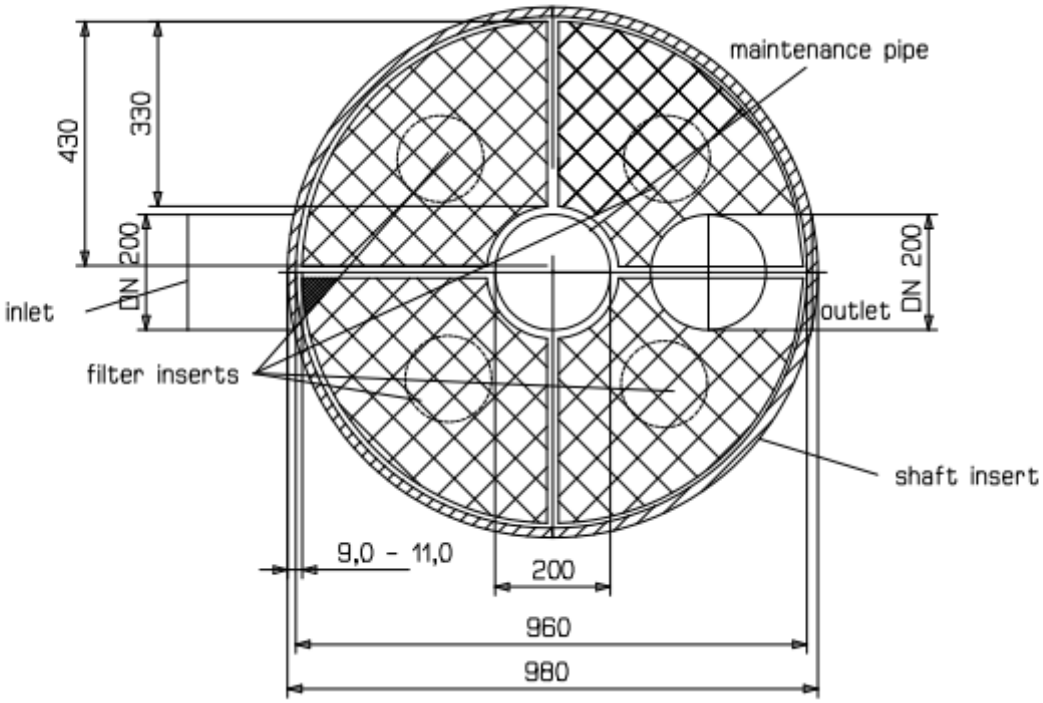
# Appendix 1

to general technical

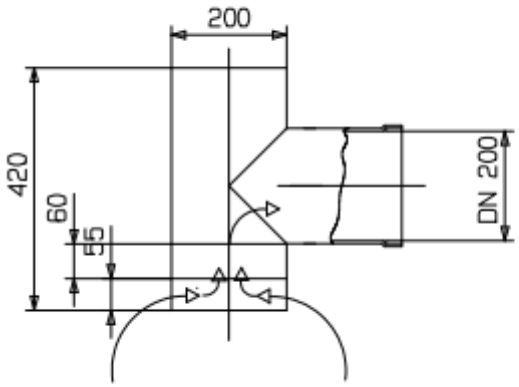
approval No. Z-84.2-4

from 12 May 2010

view from top




detail outlet




3P Technik Filtersysteme GmbH
Oschstraße 14

73072 Donzdorf

Fon +49 (0) 71 62 94 60 7 - 0
Fax +49 (0) 71 62 94 60 7 - 99

3P Hydrosystem
heavy traffic

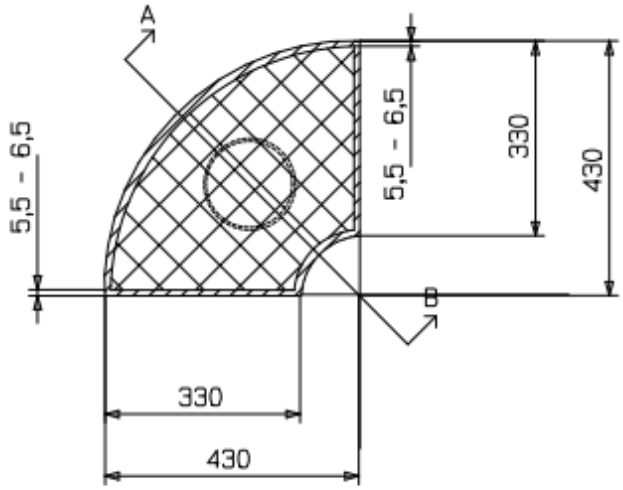
View from top

Appendix 2
to general technical

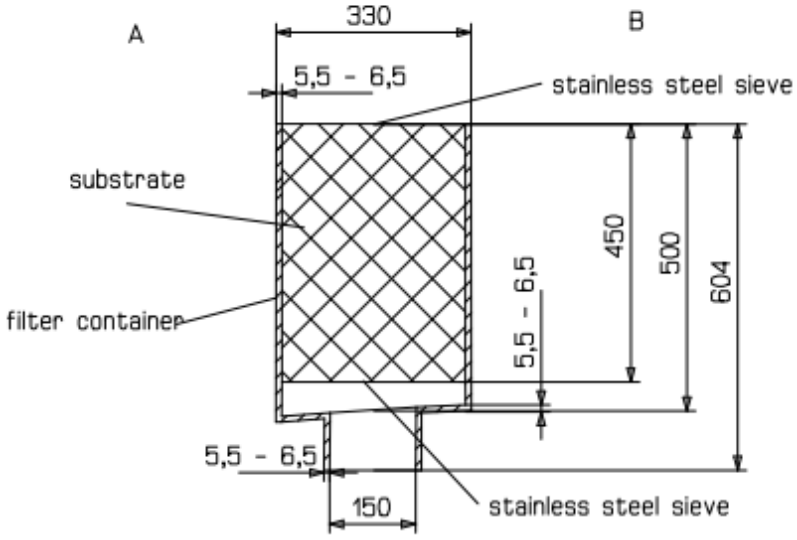
approval No. Z-84.2-4

from 12 May 2010

View from top




Sectional view A-B




3P Technik Filtersysteme GmbH
Oschstraße 14

