

# VOCATIONAL TRAINING

Environmental Engineering Occupations | Volume 3

## Recycling and Waste Management Technician



**Explanatory notes to and practical assistance for the nationally recognised vocational training regulations**

**Environmental Engineering Occupations • Volume 3**

# **Recycling and Waste Management Technician**

The National Training Regulations

Comments from Occupational Experts

For Instructors, Apprentices and Those Interested

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**Environmental Engineering Occupations  
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Volume 3**

# **Recycling and Waste Management Technician**

Explanatory notes to and practical assistance for  
the (German) Vocational Training Regulations

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## Foreword

Vocational training regulations result in close collaboration between occupational training practice and training research. With this, decisions are made on the acceptance or non-acceptance of contents in the training framework plan and their practical and timely classification, which are the result of detailed, specialist discussions.

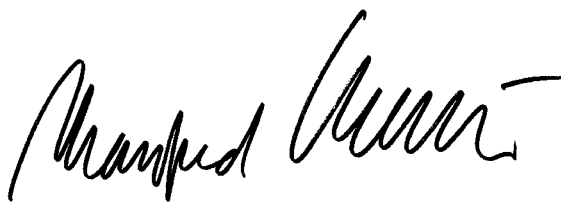
The recognition of these considerations by the "makers of vocational training regulations", their experience from the innovation of occupational practice and the factors which were essential with the decision on content are a significant aid and thus of particular interest for training personnel and instructors in vocational schools with the translation of the new vocational training regulations and the framework curriculum into practice.

With this background those involved have decided to elaborate common explanatory notes and practical assistance for the new vocational training regulations

Within the scope of these explanatory notes, the intentions and results of the new arrangement are presented and commented upon. In addition, operational assistance is offered. With this, one is not concerned with standard specifications but rather with freely applicable help for occupational use, which are also useful for vocational training school instruction.

As with vocational training regulations, practice-orientation is the most important development principle with explanatory notes. Therefore they are not created at the conference table but in close collaboration between the Federal Institute for Vocational Education and Training and the specialists who took part in the new regulation process.

I wish this practical assistance a wide distribution both in the circle of occupational training personnel and apprentices as well as instructors in vocational schools and the examiners.

A handwritten signature in black ink, appearing to read 'Manfred Kremer', with a stylized, flowing script.

Manfred Kremer  
President  
Federal Institute for Vocational Education and Training

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## 1. Intention of the New Regulations

### What is new?

Amended qualification requirements and legal provisions as well as increased environmental sensitivity and also heavy structural changes in the firms required a modernisation of the occupation requiring training for environmental technicians with the specialist fields of water supply, wastewater and waste.

Within the framework of the new regulations four individual occupations were created with the environmental technical occupations, which have the common core qualifications in the first 15 months of the training, 18 months common content at the vocational schools and the same content with the intermediate examination. All four occupations are aimed to be customer and service oriented.

Measures for quality assurance and the application of modern information and communication technologies are also parts of the training.

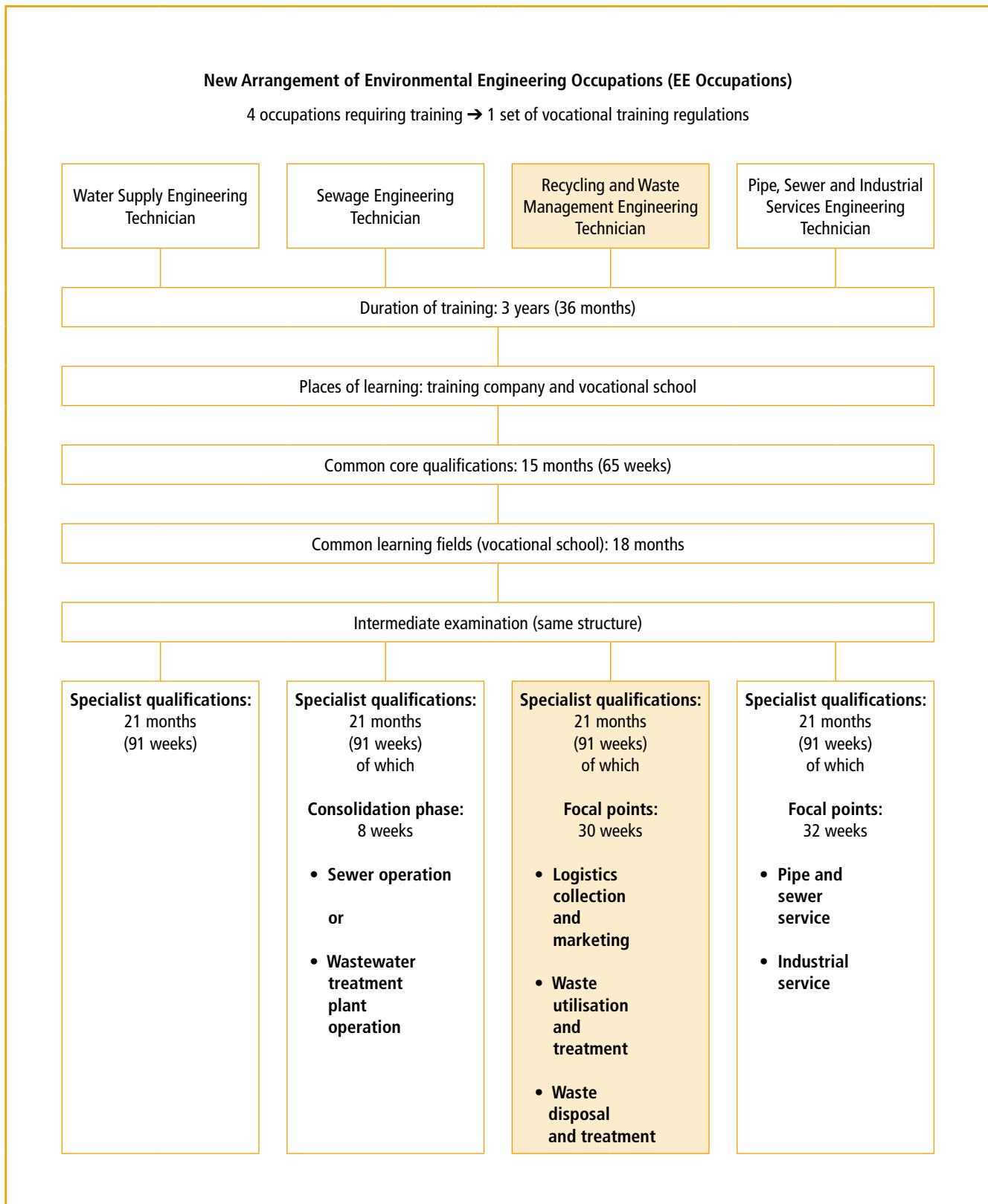
As one is concerned with environmental engineering occupations requiring training, environmental engineering, ecological cycles and hygiene within the framework of the core qualifications are also part of the intermediate examination. To this belong the causes and interaction of environmental loading of the air, water, soil and environment in the same way as the possibilities for the avoidance and minimisation of environmental loading due to plants and technologies.

The tendency in the recycling industry is going increasingly away from waste disposal and towards the avoidance of waste and waste utilisation. Firms' structures have changed severely, new companies, which are devoted mainly to recycling, have appeared on the scene. The transfer from the public to the private field of disposal has increased greatly over recent years and is still not complete. The range of offers often changes so that very marked flexibility of firm's personnel is demanded.

With the Recycling and Waste Management Technician, through the possibility of choosing between the three main focuses: logistics, collection and marketing, waste utilisation and treatment and waste disposal and treatment, the requirements of the very differently structured disposal companies are taken into account.

The acceptance of wastes, identification, separation, assignment to disposal method, the operation and maintenance of plant components, the application of measurement and analysis processes are only some of the requirements which the Recycling and Waste Management Technician must fulfil. Further, important task fields are the handling of material flows, logistics and disposition as well as commercial handling and customer service.

## Structure of occupational training



## 2. Occupational Profile and Fields of Activity

Training profile (in the original German in German, English and French)

To support transparency within the European Union the training profile, in which the field of work is described and the occupational qualifications of the occupation requiring training are listed, is issued as annex to the diploma.



### Designation of occupation

Recycling and waste management technician  
Recognized by ordinance of 17 June 2002 (BGBl. I  
Nr. 43, p. 2335)

### Duration of traineeship

3 years

Training takes place in the specialist areas of logistics, collection and marketing or waste utilisation and treatment or waste disposal and treatment.

The venues for training are company and part-time vocational school (Berufsschule).

### Field of activity

Recycling and waste management technicians work in disposal firms, utilisation and treatment facilities, such as, for example, glass and paper recycling, landfills, composting facilities, chemical-physical treatment plants.

### Occupational skills

Recycling and waste management technicians carry out their work independently on the basis of technical documents and regulations as well as legal requirements. They acquire information, plan and coordinate their work. They document their performance and take measures to ensure quality, safety, health and environmental protection at work.

### Recycling and waste management technician

- accept waste
- identify, examine and declare waste
- assign waste to disposal systems
- allot containers and vehicles taking into account work safety regulations
- manage and control technical processes
- operate, monitor, inspect, maintain and repair waste utilisation, treatment and disposal plants
- recognise faults and react independently
- document and evaluate work procedures and operational processes
- act in a customer-oriented manner and make use of relevant information and communications technologies
- work in a cost, environmental and hygiene-conscious manner
- apply relevant legal provisions, technical regulations and work safety regulations and observe quality management guidelines



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# Part I

## Vocational Training Regulations

The occupational training for Recycling and Waste Management Technician has been laid down in the [German] "Ordinance on occupational training in environmental engineering occupations" in 2002.

In this ordinance the occupation requiring training of Recycling and Waste Management Technician is regulated together with the occupations requiring training of

- Water Supply Engineering Technician
- Sewage Engineering Technician
- Pipe, Sewer and Industrial Service Technician.

In the following part of the explanatory notes the paragraphs of the vocational training regulations for the occupation of Recycling and Waste Management Technician are explained. These are the common regulations listed in the first part of the ordinance for all four occupations requiring training (§§ 1-3), the regulations for the occupation requiring training for Recycling and Waste Management Technician listed in the third part of the ordinance (§§ 16-21) and the transitional and final regulations applicable for all four occupations requiring training (§§ 28, 29).

### Ordinance text

### Explanatory notes on the ordinance

Official [German] Federal Gazette (BGBl.) for 2002, Part I, No. 43 issued in Bonn, Germany, on 02 July 2002

### Ordinance on the occupational training in the environmental engineering occupations dated 17 June 2002

- came into force on 01 August 2002
- published on 02 July 2002 in the [German] Federal Gazette
- Public notice together with the framework curriculum in the [German] Federal Official Gazette No. 204 a dated 31 October 2002

On April 1, 2005 the Vocational Training Reform Act (BerBiRefG) came into force which effected certain modifications in the Vocational Training Act (BBiG). The respective training regulation became effective before April 1, 2005 (on June 17, 2002). Hence, all references made are in relation to the BBiG dated August 14, 1969 and subsequent amendments thereto.

Based on § 25, Para. 1 together with Para. 2, Clause 1 of the [German] Vocational Training Act dated 14 August 1969 (BGBl. I, p. 1112), last amended by Article 212, NO. 2 of the Ordinance dated 29 October 2001 (BGBl. I, p. 2785), the German Federal Ministry of Economics and Technology and the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety in agreement with the German Federal Ministry of Education and Research and the German Federal Ministry of the Interior:

Vocational training regulations are based on § 25, Para. 1 of the Vocational Training Act (BBiG). They are issued by the responsible technical ministries – here the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and the Federal Ministry of Economics and Technology – in agreement with the Federal Ministry of Education and Research and the Federal Ministry of the Interior, as statutory order.

Vocational training regulations regulate, as a standard across the Federal German Republic, the in-firm part of the dual occupational training in recognised occupations requiring training. They are aimed at all those involved in occupational training within the dual system, in particular at firms providing training, at apprentices and training personnel and at **competent bodies**.

The ordinance on occupational training in environmental engineering occupations presented here, was elaborated within the Federal Institute for vocational education and training in collaboration with experts of employee and employer agencies.

Vocational training regulations are generally binding as statutory orders. That means, the vocational training in environmental engineering occupations may take place only in accordance with the provisions of these occupational training regulations.

The dual partner of in-firm training is the vocational school. The instruction in the vocational school takes place on the basis of the agreed framework curriculum. As instruction in vocational training schools is in general subject to the responsibility of the Federal German states, these transform the framework curriculum, produced by the Conference of Federal German State Culture Ministers (KMK), into individual framework curricula. Vocational training regulations and framework curricula, with regard to the training content and the point in time of their communication to the firm and vocational school, are to be harmonised.



## Summary of contents

### Part 1

#### Common regulations

- § 1 National recognition of the occupations requiring training
- § 2 Duration of training
- § 3 Structure and objective of occupational training

### Part 2

#### Regulations for the occupation requiring training of Water Supply Engineering Technician

- § 4 Description of occupation requiring training
- § 5 Training framework plan
- § 6 Training plan
- § 7 Narrative Report
- § 8 Intermediate examination
- § 9 Final examination

### Part 3

#### Regulations for the occupation requiring training of Sewage Engineering Technician

- § 10 Description of occupation requiring training
- § 11 Training framework plan
- § 12 Training plan
- § 13 Narrative Report
- § 14 Intermediate examination
- § 15 Final examination

### Part 4

#### Regulations for the occupation requiring training of Recycling and Waste Management Technician

- § 16 Description of occupation requiring training
- § 17 Training framework plan
- § 18 Training plan
- § 19 Narrative Report
- § 20 Intermediate examination
- § 21 Final examination

### Part 5

#### Regulations for the occupation requiring training of Pipe, Sewer and Industrial Service Technician

- § 22 Description of occupation requiring training
- § 23 Training framework plan
- § 24 Training plan
- § 25 Narrative Report
- § 26 Intermediate examination
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### Part 6

#### Transition and final regulations

- § 28 Transitional regulation
- § 29 Coming into effect, suspension

### Annexes

Annex 1: Training framework plan for the occupation requiring training of Water Supply Engineering Technician

Annex 2: Training framework plan for the occupation requiring training of Sewage Engineering Technician

#### Annex 3: Training framework plan for the occupation requiring training of Recycling and Waste Management Technician

Annex 4: Training framework plan for the occupation requiring training of Pipe-, Sewer and Industry Service Technician

In these explanatory notes only the paragraphs of the common regulations and the paragraphs concerning the occupation requiring training of "Recycling and Waste Management Technician" are commented upon

## § 1

### National recognition of the occupations requiring training

The occupations requiring training

1. Water Supply Engineering Technician

2. Sewage Engineering Technician

#### 3. Recycling and Waste Management Technician

4. Pipe, Sewer and Industrial Services Technician

are nationally recognised. As far as the training takes place within the area of public service, they are public service occupations requiring training. As far as the training takes place within trade and industry they are trade and industry occupations requiring training.

For a nationally recognised occupation requiring training, training may only be carried out in accordance with the vocational training regulations (§§ 28, Para. 1 BBiG). The ordinance presented here thus forms the basis for a standard federal training in firms offering training.

Supervision on this is carried out by the **competent bodies** in

accordance with §§ 84 and 75 BBiG.

The **competent body** has in particular to monitor the implementation of the occupational training and to support this with advice to apprentices and training personnel. For this purpose it is to provide training advisers (§ 45 BBiG).

## § 2

### Duration of training

Training takes three years.

The duration of training is to be so determined that the training subject matter necessary for a qualified occupation can be communicated to apprentices and makes it possible for them to obtain the required occupational experience (§ 1, Para. 2 BBiG).

Start and duration of occupational training are given in the **apprenticeship contract** (§ 4, Para. 1 BBiG). The occupational training relationship ends with the completion of the training period or the passing of the final examination (§ 14, Paras. 1 and 2 BBiG).

Reduction due to appropriate prior training:

The **competent bodies** can on application shorten the training time if, for example, an appropriate prior training (educational or operational) allows the expectation that the training objective can be achieved in a shorter period of time (§ 29, Paras. 2 and 4

BBiG). Reduction due to early admission to the examination. The training period will also be ended prematurely if apprentices, due to appropriate performance before the end of their training period are admitted to the final examination and pass it (§ 40, Para. 1 BBiG).

Extension:

In exceptional cases the training period can also be extended on the request of apprentices, if the extension appears to be necessary in order to achieve the training objective (§ 29, Paras. 3 and 4 BBiG). Exceptional cases are, for example, longer absence as a result of an illness or other periods of inactivity.

The training period must, on request of apprentices, be extended (up to the next examination possibility, maximum one year) if they do not pass the examination (§ 14, Para. 3 BBiG).

### § 3

#### Structure and objective of occupational training

(1) The training is divided into:

1. Common core qualifications to be communicated integratively in accordance with § 4 Nos. 1 to 12, **§ 10, Nos. 1 to 12**, § 16, Nos. 1 to 12 and § 22, Nos. 1 to 12 for all occupations requiring training
2. specific technical qualifications for each occupation requiring training:
  - a) for Water Supply Engineering Technician, in accordance with § 4, Nos. 13 to 24,
  - b) for Sewage Engineering Technician, in accordance with § 10, Nos. 13 to 22,
  - c) for Recycling and Waste Management Technician in accordance with § 16, Nos. 13 to 22,**
  - d) for Pipe, Sewer and Industrial Services Technician in accordance with § 22, Nos. 13 to 18.

The four environmental engineering occupations have common core qualifications which are communicated in the first 15 months of the in-firm training. They are the subject of the intermediate examination in all four occupations requiring training.

The respective technical qualifications are communicated in the second part of the training.

(2) The skills and knowledge given in this ordinance should be so communicated that the apprentice is enabled to exercise a qualified occupational activity within the meaning of § 1, Para. 2 of the German Vocational Training Act (BBiG) which, in particular, includes independent planning, implementation and monitoring. The enablement described in Para. 1 is also to be verified in examinations according to §§ 8, 9, 14, 15, **20, 21**, 26 and 27.

Comprehensive objective of occupational training is to enable the apprentices to exercise a qualified occupational activity. The trained specialists are to be capable of carrying out the tasks given to them of

- independent planning
- independent implementation and
- independent monitoring.

What is to be understood under this in detail is described by the training framework plan. The scope in which independence can develop is here, as a rule, laid down and limited by the constraints within the firm. Accordingly, for example,

Independent planning means:

- lay down work steps (occupational schedule),
- determine tools and aids,
- take account of substance and material requirements,
- estimate execution times.

Independent implementation means:

- carrying out work without instruction.

Independent monitoring means:

- comparison of work results with specifications,
- determination of whether the specifications have been achieved or which reworking is possibly required.

This concept on occupational qualification is, above all, to express that specialists can make independent decisions within the scope of their work, for example on the process of their work in the firm, on quality assurance as well as on health and environmental protection. Also, in this respect, a trained specialist differs from an untrained or semi-skilled employee.

**Part 4****Regulations for the occupation requiring training of Recycling and Waste Management Technician****§ 16****Description of occupation requiring training**

Object of the occupational training are at least the following skills and knowledge:

1. Vocational training, employment and collective bargaining law,
2. Structure and organisation of the firm providing training,
3. Safety and health protection on the job,
4. Environmental protection,
5. Operational processes, work organisation,
6. Information and documentation, quality assurance measures,
7. Environmental protection technology, ecological cycles and hygiene,
8. Fundamental principles of mechanical and process engineering, measurement technology, numerical control engineering and control technology,
9. Dealing with risks posed by electricity,
10. Application of scientific principles,
11. Materials, ancillary materials and dangerous materials, dangerous working substances, materials processing,
12. Storage, tools and equipment,
13. Safety regulations and operating instructions,
14. Customer-oriented activities,
15. Commercial activities,
16. Wastes and waste reception,
17. Waste disposal processes,
18. Operation and maintenance,
19. Material streams, logistics and disposition,
20. Measures for quality assurance,
21. Information technology,
22. Legal provisions and technical rules and standards.