73072 Donzdorf

Fon +49 (0) 71 62 94 60 7 - 0
Fax +49 (0) 71 62 94 60 7 - 99

3P Hydrosystem
heavy traffic

filter element ht

Appendix 3

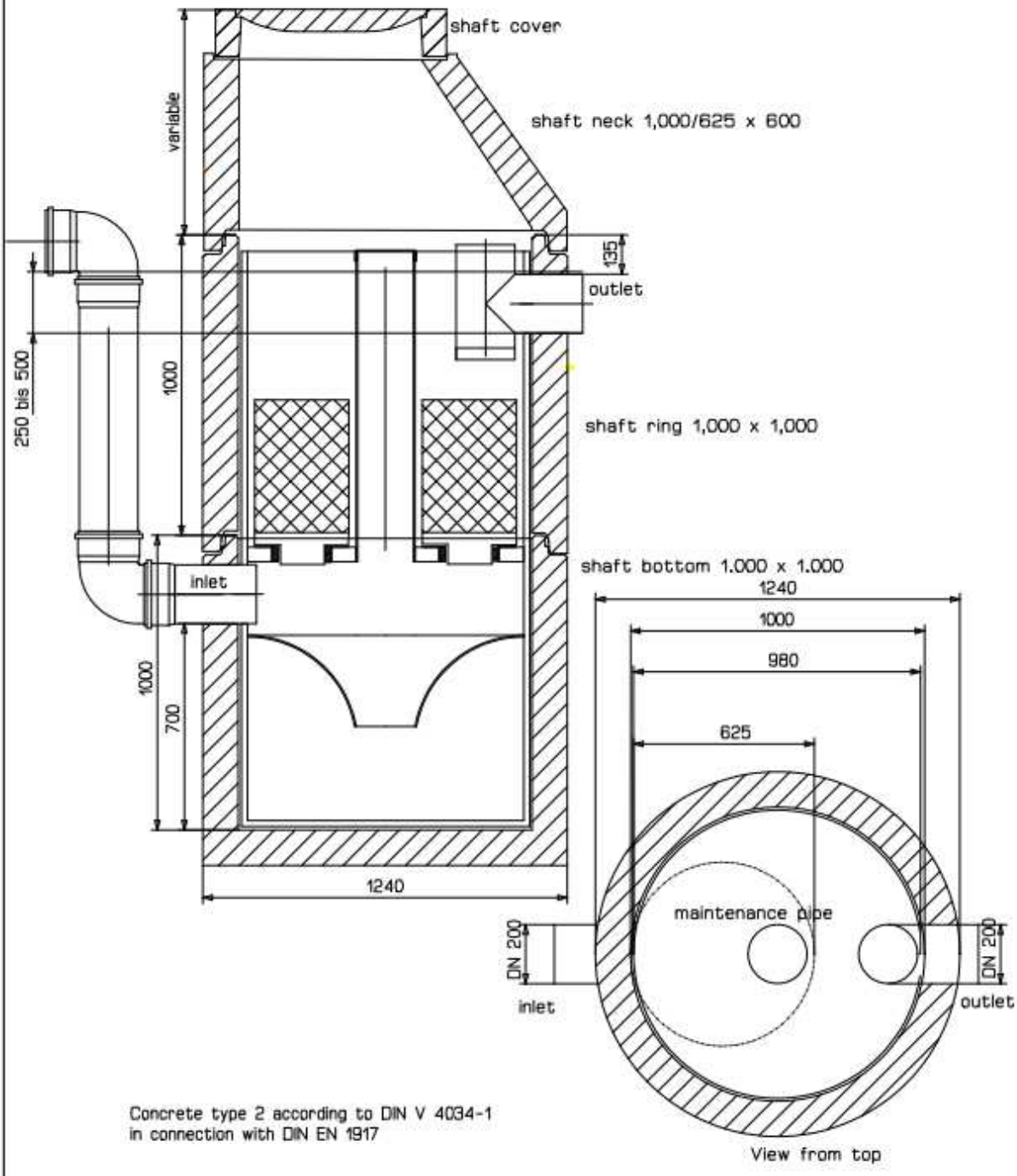
to general technical

approval No. Z-84.2-4

from 12 May 2010

Technical regulations for planning and designing rainwater runoff treatment plants

| | |
|---|---|
| DWA work sheet A 138<br>Version April 2005 | Planning, construction and operation of stormwater infiltration facilities; German Association for water supply and distribution waste water and waste - DWA |
| ATV-DVWK leaflet M 153<br>Version February 2000 | Handling recommendations for stormwater runoff; German Association for water supply and distribution waste water and waste - ATV-DVWK |
| RAS-Ew draft 2003 | Directives for road construction (RAS), part drainage (RAS-Ew); Research Association for roads and traffic - FGSV |
| DIN 18196:1988-10 | Civil and foundation engineering; ground classification for construction purposes |
| DIN 18130-1:1998-05 | Subsoil - Investigation of soil samples; Provisions of the water permeability coefficient - part 1: Laboratory tests |
| DIN EN 752:2008-04 | Drainage systems outside of buildings |




3P Technik Filtersysteme GmbH
Öschstraße 14

73072 Donzdorf

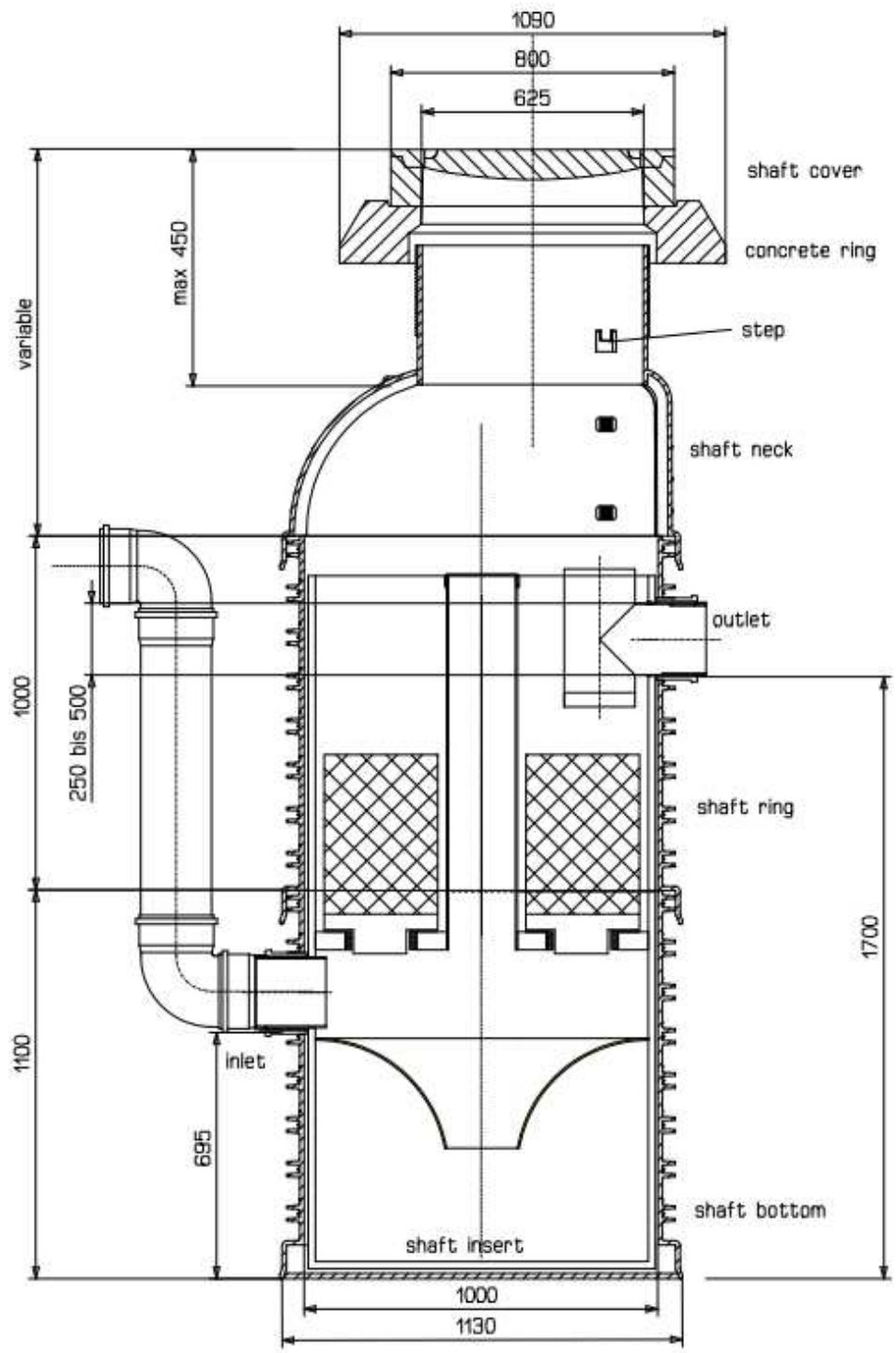
Fon +49 (0) 71 62 94 60 7 - 0
Fax +49 (0) 71 62 94 60 7 - 99

3P Hydrosystem
heavy traffic

Installation in concrete shaft

# Appendix 5

to general technical approval No. Z-84.2-4 from 12 May 2010




plastic shaft from polypropylene

3P Technik Filtersysteme GmbH
Oschstraße 14

73072 Donzdorf

Fon +49 (0) 71 62 94 60 7 - 0
Fax +49 (0) 71 62 94 60 7 - 99

3P Hydrosystem
heavy traffic

Installation in
plastic shaft

# Appendix 6

to general technical

approval No. Z-84.2-4

from 12 May 2010

## Installation instructions for 3P Hydrosystem heavy traffic

**Important notes:** The 3P Hydrosystem must be protected against pollution of the filter inserts during installation! The shaft inserts will be supplied with installed filter inserts.

1. The filter must be installed with a plunge. The distance from the bottom of the incoming pipe to the bottom of the outlet pipe must be 250 mm to 500 mm.
2. No pollution may reach the filter inserts from the top. The filter inserts must be covered or be removed prior to installation of the systems and be re-installed only after completed installation. Polluted rainwater runoff by the construction site must be disposed of properly after connecting the 3P Hydrosystem (pump out shaft). Only then the filter inserts may be re-installed.
3. If after installation of the system pavement works should be performed on the area to be drained, or construction work in the vicinity, it must be observed, that no joint mortar or mortar residues will intrude into the system. That will lead to obstruction of the filter inserts, which have to be cleaned or replaced in that case. The filter inserts should be removed prior to such works and the polluted precipitation water drainage from rinsing the area has to be disposed of properly.
4. The rubber gaskets for the filter inserts must be cleaned thoroughly prior to re-installation.