The description of the occupation requiring training contains the training subject matter collated in summarised form. It basically covers all training subject matter (skills and knowledge), which is required as instrument to attain the qualification as Recycling and Waste Management Technician. The subject matter belonging to each serial number of the description of occupation requiring training is listed in the training framework plan and is arranged by subject and time (see § 17).

The training subject matter of Positions 1 to 4 is to be communicated integratively during the whole training. Positions 5 to 12 contain the core qualifications, positions 13 to 22 the specialist qualifications.

In order to make the arrangement of the occupation description during training the guiding temporal figures are to be listed in a column in the explanatory notes to the training framework plan.

The Recycling and Waste Management Technician is an occupation requiring training with main focuses (see also § 17).

Choice can be made between the three focal points:

- "Logistics, collection and marketing"
- "Waste utilisation and treatment" and
- "Waste disposal and treatment".

The respective main focus is to be established before the start of training. For the specific content in the main focuses in all 30 weeks are to be planned as temporal guideline respectively for each main focus.

The skills and knowledge to be communicated and temporal guidance values for the identical training position vary from each other depending on the main focus. They are listed and explained in the training framework plan.

Below is a summary of the training positions in the three main focuses:

## Serial No. 16 cont.

Focal points:		
Logistics, collection and marketing	Waste utilisation and treatment	Waste disposal and treatment
Skills and knowledge to be communicated, which are to be imparted with the inclusion of independent planning, implementation and monitoring		
<ul style="list-style-type: none"> <li>■ Commercial activities (§ 16 No. 15)</li> <li>■ Material streams, logistics and disposition (§ 16 No. 19)</li> <li>■ Safety regulations and operating instructions (§ 16 No. 139)</li> </ul>	<ul style="list-style-type: none"> <li>■ Waste disposal processes (§ 16 No. 17)</li> <li>■ Operation and maintenance (§ 16 No. 18)</li> <li>■ Material streams, logistics and disposition (§ 16 No. 19)</li> <li>■ Safety regulations and operating instructions (§ 16 No. 13)</li> </ul>	<ul style="list-style-type: none"> <li>■ Waste disposal processes (§ 16 No. 17)</li> <li>■ Operation and maintenance (§ 16 No. 18)</li> <li>■ Material streams, logistics and disposition (§ 16 No. 19)</li> <li>■ Safety regulations and operating instructions (§ 16 No. 13)</li> </ul>

## § 17

## Training framework plan

The skills and knowledge in accordance with § 16 are to be communicated taking into account the focal points "Logistics, collection and marketing", "Waste utilisation and treatment" and "waste disposal and treatment" in accordance with the instruction on technical and chronological structuring of the occupational training (training framework plan) in accordance with Annex 3. A technical and chronological structuring of the training subject matter deviating from the training framework plan is in particular permitted, insofar as practical in-firm peculiarities necessitate the deviation.

The training framework plan forms the basis for the in-firm training. It lists the training subject matter which is to be communicated in the firms providing training. The training subject matter is to be described in the form of the skills and knowledge to be communicated.

The description of the skills and knowledge to be communicated orients itself on occupational terms of reference and the activities connected with these. The educational objectives thus show a clearly recognisable reference to the occupational actions taking place in the firm. In this way the instructors receive an overview of what they communicate and for what the apprentices are to be qualified.

The sequence of the skills and knowledge of an occupational description position to be communicated, as a rule is based on the work cycle. For apprentices and training personnel this simplifies the overview of the qualifications to be acquired.

The communicating of the training subject matter named in the training framework plan is to be ensured by all firms providing training. In order that firm-related peculiarities can also be taken into account with the training, a so-called **flexibility clause** is adopted

in the vocational training regulations. Through this the communicating of additional training subject matter, whose inclusion can appear to be necessary, is also enabled if, due to technical or labour organisational developments, new requirements on Recycling and Waste Management Technicians result, which are not named in this training framework plan. A flexibility aspect also lies in that the skills and knowledge to be communicated can, as required, be communicated in cooperation with other firms (combined training) and/or through occasional involvement of inter-firm training centres (see keyword **Training activities outside the training companies**).

It is to be ensured that the core qualifications (training subject matter of the first 15 months, Ser. Nos. 1 to 12) with the intermediate examination and the totality of the training subject matter with the final examination are available.

The training framework plan for the in-firm training and the framework plan for the vocational training school education are matched to each other with regard to contents and time. In this respect the training in-school and in-firm is also provided for in step. Accordingly it is recommended that training personnel and instructors in vocational schools meet and confer regularly.

## § 18 Training plan

Training personnel are to produce a training plan for the apprentices based on the training framework plan.

The firm providing training is obliged to produce an **in-firm's training plan** for the apprentices on the basis of the training framework plan. It serves the purpose of applying the skills and knowledge listed in the training framework plan to the existing conditions in the firms.

The **in-firm's training plan** is part of the **apprenticeship contract** and is attached to this as annex, (also for registration at the **competent body**) and delivery to the apprentices at the latest at the beginning of training.

## § 19 Narrative Report

The apprentice is to keep a Narrative Report in the form of a verification of training. He/she is to be given the opportunity to keep the Narrative Report during training. Training personnel are to examine the Narrative Report regularly.

The Narrative Report, which is to be kept by apprentice and is to be examined by the training personnel responsible for in-firm training, represents an important instrument for information on the actual status of the overall training in-firm and in vocational training schools for training personnel and instructors in vocational training schools up to being prior information for the examining board.

Through the keeping of the Narrative Report is to be ensured that the timely and technical course of training is made verifiable for all those involved – apprentices, training centres, vocational schools and legal representatives of apprentices – in the simplest possible form (details in keywords, possibly in loose-leaf form). Reference to the training framework plan must also be clear from this verification of training.

Following the recommendations of the German Federal Committee for Occupational Training, the verification of training is to be kept at least once a week by apprentices. Training personnel are to examine and sign off the verification of training at least monthly. They are to ensure that the legal representative of the apprentices as well as the vocational school receive information from the verifications of training at suitable intervals and that these can confirm this through their signatures. The Narrative Report can be kept according to the regulations of the **competent bodies**.

Apprentices keep the verification of training during working time. With this it is immaterial whether the Narrative Report is kept at the firm or is kept outside the firm with appropriate reduction of the attendance times at the firm.

The presentation of the Narrative Report is prerequisite for admission to the final examination.

An assessment of the form and content is, however, not possible within the scope of the final examination.

Aim of the Narrative Report is, inter alia, to record, via the monitoring of progress of training, deviations from the orderly course of training in order to be able to influence this correctively.

Fundamentally the Narrative Report can be kept, beyond the function as verification of training, also as technical documentation on the overall training time. For apprentices themselves the Narrative Report could then become an instrument if they have again to consider what they have learned in that they report on this in writing.

Reference: BBiG § 6, Para. 1, No. 4 and § 39, Para. 1, No. 2.

## § 20

### Intermediate examination

- (1) An intermediate examination is to be carried out for the determination of the state of training. It is to take place before the end of the second year of training.
- (2) The intermediate examination comprises the skills and knowledge listed in Annex 2 in Section 1 for the first 15 months as well as the subject matter to be communicated in the vocational training school instruction according to the framework curriculum, so far as it is important for the occupational training.
- (3) The candidate, in the practical part of the examination, is to carry out a practical task, which can consist of several sub-tasks, in overall a maximum of seven hours. With this, the candidate is to show that he/she can plan work routines economically, determine tools and supplies for the work, document results of work as well as take measures for safety and the protection of health with the work, for environmental protection and for quality assurance. For the practical task the following in particular are considered: processing of materials, assembly, dismantling and maintenance of components or working equipment, taking samples, measurement of physical parameters and execution of investigations and application of technical communication means.
- (4) The candidate in the written part of the examination is to solve practice-related tasks, in a maximum of 180 minutes. Here measures for safety and protection of health with the work, for environmental protection as well as for quality assurance are to be presented. The following, in particular, come into consideration for the tasks, taking into account scientific relationships and occupation-related calculations:
  1. Environmental protection technology, ecological cycles and hygiene,
  2. Plant and mechanical engineering,
  3. Measurement and analysis technology,
  4. Materials, auxiliary and hazardous matter, hazardous substances.

An intermediate examination is to be carried out before the end of the second training year. The date is laid down and promulgated by the **competent body** well in time.

The training company is obliged to enter apprentices in good time and to release them for participation.

Object of the intermediate examination are the core qualifications of the training framework plan and the framework curriculum.

The intermediate examination is, as a rule, carried out first after 18 months of the training.

The intermediate examination is divided into a practical part and a written part.

In the intermediate examination it is to be established whether and to what extent the apprentices have achieved the skills and knowledge to be communicated in this period of training and to be able to verify this under examination conditions. The intermediate examination is a monitoring instrument for training personnel and apprentices. Both are to identify the respective status of training in order, if required, to be able to have a corrective, supplementary and supportive effect on the training.

The outcome of the examination has no legal results for the continuation of the training relationship and also does not pass into the result of the final examination. Nevertheless, participation in the intermediate examination is prerequisite for the admission to the final examination (§ 39, Para. 1, No. 2 BBiG).

**§ 21****Final examination**

- (1) The final examination comprises the skills and knowledge listed in Annex 3 and the syllabus communicated in vocational training school instruction so far as it is important for the occupational training.
- (2) The examination in the practical part of the examination is to be carried out in a practical task over a maximum of 10 hours, of these two common and one focal point-related tasks. For the common tasks the following, in particular are considered:

Identification, declaration and examination of wastes as well as their assignment to the appropriate disposal paths, and operation and maintenance of facilities for waste treatment.

For the main focal point tasks the following, in particular, are considered:

In the focal point logistics, collection and marketing: carrying out of a logistics task;

In the focal point waste utilisation and treatment: carrying out of a waste utilisation and treatment task;

In the focal point waste disposal and treatment: carrying out a task of waste disposal and treatment.

With this the candidate is to show that he/she can plan the sequence of work economically, identification of work relationships, monitor and document results of work, take measures for safety and protection of health at work, take measures for environmental protection and quality assurance. The two common practical tasks are weighted in total with 70 %, the focal point-related task with 30 %.

- (3) The candidate, in the written part of the examination, is to be tested in the examination fields of waste management processes, commercial activity and law as well as economic and social studies. In the examination fields of waste management processes as well as commercial activities and law the candidate is to show that he/she can solve tasks related to practice with associated labour organisational, technical and mathematical-scientific facts. With this, measures for safety and for the protection of health with work as well as quality assurance measures are to be presented. Taking into account occupation-related calculations, tasks from the following areas are in particular considered:

1. In the examination field of waste management processes:

- a) Hygiene,
- b) Composition of waste,
- c) Waste collection and transport,
- d) Utilisation, disposal,
- e) Scientific processes,
- f) Operation and maintenance.

2. In the examination field of commercial activities:

- a) Information technology,
- b) Customer-oriented activities,
- c) Legal provisions and rules and standards,
- d) Waste disposition.

3. In the examination field of economic and social studies:

General economic and social interrelationships of the occupational and working world.

- (4) The written part of the examination has a maximum duration of:

- |  |             |
|--|-------------|
| 1. In the examination field of waste management processes    | 180 minutes |
| 2. In the examination field of commercial activities and law | 60 minutes  |
| 3. In the examination field of economic and social studies   | 60 minutes  |



*Serial No. 21 cont.*

(5) The written part of the examination, at the request of the candidate or at the discretion of the examination committee, is to be supplemented in individual fields by an oral examination if this can be decisive for passing the examination. With the determination of the results for the examination fields tested orally, the previous result and the result of the oral supplementary examination are to be weighted in the ratio 2:1.

(6) Within the written part of the examination the examination fields are to be weighted as follows:

1. Examination field of waste management processes	60 %,
2. Examination field of commercial activities and law	20 %,
3. Examination field of economic and social studies	20 %.

Subject of the final examination can be all the training contents (also the core qualifications) to be communicated in accordance with the training framework plan as well as the subject matter to be communicated in the vocational school curriculum as far as it is essential for the occupational training.

Essential component of the final examination is that the candidate, within the scope of the carrying out of a practical task, which can consist of several parts, is to plan, carry out economically the sequences of work and independently monitor the results.

As the Recycling and Waste Management Technician is an occupation requiring training with focal point (see also §§ 16,17) one of the three practical tasks is main focal point-related.

Examination regulations for the carrying out of the final examination: The examination rules are regulated in the BBiG by §§ 34-41.

For the acceptance of the examination the **competent body** sets up at least one examining board. It consists of:

- a representative of the employers,
- a representative of the employees and
- an instructor of a vocational training school.

For the carrying out of examinations the respective competent body promulgates examination regulations (§ 41 BBiG). Inter alia, these regulate:

- admission,
- breakdown of the examination,
- assessment standards,
- issue of the examination results,
- results from violations of the examination regulations and
- repeat examination.

An oral supplementary examination is only planned if the examination performance in the written part of the examination as a whole has resulted in no satisfactory performance. The supplementary examination is carried out at the discretion of the examining board or on application of the candidate for one examination field only, if it can be decisive for the passing of the examination but not, however, for the improvement of individual examination grades. The result of this oral examination has half the weight compared with the result of the appropriate written examination field.

(7) The examination has been passed if respectively in the practical and written part of the examination at least sufficient performance has resulted. And if with this, within the practical part of the examination in the examination field of electrical engineering tasks as well as in the written part of the examination in the examination field of waste management processes also at least sufficient performance has resulted.

Passing of the final examination:

The written part of the examination and the practical part of the examination receive respectively one grade.

The grade of the written part of the examination is made up as follows:

Waste management processes	60 %
Commercial activities and law	20 %
Economic and social studies	20 %

The examining board is to inform the candidate on the last day of the examination, whether he/she has passed or not passed the examination. The candidate receives a written confirmation for this from the chairman.

The candidate receives from the **competent body** a certificate of the successfully completed examination, which contains the designation of the training occupation and the results of the written and practical examination.

Final examination Recycling and Waste Management Technician			
Practical part	Written part		
<p><b>Three practical tasks, of which two common and one focal point-related task:</b></p> <p>Identify, declare and examine wastes and their assignment to the appropriate disposal routes and operation and maintenance of waste treatment facilities.</p> <ul style="list-style-type: none"> <li>■ <b>In the focal point logistics, collection and marketing:</b> Carrying out of a logistic task.</li> <li>■ <b>In the focal point waste utilisation and treatment:</b> Carrying out of a waste utilisation and treatment task.</li> <li>■ <b>In the focal point waste disposal and treatment:</b> Carrying out of a waste disposal and treatment task.</li> </ul>	<p><b>Written tasks:</b></p>		
<p>The candidate is to show that he/she can:</p> <ul style="list-style-type: none"> <li>■ plan the sequence of work economically,</li> <li>■ identify work relationships,</li> <li>■ document work results,</li> <li>■ take measures for safety and for the protection of health at work,</li> <li>■ take measures for environmental protection,</li> <li>■ take quality assurance measures.</li> </ul>	<p>The candidate is to show that he/she can:</p> <ul style="list-style-type: none"> <li>■ solve practice-related tasks with associated work-organisational, technical and mathematical-scientific contents</li> <li>■ here measures for safety and protection of health with the work as well as quality assurance measures are to be presented</li> </ul>	<p>The candidate is to show that he/she can:</p> <ul style="list-style-type: none"> <li>■ solve practice-related tasks with associated work-organisational, technical and mathematical-scientific contents</li> <li>■ here measures for safety and protection of health with the work as well as quality assurance measures are to be presented</li> </ul>	<p>The candidate is to show that he/she can:</p> <ul style="list-style-type: none"> <li>■ solve practice-related tasks with associated work-organisational, technical and mathematical-scientific contents</li> <li>■ here measures for safety and protection of health with the work as well as quality assurance measures are to be presented</li> </ul>
	<p><b>Waste management processes</b></p> <p>a) Hygiene, b) Composition of waste, c) Waste collection and transport, d) Utilisation, disposal, e) Scientific processes, f) Operation and maintenance.</p>	<p><b>Commercial activities and law</b></p> <p>a) Information technology, b) Customer-oriented activities, c) Legal provisions and rules and standards, d) Waste disposition.</p>	<p><b>Economic and social studies</b></p> <p>General economic and social interrelationships of the professional and working world.</p>
Max. 10 hours	Max. 180 minutes	Max. 60 minutes	Max. 60 minutes
<p>Weighting: both common tasks: 70 % focal point - related task: 30 %</p>	<p>Weighting: 60 %</p>	<p>Weighting: 20 %</p>	<p>Weighting: 20 %</p>
<p>Restrictive function: minimum sufficient performance</p>	<p>Restrictive function: minimum sufficient performance Examination field wastewater engineering: minimum sufficient performance</p>		

**Part 6**  
**Transition and final regulations**

**§ 28**  
**Transitional regulation**

The previous provisions are to be applied further to occupational training conditions, which are in existence with the coming into effect of this ordinance, unless the parties to the contract agree to the application of the provisions of this ordinance.

**§ 29**  
**Coming into effect, suspension**

This ordinance comes into effect on 01 August 2002. At the same time the Environmental Technician Regulations of 30 May 1984 are suspended (BGBl. I p. 731).

Berlin, 17 June 2002

**The German Federal Minister of Economics and Technology**

Signed for and on behalf of:  
Tacke

**The German Federal Minister for the Environment, Nature Conservation and Nuclear Safety**

Signed for and on behalf of  
Rainer Baake

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## Part II

# Explanatory notes on the training framework plan

## 1. Description of the occupation requiring training with temporal guidance values (overview)

Ser. No. Training Framework Plan	Description of the occupation requiring training	Temporal guidance value in weeks in the training period	
		1 <sup>st</sup> – 15 <sup>th</sup> month	16 <sup>th</sup> – 36 <sup>th</sup> month
Core qualifications			
1 2 3 4	Vocational training, employment and collective bargaining law Structure and organisation of the firm providing training Safety and health protection on the job Environmental protection	To be communicated during the complete training	
5	Operational processes, work organisation	4	
6	Information and documentation, quality assurance measures	4	
7	Environmental protection technology, ecological cycles and hygiene	8	
8	Fundamental principles of mechanical and process engineering, measurement technology, numerical control engineering and control technology	19	
9	Dealing with risks posed by electricity	4	
10	Application of scientific principles	10	
11	Materials, ancillary materials and dangerous materials, dangerous working substances, materials processing	12	
12	Storage, tools and equipment	4	
Specialist qualifications			
13	Safety regulations and operating instructions		4
14	Customer-oriented activities		4
15	Commercial activities		4
16	Wastes and waste reception		9
17	Waste disposal processes		11
18	Operation and maintenance		8
19	Material streams, logistics and disposition		7
20	Measures for quality assurance		6
21	Information technology		4
22	Legal provisions and technical rules and standards		4*

\*) To be communicated together with other training materials.