If the waste water treatment plant shall be installed in a plastic shaft structural evidence has to be provided.

**Installation:**

1. The waste water treatment plant must be pre-mounted in the respective outer shafts (or shaft components, respectively). Connections for inlet and outlet must be made and sealed.
2. Foundation excavation and wall supports according to applying technical rules. Place a horizontal bed of sand or concrete at a thickness of 10 to 15 cm.
3. Put in the shaft and check horizontal position. Align inlet and outlet opening to the correct direction.
4. Connect flow-in line.
5. Fill foundation excavation partly and compress. Filter inserts must be covered or removed before.

Appendix 7

6. Connect outlet pipe. Observe level difference between inlet and outlet according to manufacturer information.
7. Put in further shaft rings, cone, if required adjustment rings and cover.
8. After installation re-insert the filter inserts if they had been removed or remove cover, respectively.
9. Put T-piece (outlet) from the inside on the drainage line. Secure T-piece with supplied threaded rod. Observe alignment (inlet slots must be located on bottom).
10. Check if end cap on the maintenance pipe, buoyant protective device for the filter inserts and buoyant protective device for the shaft element are installed properly.

An extensive installation instruction is supplied by the manufacturer for each plant, which has to be observed.

Prior to first operation the plant must be inspected for proper installation by a competent person.

**Operating and maintenance instructions 3P Hydrosystrem heavy traffic**

Because of occurring pollutants and harmful substances in the rainwater runoff the 3P Hydrosystem heavy traffic must be inspected and cleaned in regular intervals in the same way as any other waste water treatment plant.
At rainwater runoff with unusually low or heavy solid contents the intervals for inspection may vary from following specifications.

**Annual inspections:**

- Visual inspection of the system: after opening the shaft cover the inside of the shaft must be inspected if all functional components are existing and are in proper condition (filter inserts, maintenance pipe, buoyant protective device, drainage pipe).
- Measurement of permeability of the filter inserts: for doing this the cover of the maintenance pipe must be removed. Via a pump, which is equipped with a control valve and a flow meter in the pump line, water must be taken above the filter elements and to be pumped into the maintenance pipe. Thus water is pumped in circulation. Based on the specified test plan of the manufacturer it has to be determined what value the permeability shows. For doing this the difference between water level in the maintenance pipe and above the filter elements must be determined. This should be maximum 30 cm. At too low permeability according to maintenance instructions (depending on local rain falls and connected areas) the filter elements must be rinsed or to be replaced. After completing the works the cover has to be replaced on the maintenance pipe.
- Rinsing the filter elements: by means of a suitable pressurized air and water rinsing device according to maintenance instructions or by dismantling and rinsing them outside the shaft, the filters must be cleaned. The cleaned filter elements must be replaced in the latter case after cleaning the shaft interior. Following an inspection of the permeability of the filter inserts is required again.
- Measurement of mud level: by means of a pipe camera and a gauge stick, which is put into the mud the level of sediments in the mud must be measured. Alternatively a mud measurement plate can be used. If the maximum level has been reached the mud collection chamber must be emptied.

Appendix 9

**Emptying the mud collection chamber**

- In case the mud collection chamber has been filled by occurring mud it must be emptied, the latest, however, after five years.
- For doing this the end cap on the maintenance pipe must be removed. The suction hose of a suction vehicle must be positioned into the mud collection chamber through the maintenance pipe. The mud collection chamber must be emptied following with this suction hose. Additionally water can be pumped via the maintenance pipe to loosen the mud. After completing the works the cover has to be replaced on the maintenance pipe. The mud must be disposed of properly.

**Changing the filter unit**

- The latest after three years of operation the filter inserts must be replaced. For doing this the old inserts must be taken out from the shaft insert and be replaced by new ones. The old filter inserts must be returned to the manufacturer, where they have to be disposed of properly.
- If a backflow of water from the area to be drained occurs more frequently than provided in the dimensioning, the filters must be inspected on permeability non-regularly. They can either be rinsed or replaced in order to ensure proper function.

**To be observed under all circumstances:**

- Water pumped out from the shaft, the mud collection chamber or a rinsing unit for filter inserts may only be discharged to the wastewater treatment plant. It may not be discharged into surface waters, a rain water drainage system or infiltration facility.

**Appendix 10**