<b>Focal point logistics, collection and marketing</b>			
1	Commercial activities		9
2	Material streams, logistics and disposition		19
3	Safety regulations and operating instructions		2
<b>Focal point waste utilisation and treatment</b>			
1	Waste disposal processes		17
2	Operation and maintenance		6
3	Material streams, logistics and disposition		5
4	Safety regulations and operating instructions		2
<b>Focal point waste disposal and treatment</b>			
1	Waste disposal processes		17
2	Operation and maintenance		6
3	Material streams, logistics and disposition		5
4	Safety regulations and operating instructions		2

## 2. Information for the implementation of the training framework plan

### The training framework plan – introduction for the training

The training framework plan regulates the training in firms, the framework curriculum the instruction in vocational schools (see page 81 et sqq.). Both framework plans together are the basis of the training.

The training framework plan is an introduction to the technical and temporal structure of the company training. In addition to the contents listed in the description of the occupation requiring training, it describes in detail the training objectives (skills and knowledge to be communicated).

### The training contents in the training framework plan describe minimum requirements.

The firms providing training, with regard to the depth and breadth of communication of the training subject matter, can instruct beyond the minimum requirements if the individual progress of learning of the apprentices allows this and the firm-specific circumstances allow or even require this.

For the respective contents temporal guidance in weeks is given as orientation for the duration of firms communicating. (Temporal structure, Page 28). The temporal guidance value reflects the significance given to this section of the contents in comparison with other content sections.

The sum of the temporal guidance values is 52 weeks per training year. The temporal guidance values given in the training framework plan are gross times and must be converted to actual training times available operationally (net time). With this, the times for vocational school instruction and holidays must be deducted.

According to the following model calculation the guidance values for time given in the training framework plan (gross time) can be converted into actual, operationally available training times (net time). With this, an estimated value of in total 12 weeks annual vocational school instruction is assumed. (The carrying out of the vocational school instruction is the responsibility of the individual German Federal States).

<b>Gross time (52 weeks = 1 year)</b>	<b>365 days</b>
less 52 Saturdays/52 Sundays	- 104 days
less approx. 12 weeks vocational school	- 60 days
less 6 weeks holiday <sup>1)</sup>	- 30 days
less public holidays which fall on days of training in firms <sup>2)</sup>	- ca. 8 days
<b>Net time</b>	<b>= 163 days</b>

The purely firm-based training time, according to this model calculation, is approx. 163 days per year. This leaves – related to 52 weeks per year – approx. 3 days per week. For every week given in the apprentices outline plan there are thus approx. 3 days of firm's training time available.

How the times for the communicating and consolidation are distributed to the individual learning objectives is up to the teaching personnel. Here they should be guided by the level of training of the apprentices or should place emphasis according to the operational requirements.

### Example: "Wastes and waste reception (§ 16 No. 16)"

This teaching position is allocated eight learning objectives (a) to (h), for which in total 9 weeks are planned. The distribution of these 9 weeks to the individual learning objectives is a task of training personnel.

The **firms' training plans** are elaborated on the basis of the training framework plan, which regulates the organisational and pedagogical-didactic execution of the training specifically to the firms.

### Methodical procedure for the achievement of the training objective

Within the training framework plan the training objectives are described didactically by subject through the training content and deliberately *not* the paths (training methods), which lead to these objectives. Thus the selection of the methods, with which they can put together their training concept for the complete training course, is left open for the teaching personnel. That means that for the individual training sections suitable training methods are to be applied – related to the respective training situation. This openness in the question of training should be seen by the apprentices as a chance which makes it possible for them to proceed flexibly with different training situations.

In § 3, Para 2 of the Vocational Training Regulations an important methodical accent is, however, set with the requirement so to communicate the named training content, "that the apprentices are qualified to carry out a qualified occupational activity within the meaning of § 1, Para. 2 of the Vocational Training Act, which in particular includes independent planning, implementation and monitoring".

Independent action was previously also already the comprehensive objective of training. It is, however, new that the vocational training regulations lay down the promotion of this qualification in the occupational training and to verify this in the intermediate and final examination. In practical training in firms the training objective "independent action" should be continuous principle of training and be systematically communicated.

1) For this compare in detail the legal and collective bargaining rules

2) For this compare with the appropriate rules in the individual Federal State

### 3. Information and explanatory notes on the learning objectives of the training framework plan

The following statements make no claim to completeness but are rather to serve for illustration of individual learning objectives.

Common core qualifications in accordance with § 3, Para. 1, No. 1

Part of the description of occupation requiring training		Explanatory notes
Skills and knowledge to be communicated		
1. Vocational training employment and collective bargaining law [§ 16 No. 1]		
a) Explain significance of apprenticeship contracts, in particular final examination, duration and termination	To be communicated during the whole training	<ul style="list-style-type: none"><li>• Provisions on the apprenticeship contract in §§ 3, 4, 5 Vocational Training Act</li><li>• inter alia statements:<ul style="list-style-type: none"><li>- type and objective of the training</li><li>- start and duration of training</li><li>- probationary period</li><li>- remuneration</li><li>- holidays</li><li>- conditions for termination</li></ul></li></ul>
b) Give mutual rights and obligations from the apprenticeship contract		<ul style="list-style-type: none"><li>• Basis for this are, inter alia:<ul style="list-style-type: none"><li>- Vocational Training Act</li><li>- vocational training regulations</li><li>- Youth Employment Protection Law</li><li>- Working Hours Law</li><li>- Labour and Collective Bargaining Law</li></ul></li><li>• Inter-company training</li><li>• Vocational training school attendance</li><li>• In-firm regulations, e.g. training plan, regulation of tasks, working hours and breaks, right of complaint, contents of Working Hours Regulations</li></ul>
c) Give possibilities of occupational further training		<ul style="list-style-type: none"><li>• Possibilities of adjustment and advancement further training through matching to the technical, economical and social development</li><li>• Operational further training</li><li>• Advancement further training, e.g. Master Technician</li><li>• Possibilities for promotion</li></ul>
d) Give essential parts of the employment contract		<ul style="list-style-type: none"><li>• E.g.:<ul style="list-style-type: none"><li>- description of tasks</li><li>- working hours</li><li>- beginning and duration of employment</li><li>- probationary period</li></ul></li></ul>



Part of the description of occupation requiring training		Explanatory notes
Skills and knowledge to be communicated		
<i>Serial No. 1 cont.</i>		<ul style="list-style-type: none"> <li>- termination</li> <li>- holidays</li> <li>- in-firm regulations and contracts</li> </ul>
e) Give essential provisions of the applicable collective agreements of the training company		<ul style="list-style-type: none"> <li>• Parties to collective agreements, applicable area (spatial, technical, personal) of the collective agreements for employees</li> <li>• Application to apprentices</li> <li>• E.g.: <ul style="list-style-type: none"> <li>- pay, salary, apprentice's pay</li> <li>- length of holidays, holiday bonus</li> <li>- working hours, working time regulation</li> <li>- bonuses</li> </ul> </li> </ul>
<b>2. Structure and organisation of the firm providing training</b> (§ 16 No. 2)		
a) Explain structure and tasks of the firm carrying out training	To be determined throughout the whole of training	<ul style="list-style-type: none"> <li>• Branch affiliation</li> <li>• Legal structure</li> <li>• Objective and range</li> <li>• Structure and process organisation</li> <li>• Interaction of factors on development, on service and on marketing the firm-specific products</li> </ul>
b) Explain basic functions of the training company, such as procurement, manufacture, sales volume and administration		<ul style="list-style-type: none"> <li>• Relationships to <ul style="list-style-type: none"> <li>- employers' associations and unions</li> <li>- occupational organisations, occupational associations and competent bodies</li> </ul> </li> <li>• Their aims, structure and tasks</li> <li>• Commitment to the rules of a collective agreement</li> </ul>
c) Give relationships of the training company and its employees to economic organisations, trade representatives and unions		<ul style="list-style-type: none"> <li>• Principles of trusting collaboration between employer and employee representatives as content of the [German] Industrial Constitution Law, [German] Personnel Representation Law</li> <li>• Employee council, personnel committee, youth and apprentice representatives and their information, consultation and codetermination rights; company/employment agreements</li> </ul>
d) Describe basic elements, tasks and methods of operation of the industrial consultation or personnel representation legal organs of the training company		

Part of the description of occupation requiring training		
Skills and knowledge to be communicated		Explanatory notes
<b>3. Safety and health protection on the job</b> (§ 16 No. 3)		
a) Determine hazards to safety and health in the working place and take steps for their avoidance	To be determined throughout the whole of training	<ul style="list-style-type: none"> <li>• Employers duty to ensure welfare</li> <li>• Health and work safety provisions e.g.: <ul style="list-style-type: none"> <li>- Labour Protection Law</li> <li>- Working Hours Law</li> <li>- Youth Employment Protection Law</li> <li>- Technical Plant and Equipment Safety Law</li> <li>- Hazardous Substances Ordinance</li> <li>- Technical Standards for Hazardous Substances</li> <li>- Labour Safety Law</li> </ul> </li> <li>• Mechanical, biological, chemical , thermal, acoustic and electrical hazards</li> <li>• Hazards and loading due to disregard of ergonomic principles</li> <li>• Hazard symbols and safety markings</li> <li>• Advice and monitoring of firms through external organisations, e.g. supervisory authorities, occupational organisations</li> </ul>
b) Apply occupation-related labour protection and accident prevention regulations		<ul style="list-style-type: none"> <li>• Advisory leaflets and directives for the prevention of accidents when handling substances and auxiliary materials as well as tool machines and plant</li> <li>• Substances hazardous to health</li> <li>• Behavioural rules for the maintenance of health, personal protection equipment, e.g. protection for the head, eyes, mouth, ears and skin</li> </ul>
c) Describe conduct with accidents and introduce initial measures		<ul style="list-style-type: none"> <li>• First aid measures and facilities</li> <li>• Emergency call, escape and rescue routes</li> <li>• Work accident notification (duty to report)</li> </ul>

Part of the description of occupation requiring training		Explanatory notes
Skills and knowledge to be communicated		
<p><i>Serial No. 3 cont.</i></p> <p>d) Apply regulations for preventative fire protection; describe conduct with fires and take measures for the combating of fires</p>		<ul style="list-style-type: none"> <li>• Provisions for protection against fire and explosion</li> <li>• Rules of conduct in cases of fire</li> <li>• Sources of ignition and easily inflammable substances</li> <li>• Method of operation and areas of employment of extinguishing facilities and auxiliary means</li> <li>• Fire extinguishers and fire blankets</li> </ul>
<b>4. Environmental protection</b> (§ 16 No. 4)		
<p>Contribute to the avoidance of operational environmental loads in the occupational area of influence, in particular</p> <p>a) by means of examples explain possible environmental loads due to training operations and their contribution to environmental protection</p> <p>b) apply applicable environmental protection regulations for the firm providing training</p> <p>c) use possibilities for economic and environmentally friendly use of energy and material</p> <p>d) avoid wastes; pass substances and materials to an environmentally friendly disposal</p>	<p>To be determined throughout the whole of training</p>	<ul style="list-style-type: none"> <li>• Determination and avoidance of environmental loads through, for example, noise, exhaust air, substances hazardous to water and soil</li> <li>• Emissions and immissions</li> <li>• Immission Protection Law</li> <li>• Employment of various energy carriers, e.g. electrical current, oil, coal, gas, air water and steam</li> <li>• Possibilities for the economic use of energy e.g. avoidance of leakages, optimum lighting and use of heat</li> <li>• Economic handling of working and auxiliary materials</li> <li>• Marking, keeping separate, storage, utilisation, disposal of wastes</li> <li>• Collection, storage and disposal of industrial wastes</li> <li>• Legal consequences of non-compliance</li> </ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
5. Operational processes; work organisation (§ 16 No. 5)		
a) Note efficiency of operational performances	4	<ul style="list-style-type: none"><li>• Range of available services</li><li>• Availability of resources</li><li>• Costs and revenues</li><li>• Basic elements for calculation</li></ul>
b) Describe types of cost and cost centres		<ul style="list-style-type: none"><li>• Types of cost e.g. personnel, equipment, material</li><li>• Functional accounts chart and its significance</li><li>• Recording and distribution of costs</li></ul>
c) Carry out own work in a customer oriented manner		<ul style="list-style-type: none"><li>• Quality requirements on services</li><li>• Discussions and contacts with customers</li></ul>
d) Apply working and organisation means as well as techniques		<ul style="list-style-type: none"><li>• Forms</li><li>• EDP applications</li><li>• Working procedures, processes, time planning</li></ul>
e) Plan, process and agree tasks within the team; evaluate results, monitor and present		<ul style="list-style-type: none"><li>• Team structures</li><li>• Team ability</li><li>• Teamwork</li></ul>
f) Co-operate with measures to improve work organisation and the design of the working place		<ul style="list-style-type: none"><li>• Compare/analyse</li><li>• Weak points/errors</li><li>• Modifications</li><li>• Operational proposal system</li></ul>
6. Information and documentation, quality assurance measures (§ 16 No. 6)		
a) Procure, process and evaluate information, use information and communications systems	4	<ul style="list-style-type: none"><li>• Specialist books, journals, catalogues, operating instructions, technical documents, electronic communication means</li></ul>
b) Read technical documents and plans, produce sketches		<ul style="list-style-type: none"><li>• Operating instructions, inventory plans, flow diagrams</li><li>• Drawing equipment and sketches</li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
Serial No. 6 cont.		
c) Apply organisational instructions		<ul style="list-style-type: none"> <li>• Process and work instructions</li> <li>• Service and technical operating instructions</li> </ul>
d) Produce work records and reports		<ul style="list-style-type: none"> <li>• Recording of measured data</li> <li>• Technical work procedure plans</li> <li>• Operating conditions of plant components</li> <li>• Maintenance verification</li> <li>• Performance records</li> <li>• Logbook and documentation</li> <li>• Acceptance</li> </ul>
e) Observe legal regulations for the protection of data		<ul style="list-style-type: none"> <li>• Operating specifications</li> <li>• Data security</li> </ul>
f) Carry out, document and monitor quality measures		<ul style="list-style-type: none"> <li>• Significance of quality assurance, e.g. quality management, operating manuals</li> </ul>
<b>7. Environmental protection technology, ecological cycles and hygiene</b> (§ 16 No. 7)		
a) Describe ecological cycles	8	<ul style="list-style-type: none"> <li>• Water cycle <ul style="list-style-type: none"> <li>- water cycle in nature, precipitation, percolation, runoff, evaporation</li> <li>- drawing of water and water usages</li> <li>- types and qualities of water</li> <li>- geogenic and anthropogenic pollution</li> <li>- types of wastewater: domestic wastewater, precipitation water, industrial wastewater, percolation water</li> <li>- wastewater discharge, wastewater treatment, residues of wastewater treatment</li> <li>- eutrophication, self-cleaning strength of surface waters, water quality</li> </ul> </li> <li>• Recycling management, waste management <ul style="list-style-type: none"> <li>- avoidance of waste, low waste product design</li> <li>- product, waste</li> <li>- waste for utilisation, waste for disposal</li> <li>- possibilities for utilisation and disposal of wastes</li> <li>- limits of recycling management</li> </ul> </li> </ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<i>Serial No. 7 cont.</i>		<ul style="list-style-type: none"> <li>• Carbon, nitrogen cycles               <ul style="list-style-type: none"> <li>- oxidation and reduction of carbons</li> <li>- conversion of nitrogen compounds</li> </ul> </li> <li>• Soil uses               <ul style="list-style-type: none"> <li>- application of sewage sludge, wastes and fertilisers</li> <li>- fertilisation of soils</li> <li>- percolation of water</li> <li>- loading of soils</li> <li>- self-cleaning of soils</li> </ul> </li> <li>• Air               <ul style="list-style-type: none"> <li>- the terms "emission" and "immission"</li> <li>- passing of pollutants into the air</li> <li>- aerosols (e.g. sewer cleaning)</li> <li>- global warming, greenhouse effect</li> </ul> </li> </ul>
b) Learn about and describe the causes and interactions of environmental loads of the air, of water, of the soil and of the surroundings		<ul style="list-style-type: none"> <li>• Environmental loads with the operation of networks and plants during processing and control</li> <li>• Environmentally relevant content substances of the soil, air and water and their effects on people, animals and plants</li> </ul>
c) Note principles and rules of hygiene with the operation of networks, systems and plants		<ul style="list-style-type: none"> <li>• Possibilities for transmission, infection of illnesses through intake, skin contact, inspiration</li> <li>• Preventative measures</li> <li>• Personal protection equipment</li> <li>• Disinfection</li> <li>• Washing of hands</li> <li>• Consumption of food and nourishment</li> <li>• Regulation for the use of working clothes</li> <li>• Hygienic monitoring</li> </ul>
d) Describe risks due to pathogens in raw water, wastewater, sludge and waste		<ul style="list-style-type: none"> <li>• Pathogens in water, wastewater, waste</li> <li>• Bacteria, viruses, fungi, toxins, worms, vermin</li> <li>• Conditions for life of pathogens</li> <li>• Typical symptoms of illness</li> </ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<i>Serial No. 7 cont.</i>		
e) Describe networks and plants		<ul style="list-style-type: none"> <li>• Networks and plant systems, e.g. for the processing of water, for wastewater treatment, for waste treatment</li> <li>• Process techniques, machines, equipment, function and/or principles</li> </ul>
f) Describe possibilities for the avoidance and minimisation of environmental loads using plants and techniques		<ul style="list-style-type: none"> <li>• Techniques and processes for the reduction of environmental loads, e.g. rational employment of energy, sludge utilisation, avoidance of waste</li> </ul>
g) Apply legal regulations and sets of rules and standards		<ul style="list-style-type: none"> <li>• Build up of sets of rules and standards</li> <li>• Relevant technical regulation</li> </ul>
<b>8. Fundamental principles of mechanical and process engineering, measurement technology, numerical control engineering and control technology</b> (§ 16 No. 8)		
a) Apply methods for the combination of substances and the separation of mixtures of substances	19	<ul style="list-style-type: none"> <li>• Methods for combination, e.g. mixing, stirring, kneading, gassing</li> <li>• Methods for separation: <ul style="list-style-type: none"> <li>- mechanical separation, e.g. settling, centrifuging, sieving, grading, sifting and precipitating</li> <li>- thermal separation, e.g. drying, volatising, distilling</li> <li>- physical, chemical, biological separation, e.g. precipitation, filtration, absorption</li> </ul> </li> </ul>
b) Employ methods for the conveyance of solids, liquids and gases		<ul style="list-style-type: none"> <li>• Basic physical elements of conveyance technology</li> <li>• Conveyance of solids, e.g. lifting, sucking, blowing, displacing</li> <li>• Conveyance of liquids and gases, e.g. pumping, vacuum sucking</li> </ul>
c) Assemble and dismantle fittings		<ul style="list-style-type: none"> <li>• Structure, employment and function of shut-off devices and control fittings, valves, gate valves, taps and check (clack) valves, hose pipes and pipe connections, seals and expendable parts</li> <li>• Technical installation tasks, e.g. assembly and dismantling of pipeline sections</li> </ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<p><i>Serial No. 8 cont.</i></p> <p>d) Employ and operate units, in particular pumps, blowers, compressors and electrical motors and combustion engines as well as equipment for heating, cooling and tempering</p>		<ul style="list-style-type: none"> <li>• Structure and function: <ul style="list-style-type: none"> <li>- electrical motors, combustion engines</li> <li>- pumps, e.g. centrifugal pumps, positive displacement pumps, vacuum pumps</li> <li>- blowers and compressors</li> <li>- heating plant, e.g. hot water heating, heat exchangers, feed and circulation pumps, safety facilities</li> <li>- cooling and tempering, e.g. ventilators, blowers, condensate dryers, air conditioning equipment</li> </ul> </li> <li>• Application examples for pneumatics and hydraulics</li> <li>• Pump characteristic curves, system characteristic lines, efficiency</li> <li>• Inspection and maintenance</li> </ul>
<p>e) Differentiate methods of measurement, control and regulation, explain structure and function of operation-specific equipment</p>		<ul style="list-style-type: none"> <li>• Methods <ul style="list-style-type: none"> <li>- mechanical, pneumatic, electric and electronic methods of measurement</li> <li>- measurement accuracy, measurement range, scale graduation, sensitivity, reproducibility, response time</li> <li>- differentiation control/regulation</li> <li>- basic terms, e.g. probe, measuring site, measuring transducer, regulator, control device, regulating point, control variable, control loop, actual-set-alignment, block diagram</li> <li>- standard signal, registration technology</li> </ul> </li> <li>• Equipment <ul style="list-style-type: none"> <li>- equipment for measuring, for example, temperature, pressure, height level and throughflow</li> <li>- float control</li> <li>- setting of pump switching and control</li> <li>- bimetal regulators</li> </ul> </li> </ul>
<p>f) Carry out measurement, control and regulation processes under instruction</p>		<ul style="list-style-type: none"> <li>• Operational facilities for regulation of processes</li> <li>• Causes of failures</li> <li>• Measures for the remedying of failures, e.g. switching to manual operation, passage of information</li> </ul>



Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<i>Serial No. 8 cont.</i>  g) Employ energy carriers and types of energy taking account of economic efficiency, efficiency and the hazard potential		<ul style="list-style-type: none"><li>• Primary energy carriers, e.g. natural gas, coal, oil, water, sun energy</li><li>• Secondary energy carriers, e.g. steam, electrical current, digester gas and dump gas, fuels, compressed air</li><li>• Storage of energy carriers</li><li>• Hazard classes of energy carriers</li></ul>
h) Describe methods of energy conversion		<ul style="list-style-type: none"><li>• Power-heat coupling</li><li>• Combustion</li><li>• Steam generation and usage</li><li>• pressure water generation</li><li>• Biochemical processes</li><li>• Efficiency</li></ul>
<b>9. Dealing with risks posed by electricity</b> {§ 16 No. 9}		
a) Describe basic quantities and their relationships	4	<ul style="list-style-type: none"><li>• Primary quantities: current, voltage resistance (actual resistance, capacitive, inductive)</li><li>• Differentiate Ohm’s Law and the following dependencies of the individual quantities derived from this</li><li>• Current (direct current, alternating current, three-phase current)</li><li>• Build up of a circuit, series connection, parallel connection</li><li>• Power (real power, apparent power, reactive power)</li><li>• Efficiency</li><li>• Generator and motor principles</li></ul>
b) Identify dangers of electrical current at fixed and changing work places		<ul style="list-style-type: none"><li>• Effect of electrical currents on humans</li><li>• Accidents due to electrical current</li><li>• Body current and contact voltage</li><li>• Voltage flashovers</li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
Serial No. 9 cont.		<ul style="list-style-type: none"><li>• Fixed and movable electrical apparatus</li><li>• Damaged insulation and connections</li></ul>
c) Take and arrange protective measures for the avoidance of hazards due to electrical current		<ul style="list-style-type: none"><li>• Protective measures and their effects: e.g. protective extra low voltage, protective insulation, fuse disconnection, residual current circuit breaking</li><li>• The five safety rules</li><li>• Types of protection and protective classes</li><li>• Suitable and approved electrical apparatus</li></ul>
d) Describe conduct with accidents due to electrical current and introduce initial measures		<ul style="list-style-type: none"><li>• Accident prevention regulations</li><li>• First aid with accidents due to electrical current</li></ul>
<b>10. Application of scientific principles</b> (§ 16 No. 10)		
a) Measure and evaluate physical quantities, determine material properties	10	<ul style="list-style-type: none"><li>• Length, volume, mass, time, temperature, pressure</li><li>• Material properties: e.g. electrical conductivity, pH value, oxygen content, density, melting point, boiling point</li><li>• Measuring equipment with various measurement accuracy</li></ul>
b) Take, prepare, mark, conserve and preserve samples following different processes		<ul style="list-style-type: none"><li>• Significance of sampling</li><li>• Types of sampling</li><li>• Sampling equipment</li><li>• Storage, transport, conservation</li><li>• Sampling protocols</li></ul>
c) Explain relationships of structure and characteristic properties of materials		<p>Chemical symbols and compounds:</p> <ul style="list-style-type: none"><li>• inorganic compounds: e.g. metals, acids, alkaline solutions, salts, oxides</li><li>• organic compounds: e.g. hydrocarbons, alcohols, carbonic acids, halogenated hydrocarbons, fats and plastics</li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<p><i>Serial No. 10 cont.</i></p> <p>d) Calculate, produce and separate mixtures of substances; monitor results</p>		<ul style="list-style-type: none"> <li>• Homogeneous and heterogeneous substances and mixtures of substances</li> <li>• Details of concentration, blending ratios, percentage by mass and by volume</li> <li>• Process and equipment technology</li> </ul>
<p>e) Describe reaction processes, in particular precipitation reactions, acid-base reactions and Redox reactions</p>		<ul style="list-style-type: none"> <li>• Reaction processes of metals, acids, bases, salts and other relevant substances</li> <li>• Substance conversions</li> <li>• Neutralisation, precipitation, Redox reaction</li> </ul>
<p>f) Carry out qualitative and quantitative determinations and evaluate results</p>		<ul style="list-style-type: none"> <li>• Anionic and cationic detection</li> <li>• Volumetric analysis</li> <li>• Gravimetric analysis</li> <li>• Photometric analysis</li> <li>• Employment of indicators</li> <li>• Handling of reaction products</li> </ul>
<p>g) Describe structure types and living conditions of micro-organisms and describe their significance for work in the operation</p>		<ul style="list-style-type: none"> <li>• Aerobic and anaerobic conditions</li> <li>• Influences on micro-organisms, e.g. temperature, pH value, nutrient availability</li> <li>• Micro-organisms in operational processes</li> <li>• Biological working materials and their classification into risk groups</li> </ul>
<p>h) Present material cycles and describe microbiological methods of investigation</p>		<ul style="list-style-type: none"> <li>• Significance of micro-organisms in the natural and operational material cycles, in particular nitrogen and carbon cycles</li> <li>• Parameter of microbiological processes</li> <li>• Handling a microscope</li> <li>• Microscopic picture</li> </ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
11. Materials, ancillary materials and dangerous materials, dangerous working substances (§ 16 No. 11)		
a) Select and employ materials and ancillaries taking into account their properties and applicability	12	<ul style="list-style-type: none"><li>• Metals, plastic, wood, concrete</li><li>• Lubricants and coolants</li><li>• Chemical and physical properties, e.g. expansion behaviour, melting point, flash point, electrical conductivity, elasticity, thermal and chemical resistance, hardness, viscosity, fracture behaviour</li></ul>
b) Recognise hazardous substances and hazardous working materials and employ these taking account of safety regulations and protective measures processes		<ul style="list-style-type: none"><li>• Characteristic properties, e.g. corrosive, combustible, potentially explosive, contaminative, irritant</li><li>• Hazard symbols</li><li>• Safety data sheet</li><li>• Hazard instructions</li><li>• Personal and technical protective measures</li></ul>
c) Handling of tools, machines and equipment for the processing of materials		<ul style="list-style-type: none"><li>• Process materials, e.g. measure, scribe, corn, file, drill, saw, grind, burr, bend, ream</li><li>• Flange, screw, welded, hard and soft solder connections, Velcro fastener, turn-lock fastener</li><li>• Working principles of component connections (material connection, frictional connection, positive locking)</li></ul>
d) Produce work pieces made from metal and plastics		
e) Describe joining techniques		
f) Shape, join and separate metals and plastics under tension and without cutting		
12. Storage, tools and equipment (§ 16 No. 12)		
a) Store and transport materials and goods according to their physical qualities and material properties	4	<ul style="list-style-type: none"><li>• Forms of store, types of store, store facilities</li><li>• Economic store management</li><li>• Storage conditions</li></ul>
b) Carry out inventory checks and introduce corrections		
c) Operate cranes, elevators and transport facilities		<ul style="list-style-type: none"><li>• Industrial trucks, cranes and elevators, e.g. fork-lift trucks, travellers, conveyor belts, cranes, wheel loaders, chain conveyors</li></ul>
d) Employ, inspect, maintain and clean working equipment and facilities		<ul style="list-style-type: none"><li>• Tools, equipment and workshop facilities</li><li>• operating instructions</li><li>• Servicing, repair and maintenance instructions</li><li>• Fault indication and fault correction</li></ul>
e) Determine faults on working equipment and facilities and take measures for their correction		

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 16 <sup>th</sup> – 36 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
13. Safety regulations and operating instructions (§ 16 No. 13)		
Apply measures for work safety and the protection of labour with the collection, conveyance and the treatment of wastes, hazardous substances and special wastes	4	<ul style="list-style-type: none"><li>• Personal protective equipment (PPE), e.g. breathing, eye, ear, body protection (protective helmet, protective clothing)</li><li>• Regulations for the handling of protective equipment, significance of black/white installations</li><li>• Sources of hazards and impairment of health with wastes</li><li>• Hygienic measures with wastes</li><li>• Occupational medical preventative examinations, vaccinations</li><li>• Characteristics and mode of action of hazardous substances and wastes, e.g. explosion hazardous, fire supporting, highly inflammable, poisonous, health damaging</li><li>• Safety measures for hazardous wastes, e.g. asbestos, PCBs, wastes containing mercury</li><li>• Safety and health markings, danger signs/symbols, Permitted and prohibited signs, hazard signs, hazard leaflets, pictogram's, rescue signs</li><li>• Bases for the transport of hazardous good</li><li>• Hazards through biological substances. Protection with biological work substances</li><li>• Max. working place concentration values, technical guidance concentration values</li></ul>
14. Customer-oriented activities (§ 16 No. 14)		
a) Present tasks and the significance of field service and office duties	4	<ul style="list-style-type: none"><li>• Significance for the customers and members of staff</li><li>• Points of contact with customers in the concern</li><li>• Market control and contract control</li><li>• Internal communication</li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 16 <sup>th</sup> – 36 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<p><i>Serial No. 14 cont.</i></p> <p>b) Carry out customer-oriented discussions and negotiations, make use of possibilities to ensure customer loyalty</p> <p>c) Observe legal relationships between firms and customers</p> <p>d) Take note of customer satisfaction analysis and supplier assessment</p>		<ul style="list-style-type: none"> <li>• Communication rules</li> <li>• Technical communication means</li> <li>• Requests for quotations, offers, acceptance of orders</li> <li>• Notifications, info-brochures for customers</li> <li>• Application of operational standards</li> <li>• Ratio citizens – disposal firms               <ul style="list-style-type: none"> <li>- licensing and tender delivery responsibilities for wastes</li> <li>- compulsory follow-up and use</li> </ul> </li> <li>• ratio commercial businesses – disposal firms               <ul style="list-style-type: none"> <li>- appropriation of wastes</li> <li>- offers for disposal</li> <li>- remuneration rules</li> </ul> </li> <li>• Customer portrait, supplier portrait</li> <li>• Demand from customers for order processing</li> <li>• Management of complaints</li> <li>• Assessment of complaints, processing of objections</li> </ul>
<b>15. Commercial activities</b> (§ 16 No. 15)		
<p>a) Describe principles of waste management as well as the competitive situation and basic elements of pricing</p>	4	<ul style="list-style-type: none"> <li>• Low waste production, product responsibility</li> <li>• Avoidance, reduction, utilisation of wastes</li> <li>• Environmentally friendly disposal</li> <li>• Public authority tasks, private enterprise tasks, activities as appointed third party</li> <li>• Advantages of specialist disposal firms in competition</li> <li>• Polluter principle</li> </ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 16 <sup>th</sup> – 36 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<p><i>Serial No. 15 cont.</i></p> <p>b) Explain supply and demand</p>		<ul style="list-style-type: none"> <li>• Disposal market</li> <li>• Disposal and utilisation proposals</li> <li>• Customers, disposers of wastes</li> <li>• Positive, negative market value of wastes</li> <li>• Marketing, waste exchanges</li> <li>• Bases for calculation</li> <li>• Fixed costs, variable costs, overheads</li> </ul>
<b>16. Wastes and waste reception</b> (§ 16 No. 16)		
<p>a) Differentiate wastes for utilisation, and wastes for disposal</p>	9	<ul style="list-style-type: none"> <li>• Product design</li> <li>• Recycling strategies, e.g. preservation of resources, raw material cycle, use of energy</li> <li>• Transfer from product to waste</li> <li>• Cycles of products and materials</li> <li>• Waste for utilisation/waste for disposal</li> </ul>
<p>b) Provide information on source of waste, points of production for waste, waste yields and types of waste</p>		<ul style="list-style-type: none"> <li>• Places of production, e.g. households, commerce</li> <li>• Waste and working material yields, amount of waste per inhabitant/year, in commerce and industry</li> <li>• Seasonal variations</li> </ul>
<p>c) Monitor and balance waste amounts</p>		<ul style="list-style-type: none"> <li>• Classification of waste and monitoring of waste streams</li> <li>• Recording of quantities waste statistics, characteristic values</li> <li>• Collaboration with waste balances</li> </ul>
<p>d) Differentiate and classify wastes according to properties, in particular according to the degree of the requirement for monitoring.</p>		<ul style="list-style-type: none"> <li>• Wastes not requiring monitoring</li> <li>• Wastes requiring monitoring</li> <li>• Wastes requiring particular monitoring</li> </ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 16 <sup>th</sup> – 36 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
Serial No. 16 cont.		<ul style="list-style-type: none"><li>• Hazardous/non-hazardous wastes</li><li>• Dangerous substances and biological working materials with waste</li></ul>
e) Identify, declare wastes and classify them to the European waste register		<ul style="list-style-type: none"><li>• Criteria for the waste declaration</li><li>• Employment of the European waste register</li><li>• Structure and system of the waste register</li></ul>
f) In plants and at the waste producers, accept, separate and provide for the individual material streams and their further processing		<ul style="list-style-type: none"><li>• Separate holding of wastes, classification for utilisation, disposal routes</li><li>• Possibilities for acceptance, e.g. compacting, compressing, comminution, mixing, separating</li><li>• Recording of quantities, e.g. according to mass, according to volume</li></ul>
g) Specify materials and products for utilisation and disposal, define characteristics and describe quality requirements		<ul style="list-style-type: none"><li>• Conditions for materials and products with utilisation, disposal, e.g. paper, glass, light packaging (LP), bio-waste</li><li>• Foreign substances, problem substances</li><li>• Quality requirements, quality criteria</li><li>• Thermal value, alternative fuels, secondary fuels</li></ul>
h) Indicate processing criteria and reaction possibilities of various wastes		<ul style="list-style-type: none"><li>• Separate holding of dangerous substances, hazardous substances</li><li>• Prohibition of mixing</li><li>• Criticality characteristics</li></ul>
<b>17. Waste disposal processes</b> (§ 16 No. 17)		
a) Describe physical, chemical and biological processes and their significance	11	<ul style="list-style-type: none"><li>• Knowledge about processes of waste utilisation, treatment and disposal</li><li>• Mechanical procedures, e.g. comminution, compaction, sorting, classifying, compressing, processing, shearing, cutting, breaking, grinding, granulating</li><li>• E.g. separate process, magnetic separation, density sorting, sieving, flotation, sifting, flow classification</li></ul>



Part of the description of occupation requiring training	Temporal guidance values in weeks in the 16 <sup>th</sup> – 36 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
Serial No. 17 cont.		<ul style="list-style-type: none"> <li>• Settling, sedimentation, centrifuging (cycloning), filtering</li> <li>• Aging, conversion, leaching, elution</li> <li>• Biological treatment, aerobic and anaerobic procedures</li> <li>• Thermal treatment, e.g. combustion</li> <li>• Treatment of special waste, chemical-physical treatment, e.g. precipitation, neutralisation, detoxification</li> <li>• Dewatering and hardening</li> <li>• Landfilling</li> </ul>
b) Present plant engineering and combinations		<ul style="list-style-type: none"> <li>• Methods of operation and targets</li> <li>• Mechanical engineering requirements</li> </ul>
c) Describe requirements on processes and plant engineering		<ul style="list-style-type: none"> <li>• Requirements on mechanical processes, e.g. <ul style="list-style-type: none"> <li>- selectivities, separation quality</li> <li>- sorting criteria, foreign substances, problem substances</li> </ul> </li> <li>• Requirements on biological processes, e.g. <ul style="list-style-type: none"> <li>- oxygen requirement and temperature with conversion processes</li> <li>- C/N – ratios with composting</li> <li>- water content</li> </ul> </li> <li>• Requirements of thermal treatment processes, e.g. <ul style="list-style-type: none"> <li>- oxygen requirement, thermal value and temperature with thermal treatment</li> </ul> </li> <li>• Requirements on chemical-physical treatment, e.g. <ul style="list-style-type: none"> <li>- reaction conditions</li> </ul> </li> </ul>
d) Determine environmental loads, describe possibilities for their avoidance and arrange countermeasures when required		<ul style="list-style-type: none"> <li>• Identification of immissions and emissions, e.g. dust, noise, gases, odours, fires, flying paper, vermin, appearance of the plant</li> <li>• Measures for prevention</li> </ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 16 <sup>th</sup> – 36 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
18. Operation and maintenance (§ 16 No. 18)		
a) Carry out and document commissioning and decommissioning of plant components	8	<ul style="list-style-type: none"><li>• Operating manual</li></ul>
b) Document normal operation of plants		<ul style="list-style-type: none"><li>• Measurement, control, regulation during operation</li><li>• Switching from automatic operation to manual operation</li><li>• Documentation of operation, entries in the operating logbook</li></ul>
c) Operate, monitor and service equipment, apparatus and plant		<ul style="list-style-type: none"><li>• Conditions for process control</li><li>• Servicing plans, servicing intervals, inspection and test logbook</li><li>• Documentation of servicing tasks</li></ul>
d) Determine and document operating faults, introduce countermeasures		<ul style="list-style-type: none"><li>• Identification of operational faults and determination of the causes</li><li>• Arrange repairs</li></ul>
19. Material streams, logistics and disposition (§ 16 No. 19)		
a) Describe vehicle types, types of container, collection systems and put them together according to customer requirements and areas of employment	7	<ul style="list-style-type: none"><li>• Types, sizes of containers</li><li>• Discharge and exchange system for various types of waste</li><li>• Containers with compaction</li><li>• Types of vehicle, chassis, structure, filling chute</li><li>• Collection system (collect and bring systems)</li><li>• Disposal solutions</li></ul>
b) Employ ancillaries for the implementation of the disposition		<ul style="list-style-type: none"><li>• Inventory plans</li><li>• Management of customer data</li><li>• Vehicle plan, general plans</li><li>• General container plans</li><li>• Resource plans</li><li>• Collection conditions</li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 16 <sup>th</sup> – 36 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<i>Serial No. 19 cont.</i>		
c) Plan the employment of vehicles, personnel and containers		<ul style="list-style-type: none"><li>• Resource planning of different conveyance systems</li><li>• Classification of working papers</li><li>• Collection, route, collection round planning</li></ul>
d) Describe possibilities for the appropriation, transportation, storage and intermediate storage		<ul style="list-style-type: none"><li>• Collection schedule, collection on request</li><li>• Transportation by road, by rail</li><li>• Weight utilisation of vehicles</li><li>• Transshipment of wastes</li><li>• Interchangeable containers with collection systems, vehicles</li></ul>
<b>20. Measures for quality assurance</b> (§ 16 No. 20)		
a) Describe basic elements of quality and environmental management and the significance of the specialist disposal firm	6	<ul style="list-style-type: none"><li>• Basic requirements</li><li>• Technical qualification/specialist knowledge of personnel</li><li>• Certification of the firm</li><li>• Disposal community</li><li>• Advantages of competition</li><li>• Advanced recognition</li></ul>
b) Apply procedural instructions and work instructions of systems and record changes		<ul style="list-style-type: none"><li>• Instruction of operating personnel</li><li>• Implementation of instructions</li></ul>
c) Specify requirements for reusable wastes and materials which are to be utilised and delivered and carry out quality controls		<ul style="list-style-type: none"><li>• Quality requirements for reusable products, materials for materials which are to be utilised, for the return of processed materials into the raw material cycle</li><li>• Carrying out of quality and quality controls</li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 16 <sup>th</sup> – 36 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<i>Serial No. 20 cont.</i>		
d) Carry out sampling and processing of samples for analysis		<ul style="list-style-type: none"><li>• Methods of a systematic and purposeful sampling, sampling plans</li><li>• Facilities and equipment for sampling</li><li>• Marking, conserving, preserving</li><li>• sampling protocol</li></ul>
e) Apply measurement and analysis procedures for the incoming and outgoing materials		<ul style="list-style-type: none"><li>• Organoleptic examination of wastes and materials: odour, appearance, properties, colour</li><li>• Physical and chemical investigations, e.g.<ul style="list-style-type: none"><li>- specific weight and volume</li><li>- water content, moisture</li><li>- conductivity, salt content</li><li>- sieving and sorting analysis</li><li>- temperature measurements</li><li>- flash point, thermal value</li><li>- TOC</li></ul></li></ul>
f) Evaluate analysis results together with acceptance criteria		<ul style="list-style-type: none"><li>• Identify pollutants, problem substances</li><li>• Assess degree of hazard</li><li>• Compare with relevant monitoring values</li></ul>
g) Observe requirements of quality marking of wastes and products		<ul style="list-style-type: none"><li>• Quality marks, e.g. RAL in the application<ul style="list-style-type: none"><li>- compost (criteria)</li><li>- secondary fuels (criteria)</li><li>- other materials, e.g. old glass, used paper</li></ul></li></ul>
<b>21. Information technology</b> (§ 16 No. 21)		
a) Apply firm-specific programmes for recycling and waste management	4	<ul style="list-style-type: none"><li>• Programmes, e.g.<ul style="list-style-type: none"><li>- management and tracking of containers</li><li>- management of customer data</li><li>- management of orders and invoices</li><li>- route and collection round planning</li><li>- vehicle employment planning</li><li>- personnel employment planning</li><li>- recording of operating data</li><li>- operating documentation</li></ul></li></ul>
b) Draw up bar and circular charts, characteristic curves and tables for waste management questions and documentation		<ul style="list-style-type: none"><li>• Representation of material streams</li><li>• Representation of input/output quantities</li><li>• annual comparisons</li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 16 <sup>th</sup> – 36 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<p><i>Serial No. 21 cont.</i></p> <p>c) Apply firm's system of forms</p>		<ul style="list-style-type: none"> <li>• E.g. verification procedures, operating logbook</li> <li>• E.g. Order system, invoicing system</li> </ul>
<b>22. Legal provisions and technical rules and standards</b> (§ 16 No. 22)		
<p>a) Apply legal arrangements and specialist-related technical rules and standards</p>	<p>4*</p>	<ul style="list-style-type: none"> <li>• Laws, e.g.               <ul style="list-style-type: none"> <li>- European Waste Directives</li> <li>- Recycling Management Waste Law</li> <li>- National waste laws</li> <li>- Waste statutes</li> </ul> </li> <li>• Ordinances [German], e.g.               <ul style="list-style-type: none"> <li>- Verification Ordinance</li> <li>- Specialist Disposal Firm Ordinance</li> <li>- Ordinance for the Utilisation of Wastes</li> <li>- Landfill Ordinance</li> <li>- 17th Federal German Immission Protection Ordinance (BlmSchVO)</li> </ul> </li> <li>• German Technical Directive Waste (TA-Abfall)/Municipal Solid Waste Directive (TA-Siedlungsabfall)</li> <li>• Association rules and standards</li> <li>• Standard specifications</li> </ul>
<p>b) Apply verification procedures</p>		<ul style="list-style-type: none"> <li>• Disposal verification, basic procedure, privileged procedure, advanced monitoring, disposition monitoring, collective disposal verification, acceptance certificate</li> <li>• Advice note procedure</li> </ul>
<p>c) Give information on waste management concepts and balances and prepare appropriate data</p>		<ul style="list-style-type: none"> <li>• Basic elements of waste management concepts and waste balances for producers of waste, for public bodies</li> </ul>

\* To be communicated together with other training subject matter

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 16 <sup>th</sup> – 36 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
Focal point logistics, collection and marketing		
1. Commercial activities (§ 16 No. 15)		
a) Analyse and collate customer wishes; accept and execute customer orders	9	<ul style="list-style-type: none"><li>• Recording of quantities, types and places of occurrence of waste, and frequency of removal</li><li>• Customer service and advice, presentation of the services on offer</li><li>• Classification of customers’ disposal problems</li></ul>
b) Order wastes and assign to utilisation or disposal routes		<ul style="list-style-type: none"><li>• Acceptance conditions of the respective plant</li><li>• Securing of disposal capacities</li></ul>
c) Draw up accompanying documents and invoices		<ul style="list-style-type: none"><li>• Production of disposal verifications and accompanying documents</li><li>• Carrying out of verification for customers and own business</li><li>• Assembly of data for invoicing</li></ul>
d) Record expenses for services, determine costs and calculate services		<ul style="list-style-type: none"><li>• Determination of expenses for containers, vehicles, equipment and personnel</li><li>• Allocation of cost positions</li><li>• Determination of expenses of services</li><li>• Determination of characteristic figures</li></ul>
e) Co-operate with the specifications and schedules of prices and offers		<ul style="list-style-type: none"><li>• Conversion of volumes into transport weights for different wastes</li><li>• Calculation of compaction with waste</li><li>• Cost unit rates for personnel, vehicles, equipment, ancillaries and operating supply items</li><li>• Determination of operating expenses</li><li>• Proposal for the offer of services</li></ul>
f) Process customer claims		<ul style="list-style-type: none"><li>• Handling of claims, complaints, notifications of defects</li><li>• Register of complaints</li><li>• Improvement of services</li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 16 <sup>th</sup> – 36 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<p><i>Serial No. 1 cont.</i></p> <p>g) Document procedures according to legal and operational requirements</p>		<ul style="list-style-type: none"> <li>• Documentation of provision of operational services and of plant-related data</li> <li>• Retention periods, data and forms</li> </ul>
<b>2. Material streams, logistics and disposition</b> (§ 16 No. 19)		
a) Accept wastes into intermediate storage and transfer stations	19	<ul style="list-style-type: none"> <li>• Acceptance conditions</li> <li>• Delivery documents and waste management accompanying documents</li> <li>• Sampling</li> </ul>
b) Collate storage receipts and issues taking into account quality and quantity specifications		<ul style="list-style-type: none"> <li>• Input/output quantities, storage quantities</li> <li>• Keeping of storage logbooks</li> <li>• Storage capacities and safety regulations</li> <li>• Operation of store installations</li> </ul>
c) Operate stationary and mobile collection points and carry out pollutant collections		<ul style="list-style-type: none"> <li>• TGRS 520 [German], safety precautions</li> <li>• Knowledge of vehicles</li> <li>• Acceptance conditions</li> <li>• Storage and transport conditions, sorting criteria</li> <li>• Handling of hazardous wastes</li> <li>• Transport of hazardous goods</li> </ul>
d) Describe bring and collect systems		<ul style="list-style-type: none"> <li>• Collection of residual waste</li> <li>• Collection of potentially recyclable materials, e.g. LVP (light packaging); paper, glass, biowaste, electrical/electronic scrap</li> <li>• Bulky waste collection: collection as required, scheduled collection</li> <li>• Problem wastes</li> <li>• Depot container collections</li> <li>• Potentially recyclable wastes, recycling depots</li> <li>• Container transport on private properties (full/partial service)</li> </ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<p><i>Serial No. 2 cont.</i></p> <p>e) Allocate types of interchangeable and discharge system containers as well as AS containers for the acceptance of different types of waste to employment areas</p>		<ul style="list-style-type: none"> <li>• Types of container design for different wastes</li> <li>• Marking, securing of containers</li> <li>• Container service</li> <li>• Container identification, container tracking, container invoicing</li> <li>• Setting up on private property, public traffic zones (special usage)</li> <li>• Container security day/night</li> <li>• Dimensions, weights of containers</li> <li>• Technical safety tests of containers</li> </ul>
<p>f) Employ transport systems for pasty, fluid and other wastes</p>		<ul style="list-style-type: none"> <li>• Transport of small quantities via containers, via vehicles</li> <li>• Tanker vehicles, suction/pressure vehicles</li> </ul>
<p>g) Describe vehicle engineering and possibilities for employment of vehicles including acceptance, filling/bulking, identification and weighing systems</p>		<ul style="list-style-type: none"> <li>• Vehicle: chassis, construction, filling/bulking</li> <li>• Waste collection vehicle 2000</li> <li>• Safety marking of vehicles and equipment</li> <li>• Accident prevention regulation vehicles</li> <li>• Dimensions, weights, axle loads of vehicles</li> <li>• Turning radii of vehicles</li> <li>• Scheduling of main inspections, special brake inspections, exhaust investigations of vehicles</li> <li>• Filling/bulking</li> <li>• Loading systems</li> <li>• Identification, weighing and volume measurement systems</li> <li>• Hydraulic systems</li> </ul>



Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<i>Serial No. 2 cont.</i>		
h) Allocate containers, vehicles and personnel		<ul style="list-style-type: none"><li>• Structuring of working times, shift operation, times at the wheel</li><li>• Working documents, accompanying documents</li><li>• Transport approval</li><li>• Marking and transport of hazardous goods</li></ul>
i) Carry out operational planning and co-operate with collection round optimisation		<ul style="list-style-type: none"><li>• Collection round planning, district planning<ul style="list-style-type: none"><li>- manual</li><li>- ADP-supported</li></ul></li></ul>
k) Determine expenses for the systems and carry out cost determination and performance controls		<ul style="list-style-type: none"><li>• Cost positions for the individual collection systems</li><li>• Basic elements of cost recording</li><li>• Recording of personnel hours, vehicle hours</li><li>• Checking of vehicle and personnel deployment</li><li>• Execution of simple cost determination</li><li>• Comparison actual/planned</li></ul>
<b>3. Safety regulations and operating instructions</b> (§ 16 No. 13)		
a) Apply safety regulations with hazardous substances and biological working materials	2	<ul style="list-style-type: none"><li>• Hazardous Substance Ordinance</li><li>• Differentiation of hazardous goods – hazardous materials</li><li>• Technical rules for hazardous materials, e.g. asbestos</li></ul>
b) Apply guidelines of work safety for storage, collection and conveyance		<ul style="list-style-type: none"><li>• Transport approval</li><li>• Storage of hazardous materials and substances hazardous to water</li><li>• Handling of hazardous materials</li><li>• Substance in accordance with the ordinance for inflammable substances (Hazard Class A I to A III)</li><li>• Law on the conveyance of hazardous goods, Hazardous Goods Ordinance</li><li>• Marking of vehicles</li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<i>Serial No. 3 cont.</i>		<ul style="list-style-type: none"> <li>• Duties of persons employed, e.g. company, conveyer, shipper, loader, packer, vehicle owner, recipient</li> <li>• Advisory leaflets for accidents</li> <li>• Load security facilities</li> <li>• Authorised persons in the company</li> </ul>
c) Apply regulations of hazardous goods law		<ul style="list-style-type: none"> <li>• Provisions of the ADR (European Agreement on the conveyance of dangerous goods by road)</li> <li>• Hazardous goods transport</li> <li>• Small quantity regulation</li> </ul>
d) Apply road traffic law and freight traffic law for the collection and transport of wastes		<ul style="list-style-type: none"> <li>• Times at the wheel, daily times at the wheel, breaks in times at the wheel</li> <li>• Tachograph disk</li> <li>• Ordinance on the implementation of the vehicle crew law</li> <li>• [German] Law on Road haulage (GüKG) (exemptions/regulation of exceptions)</li> <li>• Road traffic licensing ordinance</li> <li>• Road Traffic ordinance (Driver)</li> <li>• Driving on roads with working machines</li> </ul>
e) Apply activity-related operating instructions		<ul style="list-style-type: none"> <li>• Instructions for the area of logistics, collection and transport</li> </ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
Focal point waste utilisation and treatment		
1. Waste disposal processes (§ 16 No. 17)		
a) Accept, treat and prepare wastes	17	<ul style="list-style-type: none"><li>• Delivery conditions for the different materials, products and wastes</li><li>• Advice to and care of supplier with delivery</li><li>• Maintenance of the separation characteristics</li><li>• Securing and storage of falsely declared wastes, return of wastes</li><li>• Accompanying documents, delivery documents</li><li>• Registration of types and quantities of waste</li></ul>
b) Store wastes and products in intermediate stores, and then store		<ul style="list-style-type: none"><li>• Storage and stacking of dismantled and reusable products, parts</li><li>• Storage of liquids, of problem wastes, hazardous substances, of processed raw materials, of materials hazardous to water</li><li>• Security against groundwater, soil hazarding, drifting, odour formation, danger of fire</li></ul>
c) Description of basic operations of processing, utilisation and treatment		<ul style="list-style-type: none"><li>• Types of comminution</li><li>• Particle dimensions with comminution, coarse to fine comminution</li><li>• Machines for comminution, e.g. rolling crushers, impact crushers, hammer crushers, shattering mills, chopping mills, rotor cutters, shredders and their areas of application</li><li>• Separation<ul style="list-style-type: none"><li>- classifying</li><li>- sieving- separation of grain classes</li><li>- flow classifying – separation of light material</li><li>- screening – separation into grain classes</li><li>- sorting</li><li>- separator according to density – separation of plastics</li><li>- magnetic separator – separation of ferrous metals</li><li>- electric and eddy current slicers – separation of non-ferrous metals</li><li>- optical sorting – separation of glass and plastic</li><li>- flotation – preparation of paper and cardboard</li></ul></li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<i>Serial No. 1 cont.</i>		<ul style="list-style-type: none"> <li>• Settling, sedimentation, centrifuging</li> <li>• Granulating</li> <li>• Special techniques and processes of preparation, e.g. optical processes</li> </ul>
d) Describe process steps for the creation of products from wastes		<ul style="list-style-type: none"> <li>• Recycling cycles               <ul style="list-style-type: none"> <li>- product-oriented recycling</li> <li>- component-oriented recycling</li> <li>- material-oriented recycling</li> <li>- working material, raw material recycling</li> </ul> </li> <li>• Dismantling and assembly, e.g. electrical old equipment</li> <li>• Parts and separation</li> </ul>
e) Apply treatment processes for secondary raw materials		<ul style="list-style-type: none"> <li>• Washing and drying</li> <li>• Pollutant breakdown</li> <li>• Separation into material fractions, comminution</li> </ul>
f) Apply process combinations of processing and utilisation		<ul style="list-style-type: none"> <li>• Procedural planning</li> <li>• Mechanical engineering operation</li> </ul>
g) Remove problem and foreign material in the processing and utilisation process		<ul style="list-style-type: none"> <li>• Identification and removal of pollutants, problem and foreign substances</li> </ul>
h) Determine pollutants, identify hazard potentials and assign to disposal routes		<ul style="list-style-type: none"> <li>• Hazard potentials of pollutants, in particular with destruction and release</li> <li>• Manufacturer information on pollutant loading</li> <li>• Disposal of pollutants, problem and foreign substances</li> </ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
2. Operation and maintenance (§ 16 No. 18)		
a) Control, regulate and monitor methods of processing and utilisation	6	<ul style="list-style-type: none"><li>• Process steps of processing and utilisation for individual substances, material streams</li></ul>
b) Operate measuring, control and regulation facilities		<ul style="list-style-type: none"><li>• Method of function of individual units, machines and facilities</li></ul>
c) Monitor and service plant components and facilities		<ul style="list-style-type: none"><li>• Manufacturer's operating instructions</li><li>• Measuring, control and regulation possibilities and facilities of the plant for process monitoring</li><li>• Monitoring of the consumption of energy, operating materials, ancillaries, regulation of gas and water supplies</li><li>• Observance of quality requirements</li><li>• Optimisation of the procedures</li><li>• Switching from automatic to manual operation</li><li>• Commissioning, decommissioning, normal operation</li><li>• Servicing plans, servicing and care tasks</li></ul>
d) Identify malfunctions of units, machines and equipment as well as operating faults and introduce improvements		<ul style="list-style-type: none"><li>• Identification of faults and malfunctions</li><li>• Determination of causes</li></ul>
e) Identify defects in process engineering and introduce improvements		<ul style="list-style-type: none"><li>• Preparation and introduction of countermeasures</li><li>• Regular classification, e.g. of obstruction points</li><li>• Adjustment of process technology to customer wishes</li></ul>
f) Plan and arrange inspections and co-operate with rebuilding		<ul style="list-style-type: none"><li>• Use of periods of low-level operation</li></ul>
g) Document the routine operation and maintenance		<ul style="list-style-type: none"><li>• Record operating phases of plant operation including the optimisation, improvement and operating faults and show these using firm's forms</li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
3. Material streams, logistics and disposition (§ 16 No. 19)		
a) Check and document material streams and quantities in the plant system	5	<ul style="list-style-type: none"><li>• Input/output of the plants</li><li>• Process-dependent material streams and quantities</li><li>• Documentation of the marketing of the material obtained</li></ul>
b) Carry out sampling, sample preparation, sampling protocolling and quality monitoring		<ul style="list-style-type: none"><li>• Sampling with, for example, solid and liquid wastes, homogenous and heterogeneous materials, with highly volatile components, for storage conditions</li><li>• Measurements of gases, toxic substances, conductivities, pH values</li><li>• Quality tests</li><li>• Quality assessments</li><li>• Application of field methods, quick tests</li></ul>
c) Check and document utilisation products according to quality and, as required, introduce measures for improvement of the quality		<ul style="list-style-type: none"><li>• Examples<ul style="list-style-type: none"><li>- paper according to recovered paper sorting list</li><li>- glass according to foreign bodies and colour changes</li><li>- recycling building material – quality requirements</li><li>- plastics according to plastic type</li><li>- compatibility of plastics/plastic mixes</li><li>- waste wood loading groups</li><li>- European steel scrap class list</li><li>- humus, earth, compost RAL – quality marks</li></ul></li><li>• Putting together and release of quantities</li><li>• Delivery papers for handover and delivery</li></ul>
d) Make available and market utilisation products and secondary raw materials		
e) Pass residual wastes to disposal		<ul style="list-style-type: none"><li>• Correct intermediate storage, container and storage site</li><li>• Disposal to schedule</li></ul>
f) Plan and document provision of personnel, vehicles and equipment		<ul style="list-style-type: none"><li>• Planning for personnel, vehicles and equipment design</li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
4. Safety regulations and operating instructions (§ 16 No. 13)		
a) Describe hazards due to biological substances and hazardous material	2	<ul style="list-style-type: none"><li>• Correct intermediate storage, container and storage site</li><li>• Handling of biological working materials with utilisation</li><li>• Protective and hygienic measures</li><li>• Biomaterial Ordinance, Technical Regulations for Biological Working Materials (TRBA) Guidelines</li><li>• Protective measures with hazardous materials and hazardous goods</li><li>• Safety data sheets</li><li>• Industrial-medical precautions</li></ul>
b) Apply safety regulations for the plant and process technology		<ul style="list-style-type: none"><li>• Labour protection regulations for plants and process technology, e.g. cranes and conveyors, power driven machines</li></ul>
c) Describe and operate fire prevention and fire protection installations		<ul style="list-style-type: none"><li>• Operational readiness of facilities, e.g. fire extinguishers, sprinkler systems, fire blankets, fire-fighting water collection facility</li></ul>
d) Carry out measures for protection against explosion		<ul style="list-style-type: none"><li>• Escape routes, emergency call, sounding alarms</li><li>• Explosion endangered areas and marking of danger of explosion</li><li>• Causes of fire and explosion</li><li>• Explosion protection guidelines and accident prevention ordinance</li></ul>
e) Apply activity-related operating instructions		<ul style="list-style-type: none"><li>• With processing and utilisation</li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
Focal point waste disposal and treatment		
1. Waste disposal processes (§ 16 No. 17)		
a) Accept, process, pretreat and make available wastes	17	<ul style="list-style-type: none"><li>• Delivery conditions for the different materials, products and wastes</li><li>• Advice to and care of supplier with delivery</li><li>• Maintenance of the separation characteristics</li><li>• Securing and storage of falsely declared wastes, return of wastes</li><li>• Accompanying documents, delivery documents</li><li>• Registration of types and quantities of waste</li><li>• Weighing of wastes and documentation</li><li>• Intermediate storage of wastes</li><li>• Methods of dividing, separating and sorting, e.g. high thermal value, low thermal value, fractions capable of biological treatment</li><li>• Utilisable, storable fractions</li><li>• Removal of problem, foreign materials and pollutants</li><li>• Production of secondary fuels</li><li>• Operation of recycling yards</li></ul>
b) Describe methods and process steps for the treatment and disposal of wastes		<ul style="list-style-type: none"><li>• Separation, sorting, comminution and homogenisation</li><li>• Settling, sedimentation, centrifuging, neutralisation, precipitation, flotation, evaporation, distillation</li></ul>
c) Carry out two of the following five listed waste treatment processes		
aa) Storage of wastes		<ul style="list-style-type: none"><li>• Location and structure of a landfill</li><li>• Acceptance, treatment and accommodation of wastes</li><li>• Operation and monitoring of technical facilities</li></ul>



Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<i>Serial No. 1 cont.</i>		<ul style="list-style-type: none"> <li>• Possibilities for the use of landfill gas and extraction</li> <li>• Collection and treatment of seepage water</li> <li>• Balancing of the water resources</li> </ul>
bb) Thermal treatment of wastes		<ul style="list-style-type: none"> <li>• Methods of thermal treatment in particular incineration</li> <li>• Operation of technical facilities under instruction</li> <li>• Treatment of residues, processing of residues, disposal of residues</li> <li>• Use of energy</li> </ul>
cc) Composting of wastes		<ul style="list-style-type: none"> <li>• Methods of composting</li> <li>• Composting facilities</li> <li>• Creation of compost, processing of compost, marketing and application of compost</li> </ul>
dd) Mechanical-biological treatment of wastes		<ul style="list-style-type: none"> <li>• Classification of processes into disposal concepts</li> <li>• Processing stages</li> <li>• Operation of facilities</li> <li>• Making available the secondary raw materials extracted and handing over of the high thermal value fraction and material</li> <li>• Making available the treated wastes for storage</li> </ul>
ee) Treatment of special wastes		<ul style="list-style-type: none"> <li>• Operation of mobile pollutant collections and stationary intermediate stage</li> <li>• Sorting of problem wastes from households and commercial operations</li> <li>• Making available wastes for special waste treatment</li> <li>• Carrying out of special waste treatment using individual processes, e.g. chemical-physical, physical processes, incineration of special waste, landfilling of special waste</li> </ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
2. Operation and maintenance (§ 16 No. 18)		
a) Control, regulate and monitor processes of treatment and disposal	6	<ul style="list-style-type: none"><li>• Process steps of treatment and disposal for individual substances, material streams</li></ul>
b) Operate measuring, control and regulation facilities		<ul style="list-style-type: none"><li>• Method of function of individual units, machines and facilities</li></ul>
c) Operate, monitor and service plant components and facilities		<ul style="list-style-type: none"><li>• Manufacturer's operating instructions</li><li>• Measuring, control and regulation possibilities and facilities of the plant for process monitoring</li><li>• Monitoring of the consumption of energy, operating materials, ancillaries, regulation of gas and water supplies</li><li>• Observance of quality requirements</li><li>• Optimisation of the procedures</li><li>• Switching from automatic to manual operation</li><li>• Commissioning, decommissioning, normal operation</li><li>• Servicing plans, servicing and care tasks</li></ul>
d) Identify malfunctions of units, machines and equipment as well as operating faults and introduce improvements		<ul style="list-style-type: none"><li>• Identification of faults and malfunctions</li><li>• Determination of causes</li><li>• Preparation and introduction of countermeasures</li><li>• Regular classification, e.g. of obstruction points</li><li>• Adjustment of process technology to customer wishes</li></ul>
e) Plan and arrange inspections and co-operate with rebuilding		<ul style="list-style-type: none"><li>• Use of periods of low-level operation</li></ul>
f) Plan and document provision of personnel, vehicles and equipment		<ul style="list-style-type: none"><li>• Record operating phases of plant operation including the optimisation, improvement and operating faults and show these using firm's forms</li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
3. Material streams, logistics and disposition (§ 16 No. 19)		
a) Describe operational procedures of waste treatment and waste disposal	5	<ul style="list-style-type: none"><li>• Objectives of the plants</li><li>• Method of function of the reactions, e.g. ageing, chemical decomposition, seepage water, water resources, temperatures, emissions, residues, usable products</li></ul>
b) Carry out sampling, sample preparations, sampling protocolling, and investigations		<ul style="list-style-type: none"><li>• Sampling with, for example, solid and liquid wastes, homogenous and heterogeneous materials, with volatile components, for storage conditions</li><li>• Groundwater and seepage water samples</li><li>• Sampling of composts, sludge</li><li>• Measurement of gases, toxic substances, conductivity, pH values</li><li>• Production of eluates</li><li>• Determination of dry solid matter, ignition loss, COD, BOD5</li><li>• Quality testing</li><li>• Quality assessments</li><li>• Employment of field methods/quick tests</li><li>• Evaluation of examination results</li></ul>
c) Check and document material streams with regard to quantity and quality in the plant systems		<ul style="list-style-type: none"><li>• Input/output of the plants</li><li>• Process-dependent material streams and quantities</li><li>• Documentation of the marketing of the material obtained</li></ul>
d) Carry out measurements for the control of the plants and for the consideration of the immissions		<ul style="list-style-type: none"><li>• Sampling with, for example, solid and liquid wastes, homogenous and heterogeneous materials, with highly volatile components, for storage conditions</li><li>• Measurements of gases, toxic substances, conductivities, pH values</li><li>• Quality tests</li><li>• Quality assessments</li><li>• Application of field methods, quick tests</li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
<i>Serial No. 3 cont.</i>		
e) Record details on substances and energy		<ul style="list-style-type: none"><li>• Document the issue of materials, e.g. recyclable materials, secondary fuels, compost</li><li>• Delivery and issue of expendables and ancillary materials</li><li>• Register quantities of seepage water</li><li>• Document the generation, use and consumption of energy</li></ul>
f) Record wastes separately for disposal, provide intermediate storage and make available for disposal		<ul style="list-style-type: none"><li>• Correct intermediate storage, containers and storage site</li><li>• Disposal to schedule</li></ul>
g) Plan and document the provisioning of personnel, vehicles and equipment		<ul style="list-style-type: none"><li>• Planning of the provision of personnel, vehicles and equipment</li></ul>
4. Safety regulations and operating instructions [§ 16 No. 13]		
a) Describe hazards due to biological substances and hazardous material	2	<ul style="list-style-type: none"><li>• Handling of biological working materials with utilisation</li><li>• Protective and hygienic measures</li><li>• Biomaterial Ordinance, Technical Regulations for Biological Working Materials (TRBA) Guidelines</li><li>• Protective measures with hazardous materials and hazardous goods</li><li>• Safety data sheets</li><li>• Industrial-medical precautions</li></ul>
b) Apply safety regulations for the plant and process technology		<ul style="list-style-type: none"><li>• Labour protection regulations for plants and process technology, e.g. cranes and conveyors, power driven machines</li></ul>
c) Describe and operate fire prevention and fire protection installations		<ul style="list-style-type: none"><li>• Operational readiness of facilities, e.g. fire extinguishers, sprinkler systems, fire blankets, fire-fighting water collection facility</li></ul>
d) Carry out measures for protection against explosion		<ul style="list-style-type: none"><li>• Escape routes, emergency call, sounding alarms</li><li>• Explosion endangered areas and marking of danger of explosion</li></ul>

Part of the description of occupation requiring training	Temporal guidance values in weeks in the 1 <sup>st</sup> – 15 <sup>th</sup> training month	Explanatory notes
Skills and knowledge to be communicated		
Serial No. 4 cont.		<ul style="list-style-type: none"> <li>• Causes of fire and explosion</li> <li>• Explosion protection guidelines and accident prevention ordinance</li> </ul>
e) Apply activity-related operating instructions		<ul style="list-style-type: none"> <li>• With processing and utilisation</li> </ul>

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## Part III

# Keywords from A - Z

## 1. Advanced vocational training

The advanced vocational training is to enable the maintenance and expansion of knowledge and skills, adjustment to development and occupational advancement.

To advanced occupational development training belong, above all, advanced vocational training courses which are regulated by **competent bodies**. These determine the objective, the requirements, the procedure of examination, the prerequisites for registration and the establishment of examination committees.

## 2. Apprentice's pay

Those providing instruction must provide apprentices with a fair remuneration (§ 10 BBiG). The amount of the remuneration is to be regulated in the **apprenticeship contract**.

With continuing occupational training it must increase at least annually.

## 3. Apprenticeship contract

Before the start of occupational training an apprenticeship contract must be concluded between those providing instruction and apprentices (§ 3 BBiG).

The essential content of the apprenticeship contract must be recorded in writing by those providing instruction after agreement, in any case before the start of the occupational training (§ 4 BBiG). The record of the contract is to be signed by those providing instruction, by the apprentices and (for those under age) by their legal representatives (§ 4 BBiG). The contractual record must, at the least, contain details on:

- type and objective of the occupational training, in particular the occupation for which training is to be carried out,
- start and duration of the occupational training,

- **training activities outside the training company**,
- duration of regular daily working time,
- duration of the **probationary period**,
- payment and amount of the **apprentice's pay**,
- duration of **the holidays**,
- conditions under which the apprenticeship contract can be terminated.

## 4. Competent bodies

According to the Vocational Training Act the following tasks are delegated to the competent bodies: monitoring of the implementation of the occupational training, to support this through consultation with instructors and apprentices through the training advisers appointed for this purpose and, insofar as no regulations exist to regulate the execution of occupational training through legal provisions (e.g. examination rules) (comp. § 45 BBiG).

Recycling and Waste Management Technician is an occupation requiring training of the public service. So far as the training takes place in trade and industry firms it is an occupation requiring training of trade and industry.

Public service within the meaning of § 1 of the Ordinance on Occupational Training in environmental engineering trades covers all legal persons under public law with all their facilities, which are not legally made independent.

For the area of public service the responsible agencies for the Federal [German] Government are determined by the top Federal Government Authority otherwise through the Federal States (comp. § 84 Para. 1 BBiG). The directory of competent bodies for this can be found on Page 99 in the part "General Information".

If occupational training takes place in trade and industry firms then the respective local Chamber of Commerce and Industry takes over the function as competent bodies.

The responsible agency sets up an occupational training committee (§ 56 BBiG), to which belong representatives of the employers and of the employees as well as – with an advisory capacity – teachers of the vocational school.

The occupational training committee has to adopt the legal provisions to be implemented by the competent body for the execution of the occupational training (e.g. the examination rules) and must be informed of and follow all important matters of the occupational training.

## 5. Coordination between the training company and the vocational school

The initial occupational training for the Recycling and Waste Management Technician takes place in the dual system for occupational training.

Characteristic for the dual occupational training is that the apprentices acquire the skills and knowledge, required for the practice of an occupation, within a training company and in a vocational school.

The duality is also evident in the different vocational training regulations:

- Basis for the training carried out in the firm are the standard nationally applicable vocational training regulations issued as legal ordinance.
- Basis for the curricula of the vocational schools are the framework curricula of the Conference of [German] Federal State Culture Ministers, which represent a recommendation.

Vocational training regulations and framework curricula therefore differ both in their legal quality and in their area of application.

The firm carrying out training and the vocational school must complement each other and agree in the training in order that the dual system works in a sensible and helpful way for all those involved. Such a collaboration cannot be prescribed.

Training practice for the occupational training as Recycling and Waste Management Technician on a framework training plan can fall back on a training framework plan, which is agreed with the framework curricula of the Conference of Culture Ministers. With this the prerequisites for the collaboration between training companies and the vocational schools are met.

The successful conversion of the new vocational training regulations is essentially dependent on a constructive agreement between the two places of learning: school and firm.



## 6. End of training/giving of notice

A giving of notice can take place at any time from the apprentices or instructors during the **probationary period**. Notice requires to be in the written form. During the **probationary period** no reasons have to be given.

After the **probationary period** the training relationship can be terminated only with good reasons, i.e. if for one side it is unreasonable to continue the training relationship. When an important reason exists has to be decided in the individual case. The reasons are to be given.

Another possibility of giving notice exists if the apprentice wishes to be trained in another occupation requiring training. Here the training relationship can be terminated with four weeks notice. Notice must be given in writing and must contain the reasons for the termination.

For those who have not yet reached their majority notice can only be given if the legal representative agrees. If minors are given notice the termination must be discussed with the legal representatives.

## 7. Flexibility clause

The **in-firm's training plan** can deviate from the training framework plan with regard to its content and timely structure due to practical business characteristics. This fact designated as flexibility clause can be derived from § 17 of the ordinance.

The skills and knowledge listed in the training framework plan are to be communicated by the final examination.

## 8. Holidays

Apprentices have the right to paid holidays. The legal minimum holidays are laid down:

- for young persons in the [German] Youth Employment Protection Law (JarbSchG) and
- for adults in the [German] Federal Holidays Law.

For young persons the duration of the holidays is scaled according to age. Annually it is:

- at least 30 working days if the young person is still not 16 years of age at the beginning of the calendar year

- at least 27 days if the young person is still not 17 years old at the beginning of the calendar year

- at least 25 days if the young person is still not 18 years old at the beginning of the calendar year (JarbSchG).

For the year in which they become 18 years old young persons still have holidays in accordance with the Youth Employment Protection Law. Those who are 18 years old at the beginning of the calendar year receive adult holidays. Adult holidays are a minimum of 24 working days a year.

## 9. In-firm's training plan

For the individual training process the firm providing training produces the in-firm training plan for the apprentices. This is handed out and explained to the apprentices at the start of training; in the same way the vocational training regulations are also to be made available.

A technical and temporal breakdown of the training subject matter is in particular admissible if operationally practical peculiarities make this necessary (**Flexibility Clause**, § 11 of the Ordinance). It is to be noted that training subject matter of the training framework plan is not lost. The minimum requirements are laid down in the training framework plan.

Additional skills and knowledge can be additionally communicated depending on the requirement.

With the production of the training plan the following are to be taken into account:

- the personal qualifications of the apprentices (e.g. different educational background)
- the circumstances of the training company (e.g. operational structures, personnel and technical installations, regional peculiarities)
- the carrying out of training (**training activities outside the training company**, blocking of the vocational school instruction).

The temporal guidance values are to be calculated to firm requirements. In addition an arrangement of the training blocks for fixed months in the training year must also take place. With this block training, **holidays** and, if required, **training activities outside the training company** are to be taken into account.

With a larger number of apprentices the elaboration of a transfer plan is recommended.

## 10. Occupational capacity to act

Objective of the training is the occupational capacity to act. It is to enable apprentices to independently plan, execute and monitor qualified occupational activities within the meaning of § 1 Para. 2 BBiG (comp. § 3 Para. 2 of the ordinance).

In order to achieve this objective technically-related and interdisciplinary qualifications (skills, knowledge and competence) are communicated in the training and, within this framework, expertise is supported which can be realised in precise activities.

**Professional competence**  
enables certain tasks in occupational relationships to be processed to meet the objective.

If, during the course of training, a decrease or increase of the contractual training time results, then it is recommended undertaking well in time an adjustment of the training plan to the changed course of training.

**Methods expertise**  
covers strategy, organisation, structure and arrangement of an activity.

**Social competence/personal competence**  
enables the mastery of occupational activity also in social relationships.

These qualification components and expertise are basically not isolated within the training but are communicated and supported together using complex tasking.

Professional competence, methods expertise and social competence are to be placed at the same level in the personality development of the young persons during training. Appropriate qualifications are to be included in the training framework plan.

## 11. Probationary period

The occupational training relationship starts with the probationary period. It must be at least one month long and may be a maximum of three months (§ 13 BBiG).

As the probationary period already belongs to the occupational training the complete obligations of the instructors and the apprentices also stand. During the probationary period the instructors are obliged to examine carefully the suitability of apprentices for the trade to be

learned. The apprentices must also examine whether they have made the right selection.

During the probationary period the occupational training relationship can, at any time, be terminated in writing both by the instructors and also by the apprentices without giving reasons and without any time limit (§ 15 BBiG).

## 12. Suitability as instructor

In accordance with the [German] Vocational Training Act (BBiG) only those persons may carry out instruction who are personally and technically qualified. Technically qualified to carry out occupational training are those who possess the skills and knowledge as well as the occupational and labour pedagogic knowledge (§ 20 BBiG). Further information is provided in the ordinance on the occupational and labour pedagogic suitability for occupational training - The [German] Ausbildereignungsverordnung (AEVO) – dated 16 February 1999. According to this, training personnel for occupational training have to verify occupational and labour-pedagogic knowledge in a special examination (§ 21 BBiG).

The specialist qualification is given in detail in § 76 BBiG. Here you will also find an exception ruling which allows for the recognition of the specialist qualification of specialists without recognised final examination following consultation by the **competent body**.

The **competent body** are to see that the personal and specialist qualification of instructors is available (§ 23 BBiG).

The new occupation requiring training demands from training personnel basic pedagogic skills. It is not just "demonstrators" that are required but rather more the guidance and advisory function and thus the urging of apprentices towards independent learning.

## 13. Suitability of the training company

Apprentices may only be engaged if the training company, according to type and equipment, is suitable for the occupational training, and the number of apprentices is in a reasonable relationship to the number of training places and the technicians employed.

The suitability of a training facility in which the laid-down occupational skills and knowledge cannot be communicated completely exists if suitable **training activities outside the training company** can be carried out (§ 22 BBiG).

The determination of the suitability takes place through the **competent body** (§ 22 BBiG).

It is necessary to develop a high degree of flexibility with the assessment of the suitability of firms providing training.

It is undisputable that that the legal requirements on the training company have to be met without limitation. However, collaborative training ventures and co-operations increase possibilities for negotiation.

## 14. Training activities outside the training company

If firms carrying out training are too specialised to be able to cover all parts of the training or if the firm is too small to ensure all technical and personnel prerequisites there is a possibility of balancing out such deficits through training activities outside the training company.

To this belong training measures in

- **inter-company vocational training centres** (comp. § 22 BBiG)

and in the

- **collaborative training venture.**

**Inter-company training vocational centres:**

In order to relieve the pressure on training operations inter-company vocational training centres can be offered. Information on this is given by the **competent bodies**.

**Collaborative training venture:**

A collaborative training venture exists if different firms combine to plan and, based on the division of labour, carry out occupational training together. The apprentices then complete certain parts of their training not in the training company but rather in one or more partner firms.

In practice four variants of collaborative training ventures have developed, also in combined form:

- leading firm with partner firms

- consortium training companies

- operational training association

- operational contracted training

The following legal conditions are to be observed with a collaborative training venture:

- the training company within whose responsibility training is carried out must cover the major part of the description of the occupation requiring training.

- The instructors can only finalise conditions for taking on part of the training when it is guaranteed that the quality of the training in the other training company is equally assured.

- The training company must be able to influence the appointment of the training personnel.

- The **apprenticeship contract** may contain no limitations of the legal rights and responsibilities of the instructors and apprentices. The agreements of the partner firms concern only the relationship between each other.

- Fundamentally, the **in-firm's training plan**, it must be shown which training contents are being communicated at which point in which training facility (cooperative training company).

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# General Information

## 1. Check lists

### Check list 1:

#### What is to be done before start of training

• Is the firm recognised by the competent body as a firm providing training?	<input type="checkbox"/>
• Are the legal prerequisites for training present, i.e. does the technical and personal suitability in accordance with § 20 BBiG exist? Has the trainer or one of the instructors determined by him/her obtained the necessary training qualification?	<input type="checkbox"/>
• Are, in addition to the responsible instructors, sufficient specialists in the individual training places/areas available for the instruction of the apprentices?	<input type="checkbox"/>
○ • Has an instructor been named to the competent body?	<input type="checkbox"/>
• Which actions have to be started in order to present the concern as attractive training company for those interested in training (e.g. making contact with the responsible labour exchange, place advertisements in daily newspapers or youth magazines, present firm on potential trainee days, industrial placements)?	<input type="checkbox"/>
• Are firm selection processes (employment tests) as well as selection criteria for apprentices laid down?	<input type="checkbox"/>
• Who directs the job interviews with the applicants and decides on employment?	<input type="checkbox"/>
• Is the apprenticeship contract formulated and signed by the instructor and the apprentices?	<input type="checkbox"/>
• Is the firm in the position to communicate all technical contents of the vocational training regulations? Are all training locations/areas necessary for this available? Can or must one fall back on additional training activities outside the training company (inter company vocational training centres, collaborative training venture)?	<input type="checkbox"/>
• Has a in-firm's training plan been produced (technical and temporal structure as annex to the training contract)?	<input type="checkbox"/>
○ • Has the concluded apprenticeship contract including the in-firm's training plan been made available to the apprentice(s) as well as the competent body?	<input type="checkbox"/>
• Is the apprentice registered with the vocational school?	<input type="checkbox"/>
• Are the training regulations, the training framework plan, if required the framework curricula as well as an example of the Vocational Training Act and of the Youth Employment Protection Law available in the firm?	<input type="checkbox"/>
• Is the first day already completely planned? (Check list 4)	<input type="checkbox"/>

**Check list 2:**  
**Obligations of the training company/of the instructors**

	• Observe the legal constraints, e.g. of the Vocational Training Act, Youth Employment Protection Law, firms agreements and apprenticeship contract as well as the provisions for labour safety and accident prevention.	<input type="checkbox"/>
○	• Conclusion of a apprenticeship contract with the apprentice(s).	<input type="checkbox"/>
	• Release for vocational school and examinations.	<input type="checkbox"/>
	• Apprentice's pay, if necessary observation of collective bargaining agreements.	<input type="checkbox"/>
	• Significance and duration of the probationary period.	<input type="checkbox"/>
	• Conversion of the vocational training regulations and the training framework plan as well as technical and temporal structuring into working practice, above all through the production of training and transfer plans.	<input type="checkbox"/>
	• Configuration of a "training work place" according to the training subject matter and the free provision of all necessary training means.	<input type="checkbox"/>
	• Communication of skills and knowledge.	<input type="checkbox"/>
	• Observation of the training responsibility.	<input type="checkbox"/>
○	• Assessment of apprentices.	<input type="checkbox"/>
	• Production of a training report at the end of training.	<input type="checkbox"/>

**Check list 3:**  
**Obligations of the apprentices**

<input type="radio"/>	• Obligation to attend.	<input type="checkbox"/>
	• Active acquiring of all skills and knowledge which are necessary to complete the training successfully.	<input type="checkbox"/>
	• Attending the vocational school.	<input type="checkbox"/>
	• Production of verification of training (Narrative Report).	<input type="checkbox"/>
	• Sitting of intermediate and final examinations.	<input type="checkbox"/>
<input type="radio"/>		

**Check list 4:**  
**The first day**

• How is the day structured? Are all responsible persons, including specialists, informed that new colleagues are joining the firm?	<input type="checkbox"/>
• Which actions are planned? (Examples: presentation of the firm, its organisation and internal structure, how it sees itself, the persons responsible for training; if required carry out a tour of the firm).	<input type="checkbox"/>
• Which rights and responsibilities result from the apprenticeship contract for the apprentices as well as for the instructors and the firm?	<input type="checkbox"/>
○ • Handing out of working clothing and protective equipment.	<input type="checkbox"/>
• Information on the greatest hazards in the firm.	<input type="checkbox"/>
• Which regulations on work safety and for the prevention of accidents apply in the company?	<input type="checkbox"/>
• Familiarisation with the social rooms.	<input type="checkbox"/>
• Which working time regulations apply for the apprentices?	<input type="checkbox"/>
• Explanation of the in-firm's training plan.	<input type="checkbox"/>
• Which special work equipment is available for the training?	<input type="checkbox"/>
• How is the verification of training to be carried out? (Form, time intervals: day, week, month).	<input type="checkbox"/>
○ • Explain significance of the Narrative Report for admission to the examinations.	<input type="checkbox"/>
• Which vocational school is responsible? Where is it and how does one get to it? Is the instruction in block training or on individual days of the week? Must the apprentices come to work in the firm after school?	<input type="checkbox"/>
• Examinations: explain the role of the intermediate and final examination, discuss timings, explain the contents of the examinations.	<input type="checkbox"/>
• With which health insurance are the apprentices insured against illness?	<input type="checkbox"/>
• What has to be observed in case of illness?	<input type="checkbox"/>
• Significance of the probationary period.	<input type="checkbox"/>
• Firm's holiday regulations.	<input type="checkbox"/>
• Firm's additional services/apprentice's pay.	<input type="checkbox"/>



**Check list 5:**

**What has to be observed with the registration for the intermediate examination?**

<input type="radio"/>	• Have the apprentices registered in time with the responsible agency for the intermediate examination?	<input type="checkbox"/>
	• How are the apprentices prepared in-firm for the intermediate examination?	<input type="checkbox"/>
	• Do the apprentices know the location, structure and duration of the intermediate examination?	<input type="checkbox"/>
	• Have the apprentices had the content of the intermediate examination explained to them?	<input type="checkbox"/>
	• Has the training subject matter for preparation for the examination been repeated and consolidated?	<input type="checkbox"/>
<input type="radio"/>		

**Check list 6:**

**What has to be observed with the registration for the final examination?**

<input type="radio"/>	• Have the apprentices been registered in time with the competent body for the final examination?	<input type="checkbox"/>
	• How are the apprentices prepared in-firm for the final examination?	<input type="checkbox"/>
	• Do the apprentices know the structure of the final examination (e.g. written, practical parts)?	<input type="checkbox"/>
	• Have the apprentices had the content of the final examination explained to them?	<input type="checkbox"/>
	• Has the training subject matter for preparation for the examination been repeated and consolidated?	<input type="checkbox"/>
	• Do the apprentices know the time, location, structure and duration of the final examination?	<input type="checkbox"/>
	• Check Narrative Report for completeness.	<input type="checkbox"/>
<input type="radio"/>		

## 2. Framework Curriculum for the vocational school instruction

### Framework curriculum

for the occupation requiring training of

Recycling and Waste Management Technician

[Decision of the Conference of Culture Ministers of a 14 May 2002]

#### Part I: Preliminary remarks

This framework curriculum for the occupation related instruction of the vocational school has been decided by the permanent Conference of Culture Ministers and Senators of the [German] Federal States.

The framework curriculum is aligned with the appropriate federal training regulations promulgated by the German Federal Ministry of Economics and Technology or the otherwise responsible specialist ministry in mutual agreement with the German Federal Ministry of Education and Research. The process of coordination is regulated through the "Joint minutes dated 30 May 1972". The framework curriculum fundamentally builds on the German Certificate of Secondary Education (Hauptschulabschluss) and describes the minimum requirement.

With assigned occupations the framework curriculum is structured into an basic training spanning the combined occupational field and specialist training which builds on this.

On the basis of the vocational training regulations and of the framework training plan, which regulate the objectives and contents of the occupational training, the final qualification in an occupation requiring training as well as – joint with instruction in further subjects – the graduation from the vocational school are imparted.

With this, important prerequisites for a qualified employment as well as for the entry into educational and occupational advanced and further education courses are achieved.

The framework curriculum contains no methodical determinations for the instruction. Independent and responsibly conscious thought and action as global objective of the training is preferably communicated in such teaching forms, in which it is part of the overall methodical concept. With this, fundamentally every methodical procedure can contribute to the achievement of the aim. Methods which directly support the occupational capacity to act are particularly suitable and should therefore be suitably taken into account in the structuring of the teaching.

The [German] Federal States take over the framework curriculum directly or convert it into their own curriculum. In the second case they ensure that the result of the technical and temporal agreement with the respective training regulations taken into account in the framework curriculum are retained.

#### Part II: Training contract of the vocational school

The vocational school and the training companies fulfil a common apprenticeship contract in the dual training occupational training.

With this, the vocational school is an independent place of learning. It functions as equal partner with those others involved in occupational training. It has the task of communicating occupational and general training teaching matter to the students taking particular account of the requirements of the occupational training.

The vocational school has basic and technical occupational training as the objective and expands the previously gained general education. With this, it wants to enable the fulfilment of the tasks in the occupation as well as helping to structure occupational life and society in social and ecological responsibility. Here it aligns itself in accordance with the regulations of the national educational law applicable for this type of school. In particular the occupation-related instruction orientates itself additionally to the resources of national standard occupational regulations officially recognised for each occupation requiring training:

- framework curriculum by the Permanent Conference of [German] Culture Ministers and Senators of the Federal States (KMK)

- vocational training regulations of the [German] Federal Government for in-firm training.

In accordance with the General Agreement on Vocational Schools (Decision of the KMK dated 15 March 1991) the vocational school has as objective:

- "to communicate an occupational ability which combines the specialist competence with general abilities of a humane and social type;

- to develop occupational flexibility for the mastery of the changing requirements of occupational life and society also with regard to the coalescence of Europe;

- to kindle the willingness for continuation and further occupational training;

- to encourage the ability and readiness to behave with a sense of responsibility with the creation of individual life styles and in public life."

To achieve these objectives the vocational school must

- align the teaching to a theory of education specific to its tasks, which emphasises action-orientation;

- to communicate interdisciplinary occupational and occupational field qualifications taking into account the required specialisation;

- to ensure a differentiated and flexible range of training in order to meet different abilities and talents as well as the respective requirements of occupational life and society;

- to support and encourage those who are handicapped or disadvantaged within the scope of their capabilities;
- to draw attention to the threats and dangers of accidents associated with the exercising of the occupation and with the private life style and to indicate possibilities for their avoidance or reduction.

In addition, the vocational school, as far as is possible within general instruction and within the scope of occupation-related instruction, is to go into the core problems of our time such as, for example:

- work and unemployment,
- peaceful coexistence of people, nations, and cultures in a world with the observance of cultural identity,
- maintenance of the basic elements of life and
- guarantee of human rights.

The listed objectives are aimed at the development of the occupational capacity to act. Here these are understood to be the willingness and ability of individuals to behave in social, occupational and private situations correctly, thoughtfully as well as individually and socially responsibly.

**Occupational capacity to act** develops into the dimensions of occupational competence, personal competence and social competence.

**Professional competence** stands for the willingness and ability, on the basis of technical knowledge and skills, to solve problems objective-oriented, appropriately, methodically and independently and to evaluate the results.

**Personal competence** stands for the willingness and ability, as individual personality, to clarify, to consider thoroughly and to assess the chances for development, the demands and the limitations; to develop one's own talents as well as to formulate and further develop schemes for life. It covers personal characteristics such as independence, critical faculty, self-assurance, reliability, responsibility and sense of duty. To this belongs in particular also the development of well-considered moral concepts and the self-determined commitment to values.

**Social competence** stands for the willingness and ability to live and form social relationships, to detect benefits and pressures, to understand others and to discuss rationally and responsibly with them and to advise them. To this belongs in particular also the development of social responsibility and solidarity.

**Competence in method and learning** grows from a balanced development of these three dimensions.

Competence stands for the success in learning with regard to the individual learner and his/her qualification for self-dependent dealings in private, occupational and social situations. In opposition to this, under qualification is to be understood the success in learning with regard to usability, i.e. from the aspect of the demand in private, occupational and social situations (comp. Deutscher Bildungsrat [German Central Advisory council for Education] Recommendations of the Education Commission for the Reorganisation of the Secondary Level II).

### Part III: Didactic principles

The objective of occupational training requires that the instruction is directed towards an education tailored to the tasks of the vocational school, which emphasises action-orientation and which enables young people independently to plan, execute and assess working tasks within the framework of their occupational activity.

Learning in the vocational school takes place fundamentally related to concrete occupational action as well as in a wide range of intellectual operations, also the intellectual comprehension of the actions of others. This learning is above all tied to the reflection of the execution of the action (of the action plan, of the procedure, of the results). With this mental inspiration of professional work the prerequisites are created for the learning within and outside work. This signifies for the framework curriculum that the description of the objectives and the selection of the content takes place related to the occupation.

On the basis of learning theoretical and didactic knowledge, in a practical approach for the formation of action-oriented instruction, the following orientation points are given:

- didactic reference points are situations which are significant for the exercising of the occupation (learning for action).
- the starting point of learning is formed by actions, as far as possible carried out or intellectually understood independently (learning by doing).
- actions must, as far as possible, be planned, executed, checked, if necessary corrected, and finally evaluated independently by those learning.
- actions should support a holistic comprehension of professional reality, e.g. include technical, security, economic, legal, ecological aspects.
- actions must be integrated into the experiences of those learning and must be reflected with regard to their social effects.
- actions are also to include social processes, e.g. declaration of interests or mastering of conflicts.

Action-oriented instruction is a didactic concept, which brings together systematic technical and activity structures. It can be realised through various teaching methods.

The range of instruction of the vocational school depends on young persons and adults who differ, according to previous education, cultural background and experiences from the firms carrying out training. The vocational school can only fulfil its apprenticeship contract when it takes account of these differences and encourages students – also those disadvantaged or particularly talented – according to their individual possibilities.

### Part IV: Occupation-related preliminary remarks

The above framework curriculum for the occupational training of the Recycling and Waste Management Technician is harmonised with

the [German] Ordinance on Occupational Training in Environmental Engineering Occupations, dated 17 June 2002 (BGBl. No. 43, p. 2335).

For the examination area of economic and social science, important subject matter of the vocational school is communicated on the basis of "Elements for instruction of the vocational school in the field of economic and social science of commercial-technical occupations requiring training" (Decision of the Conference of Culture Ministers (KMK) dated 18 May 1984). The framework curriculum for the occupation requiring training, Environmental Technician (Decision of the KMK dated 20 August 1984), is rescinded.

The framework curriculum for the occupation requiring training, Recycling and Waste Management Technician, was developed together

with the framework curricula for the occupations requiring training, Water Supply Engineering Technician, Recycling and Waste Management Technician and Pipe, Sewer and Industry Service Technician. In view of the scope of the common core qualifications, which are necessary for the pursuit of these occupations, the learning fields 1 to 6 (1st and 2nd Training Years) of these four framework curricula are identical and should be taught together.

Learning fields 7 to 13 are designed specifically for the occupation of Recycling and Waste Management Technician. A differentiation in the focal points, as the training ordinance foresees, has been dispensed with in the framework plan for reasons of the broad applicability of the apprentices. The communicating of mathematical knowledge takes place integrative in the appropriate learning field.

## Part V: Learning fields

### Summary of the learning fields for the occupation requiring training Recycling and Waste Management Technician

Learning fields		Time guidance values		
Serial No.		1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year
1	Planning of an environmental concept	80		
2	Handling of micro-organisms	40		
3	Employ environmental chemicals	80		
4	Operate pipeline systems	80		
5	Examination of the content substances of water and waste		60	
6	Operate and maintain machines and installations		80	
7	Collect and transport wastes		60	
8	Treat wastes chemically and mechanically		40	
9	Treat wastes biologically		40	
10	Make arrangements for wastes			100
11	Examine wastes			60
12	Process wastes			60
13	Dispose of wastes			60
	<b>Sum (in total 840)</b>	<b>280</b>	<b>280</b>	<b>280</b>

Learning Field 1:

1<sup>st</sup> Training Year

Planning of an environmental concept

Time guidance value: 80 hours

**Formulation of the objective:**

Students design a concept for the operation of an environmental engineering concern. For this they collect information on material streams in environmental engineering systems and make themselves familiar with the method of function of supply and disposal facilities as well as of the pipe, sewer and industrial services. With their planning they take into account causes and results of environmental loading of the air, water and soil which originate from the facilities and determine

interactions with living creatures. They take into account possibilities for the avoidance and minimisation of environmental loads. With the concept development of work sharing they learn in a team, to plan, mutually process and jointly agree tasks. They apply information and communication systems to meet objectives, document results and evaluate these.

Contents:

- Eco-system
- Water cycle and water quality
- Water pollution: eutrophication, contamination, acidification
- Air pollution: soil pollution, biotope destruction
- Avoidance of wastes
- Development and function of wastewater disposal facilities
- Development and function of water supply facilities
- Development and function of recycling and waste management operations
- Development and function of facilities of pipe, sewer and industrial services
- Legal requirements, technical rules and standards
- Labour organisation
- Work place layout
- Use of information systems
- Data protection regulations
- Procurement of work equipment
- Accident prevention, labour protection

<b>Learning Field 2:</b>	<b>1<sup>st</sup> Training Year</b>
<b>Handling of micro-organisms</b>	
<b>Time guidance value: 40 hours</b>	

**Formulation of the objective:**

Students create suitable living conditions for micro-organisms and can employ micro-organisms for the conversion of matter in systems. They are made aware which hazards for their personal health and also

for the health of the population emanate from micro-organisms. They are in a position to take hygienic measures in practice and to combat pathogenic micro-organisms.

- Contents:
- Structure, types and characteristics of micro-organisms
  - Conditions for life and resistance of micro-organisms
  - Significance of micro-organisms for environmental engineering occupations
  - Material cycles
  - Hazards due to micro-organisms: viruses, bacteria, fungi, animal parasites
  - Hygiene measures
  - Vaccinations
  - Identification of micro-organisms
  - Prevention of accidents and protection against accidents
  - Work safety

**Learning Field 3:**  
**Employ environmental chemicals****1<sup>st</sup> Training Year****Time guidance value: 80 hours****Formulation of the objective:**

Students plan the employment of environmental chemicals for the processing of water, industrial treatment, wastewater and waste disposal. They know the properties and the build-up of these substances and assess the danger of the reaction. Students arrange the working materials and hazardous materials into hazard classes and carry out deliberate measures for disposal. They store and pack hazardous substances

correctly and know the legal basis for the transport of hazardous goods. They identify the effects of hazardous substances and take suitable protective measures. The students participate with the production of operational instructions for the handling of hazardous materials and can react suitable to hazardous situations in the firm.

- Contents:
- Mixtures of substances
  - Material structure and properties
  - Precipitation, acidic, base and Redox reactions
  - Classes of substances
  - Stoichiometric calculations
  - Temperature, conductivity, pH value, oxygen
  - Mass, volume, density
  - Classification of hazardous substances
  - Creation of hazardous substances
  - Handling of hazardous substances
  - Disruption of operational procedures due to hazardous substances
  - Dangerous chemical reactions
  - Disposal of hazardous substances
  - Storage, packaging of hazardous substances
  - Transport of dangerous goods
  - Operating instructions
  - Accident prevention, labour protection

**Learning Field 4:**  
**Operate pipeline systems**

**1<sup>st</sup> Training Year**

**Time guidance value: 80 hours**

**Formulation of the objective:**

Students read pipeline plans and complete sketches. They notionally carry through the production of pipeline sections. The students plan the installation of fittings and conveyance facilities and, taking account of the medium to be transported, select the required materials and sealing materials. Here they carry out calculations on pipeline systems and produce material lists. They employ processes for the sealing of pipeline components with the production of pipeline systems taking

into account the different materials and ancillaries and the technical process conditions. Students take measurements and explain the methods of converting, transferring and processing of measured values. They evaluate the measurements taken and introduce measures for the correction of defects. Students decide upon the employment of control and regulating facilities.

- Contents:
- Pipelines, fittings, seals
  - Pipe and hose connections
  - Pipeline plans, basic-, process and RI flow diagrams
  - Markings of pipes and fittings
  - Linear expansion, mass and volume flow calculations
  - Pressure loss in pipelines
  - Characteristics of materials
  - Working materials and ancillaries
  - Corrosion and corrosion protection
  - Temperature, pressure, filling level, volume and flow measurement methods
  - Transducers
  - Standard signals
  - Connection handler and stored-program control
  - Continuous and discontinuous controllers, control cycles
  - Legal provisions, sets of technical rules and standards
  - Accident prevention, labour protection



**Learning Field 5:**

**2<sup>nd</sup> Training Year**

**Examination of the content substances of water and waste**

**Time guidance value: 60 hours**

**Formulation of the objective:**

For selected conditions, students carry out preparation and sampling as well as the conservation and transport of samples according to the applicable regulations. They verify qualitatively important content substances of water and waste. They carry out simple quantitative determi-

nations check the results for plausibility, interpret and document these. They are aware of the effects of analysis results on the progress of processes and can introduce measures for process optimisation.

**Contents:**

- Sampling
- Sensor values
- Physical parameters
- Individual, group and summation parameters
- Laboratory equipment
- Qualitative determination of relevant cations and anions
- Quantitative determination, volumetric, gravimetric, instrumental
- Operating logbooks, performance picture
- Accident prevention and protection against accidents
- Work safety
- Accuracy
- Accident prevention, labour protection

**Learning Field 6:****2<sup>nd</sup> Training Year****Operate and maintain machines and installations****Time guidance value: 80 hours****Formulation of the objective:**

Students operate various mechanical installations and decide upon employment to meet the situation whereby they understand the functional principle of the machines. With the aid of instructions they can carry out the inspection and servicing of mechanical installations typical for their occupation. The inspection and servicing tasks are documented with the aid of the application of current ancillaries. They ascertain the causes of operating faults with the help of technical drawings and instructions. With all activities they apply current knowledge of technical environmental protection. They plan the environmentally friendly

storage and disposal of the operating resources for the machines and take part actively in decisions on the disposition of consumable materials. Students know the methods for bringing together and separating of substances and can describe and differentiate these according to their function. They are in a position to employ solid, liquid and gaseous energy carriers and electrical energy correctly taking into account the operating conditions. Students use their knowledge of basic electrical parameters for the selection of electrical facilities. Here they take note of the hazards of electrical current and take protective measures.

**Contents:**

- Electrical motors and combustion engines
- Pumps, blowers and compressors
- Selection, employment and application of work equipment
- Assembly and dismantling of operational facilities
- Maintenance of operational facilities, card files, protocols
- Lifting equipment and transport facilities
- Storage and disposition
- Avoidance and/or minimisation of environmental loads due to operating equipment
- Technical documents
- Bringing together and separation of substances
- Energy carriers
- Equipment for heating and cooling
- Basic electrical parameters
- Voltage generators, transformers and motors
- Protective measures, conduct with accidents due to electrical current
- Responsibility
- Prevention of accidents and protection against accidents
- Work safety

**Learning Field 7:**  
**Collect and transport wastes**

**2<sup>nd</sup> Training Year**

**Time guidance value: 60 hours**

**Formulation of the objective:**

Students in a team plan the collection of waste according to logistic, equipment-technical and commercial aspects. With this they take into account the source of the waste, the amount of waste and type of collection taking note of legal provisions and (technical) rules and stan-

dards. For selected examples of waste requiring particular monitoring they develop concepts for collection, transport and storage observing special safety regulations and operating instructions.

- Contents:
- Types of waste, quantities of waste, source of waste
  - Material streams
  - Quality requirements for the utilisation of wastes
  - Declaration of wastes
  - Types, structure and employment of refuse collection vehicles and refuse collection containers
  - Identification and weighing system
  - Testing of refuse collection containers
  - Bring and collect systems
  - Methods for the calculation of refuse charges
  - Collection round (tour) planning
  - Transfer stations, intermediate storage
  - Carrying out of problem refuse collections
  - Structure and function of special refuse collection points
  - Hazardous goods transport: marking, banning of collective loading, loading safety
  - Examination of times at the wheel and rest periods
  - Accompanying documents
  - Storage of wastes
  - Legal provisions of waste and hazardous goods transport
  - Accident prevention, work safety

**Learning Field 8:****2<sup>nd</sup> Training Year****Treat wastes chemically and mechanically****Time guidance value: 40 hours****Formulation of the objective:**

Students are in a position to monitor and control processes for mechanical, chemical and thermal treatment of wastes. For this they use various systems for the collection and utilisation of wastes, determine quality requirements on the wastes to be utilised, take into account

processes for the treatment of wastes with the aim of creating marketable intermediate and end products.

**Contents:**

- Collection systems as prerequisite for treatment
- Thermal utilisation
- Chemical treatment
- Utilisation routes of wastes  
e.g. plastics, metals, paper, cardboard, glass, drinks cartons, batteries, fluorescent tubes, electrical scrap, old wood, construction site wastes, building rubble, contents of oil separators, problem wastes
- Sense of responsibility
- Accident prevention, work safety

**Learning Field 9:**  
**Treat wastes biologically**

**2<sup>nd</sup> Training Year**

**Time guidance value: 40 hours**

**Formulation of the objective:**

Students plan the monitoring and control of composting and fermentation processes taking into account different technical processes. For this they select types of waste which are suitable for a biological utilisation. They check the quality of compost and fermentation products

and, due to the knowledge of application possibilities of the products, develop their own marketing concepts.

- Contents:
- Procedures with the formation of humus
  - Prerequisites for the composting
  - Aerobic and anaerobic procedures
  - Own composting
  - Decentralised composting
  - Large central composting plants
  - Intensive rotting process
  - Fermentation of wastes
  - Biological-mechanical waste treatment
  - Compost quality
  - Employment and marketing of compost
  - Utilisation of sewage sludge
  - Legal provisions, technical rules and standards
  - Accident prevention, work safety

**Learning Field 10:****3<sup>rd</sup> Training Year****Make arrangements for wastes****Time guidance value: 100 hours****Formulation of the objective:**

Students accept customer orders, advise customers, offer additional services and conclude contracts taking into account the general business conditions. They determine the most advantageous disposal or utilisation route for the waste to be disposed of, calculate the costs and as a team produce offers and specifications and schedules of prices. Students make arrangements for the personnel, vehicles and containers

required for the execution of the contract, produce the required accompanying documents, process claims and draw up invoices. Using technical communication facilities they monitor and document the material streams, test dates, storage and quality assurance measures. Students cooperate in the quality and environmental management systems.

**Contents:**

- Acceptance and execution of customer orders
- Customer advice
- Disposal and utilisation routes
- Accompanying documents and invoices
- Waste concepts and balances
- Determination of costs
- Calculation of services
- Production of offers and specifications and schedules of prices
- Claims
- Storage logbooks
- Disposition of personnel, vehicles and containers
- Monitoring and documentation of material streams
- Cross-border utilisation of waste
- Monitoring of servicing and testing dates for containers and vehicles
- Expenses for collection systems
- Monitoring and evaluation of services
- Quality and environmental management
- Documentation of quality assurance measures
- Firm-specific software
- Documentation of results
- Organisation of labour, teamwork
- Legal provisions, technical rules
- Punctuality
- Accident prevention, work safety

**Learning Field 11:**

**3<sup>rd</sup> Training Year**

**Examine wastes**

**Time guidance value: 60 hours**

**Formulation of the objective:**

Under various operational conditions, students take solid and liquid samples, prepare these and produce sampling protocols. For the parameters specified in legal provisions, they examine the samples taken from problem wastes, seepage water, potentially recyclable materials,

compost and industrial wastes and from this derive information on the process control as well as on the quality of the wastes examined.

**Contents:**

- Sampling
- Production of eluates
- Sorting analysis of potentially recyclable materials and problem refuse
- Determination of thermal value
- Examination of liquid wastes  
e.g. pH, conductivity, oxygen, COD, BOD5, phenols, chromate, nitrite, nitrate, ammonia, chlorine
- Examination of solid wastes  
e.g. dry solids content, dry residue, ignition loss, nutrient content, oil content, plant compatibility, germ content
- Examination of gaseous pollutants
- Quality controls
- Legal provisions, technical sets of rules and standards
- Accuracy and plausibility
- Accident prevention, work safety

**Learning Field 12:****3<sup>rd</sup> Training Year****Process wastes****Time guidance value: 60 hours****Formulation of the objective:**

In a team students design plants for the processing of waste. Based on the composition of the waste they select a process, monitor and control of the procedures. They carry out maintenance measures and correct

malfunctions in the plant. Students plan inspections and document the routine operation and maintenance.

**Contents:**

- Mechanical processing  
in particular breakdown, comminution, sorting, sieving, fractioning
- Production of pre-products and intermediate products  
in particular granulation, mixing, compressing
- Conveyance facilities
- Measuring, control and regulation facilities
- Identification of defects, correction of operating faults
- Procedures
- Maintenance
- Stock keeping, storage aids
- Accident prevention, labour protection



**Learning Field 13:**

**3<sup>rd</sup> Training Year**

**Dispose of wastes**

**Time guidance value: 60 hours**

**Formulation of the objective:**

Students are in the position to accept, allot and correctly dispose of wastes. They are aware of the hazards to the environment through these plants and take measures to minimise emissions. With this, they

decide on the prerequisites for the tendering for a waste disposal plant and assign the disposal route.

**Contents:**

- Prerequisites for waste disposal
- Planning and establishment of waste disposal plants
- Facilities, operation and recultivation of a landfill
- Recording of weather data
- Disposal of asbestos
- Allocation of landfills
- Design and operation of refuse incineration plants
- Pyrolysis technology
- Disposal of wastes in need of particular monitoring through, for example, chemical-physical treatment, biological treatment, incineration
- Hazards to the environment through waste disposal plants
- Legal provisions, technical rules and standards
- Accident prevention, labour protection

### 3. Literature/Training materials

- **Handbuch für Umwelttechnische Berufe (Ver- und Entsorger)**  
[Handbook for Environmental Engineering Occupations  
(Environmental Technician)]  
Hirshammer Verlag München  
Vol. 1: Grundlagen für alle Fachrichtungen [Basics for all specialisations], ISBN 3-88721-071-9

Vol. 2: Wasserversorgung [Water supply], ISBN 3-88271-072-7

Vol. 3: Abwasser [Sewage]  
ISBN 3-88721-073-5

Vol. 4: Kreislauf- und Abfallwirtschaft  
[Recycling and waste management]  
ISBN 3-88721-074-3

- Ignatowitz, E.  
**Chemietechnik**  
[Chemical engineering]  
Verlag Europa-Lehrmittel, Haan-Gruitten

- Fischer, U.  
**Fachkunde Metall**  
[Metals Manual]  
Verlag Europa-Lehrmittel, Haan-Gruitten

- Landesumweltamt Nordrhein-Westfalen  
**Handbuch für Laborpraxis für Ver- und Entsorgerinnen/  
Ver- und Entsorger**  
[Manual for laboratory practice for Environmental  
Technicians]  
Materialien No. 33

- Nickel, W.  
**Recycling-Handbuch Strategien-Technologien-Produkte**  
[Recycling manual Strategies-engineering-products]  
VDI-Verlag  
ISBN 3-18-401386-3

- **BVDS Fachbuch Stahlrecycling:  
vom Rohstoff Schrott zum Stahl**  
[Manual of steel recycling  
from the raw material scrap to steel]  
Augsburger Druck- und Verlagshaus,  
Augsburg

- Cord-Landwehr, Klaus  
**Einführung in die Abfallwirtschaft**  
[Introduction to waste management]  
B.G. Teibner Verlag, Stuttgart  
ISBN 3-519-1426-0

- Bilitewski, B.; Härdtle, G.; Marek, K.  
**Abfallwirtschaft**  
[Waste management]  
Springer-Verlag, Berlin  
ISBN 3-540-64276-6

#### Further training media and materials

- **Training and occupation**  
Rights and responsibilities during occupational training inter alia  
German Federal Ministry of Education and Research  
[www.bmbf.bund.de](http://www.bmbf.bund.de)
- **KURS** – The database for training and further training of the  
German Employment office  
[www.arbeitsagentur.de](http://www.arbeitsagentur.de)
- **Federal Institute for Vocational Education and Training (BIBB)**  
annually issues the handbook "Lieferbare Veröffentlichungen  
[Deliverable publications]" in which comprehensive material on all  
subjects of occupational training are to be found. This summary  
which also appears as a CD-Rom can be obtained directly from the  
BIBB.  
[www.bibb.de](http://www.bibb.de)

#### foraus.de: virtual BIBB Forum for Training Personnel

The Federal Institute for Vocational Education and Training (BIBB), together with Thinkhouse GmbH has developed a forum in the internet under the address: [www.foraus.de](http://www.foraus.de).

foraus.de offers its visitors not only information, an instructors' library and online further training. With membership (free registration) in foraus.de, in addition to a personalised communication platform there are available many additional functions for discussion, research and exchange of experiences. Furthermore, one is informed per E-mail on the latest developments in the field of vocational training and on current events in foraus.de.

## 4. Addresses

■ **ver.di – Vereinte Dienstleistungsgewerkschaft**  
[United Services Union]

Bundesverwaltung  
Paula-Thiede-Ufer 10  
D-10179 Berlin  
Tel.: +49 (0) 30/69 56-0  
Fax: +49 (0) 30/69 56-39 56  
E-mail: info@verdi.de  
Internet: www.verdi.de

■ **Bundesverband der Deutschen Entsorgungswirtschaft e.V.**  
[The Federation of the German Waste Management Industry]  
(BDE)

Behrenstrasse 29  
D-10117 Berlin  
Tel.: +49 (0) 30/5 90 03 35-0  
Fax: +49 (0) 30/5 90 03 35-99  
E-mail: info@bde-berlin.de  
Internet: www.bde-berlin.de

■ **Bundesverband Sekundärrohstoffe und Entsorgung e.V.**  
[German Federation for Secondary Raw Materials and  
Disposal] (bvse)

Hohe Straße 73  
D-53119 Bonn  
Tel.: +49 (0) 2 28/9 88 49-0  
Fax: +49 (0) 2 28/9 88 49-99  
E-mail: info@bvse.de  
Internet: www.bvse.de

■ **Verband Kommunale Abfallwirtschaft und Stadtreinigung**  
**im VKU** [German Association of Municipal Waste  
Management and City Cleansing] (VKS im VKU)

Brohler Str. 13  
D-50968 Köln  
Tel.: +49 (0) 221 / 3770-385  
Fax: +49 (0) 221 / 3770-371  
E-mail: vks-verband@vku.de  
Internet: www.vksimvku.de

■ **Bundesinstitut für Berufsbildung**  
[Federal Institute for Vocational Education and Training]  
(BIBB)

Robert-Schuman-Platz 3  
D-53175 Bonn  
E-mail: zentrale@bibb.de  
Internet: www.bibb.de

■ **Bundesministerium für Bildung und Forschung [Federal  
Ministry of Education and Research] (BMBF)**

Heinemannstr. 2  
D-53175 Bonn  
Tel.: +49 (0) 18 88/57 -0  
Fax: +49 (0) 18 88/57-36 01  
E-mail: information@bmbf.bund.de  
Internet: www.bmbf.bund.de

■ **Bundesministerium für Wirtschaft und Technologie [Federal  
Ministry of Economics and Technology] (BMWi)**

Scharnhorststr. 34-37  
D-10115 Berlin  
Villemombler Str. 76  
D-53123 Bonn  
Tel.: +49 (0) 18 88/61-50  
Fax: +49 (0) 18 88/57-36 01  
E-mail: info@bmwi.bund.de  
Internet: www.bmwi.bund.de

■ **Bundesministerium für Umwelt, Naturschutz und  
Reaktorsicherheit [Federal Ministry for the Environment,  
Nature Conservation and Nuclear Safety] (BMU)**

Alexanderplatz 6  
D-10178 Berlin  
Tel.: +49 (0) 30/18 305-0  
Fax: +49 (0) 30/18 305-4375  
Robert-Schuman-Platz 3  
D-53175 Bonn  
Tel.: +49 (0) 2 28/99 305-0  
Fax: +49 (0) 2 28/99 305-3225  
E-mail: info@bmu.bund.de  
Internet: www.bmu.bund.de

■ **Sekretariat der Ständigen Konferenz der Kultusminister der  
Länder in der Bundesrepublik Deutschland [Secretariat of  
the Permanent Conference of the Culture Ministers of the  
Federal States of the Federal Republic of Germany] (KMK)**

Lennéstr. 6  
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Fax: +49 (0) 2 28/5 01-7 77  
E-mail: berufsbildung@kmk.org  
Internet: www.kmk.org

**Competent bodies**

For the occupational training in environmental occupations

■ **Baden-Württemberg**

Regierungspräsidium Karlsruhe  
Referat 12d  
D-76247 Karlsruhe  
E-mail: poststelle@rpk.bwl.de

■ **Bayern**

Bayerische Verwaltungsschule (BVS)  
Ridlerstraße 75  
D-80339 München  
E-mail: info@bvs.de

■ **Berlin**

Senatsverwaltung für Inneres und Sport  
ZS B11MO  
Klosterstraße 47  
D-10179 Berlin  
E-mail: poststelle@sennin.sport.berlin.de

■ **Freie Hansestadt Bremen**

Der Senator für Finanzen - 33/6 -  
Doventorscontrescarpe 172, Block B  
D-28195 Bremen  
E-mail: office@finanzen.bremen.de

■ **Freie und Hansestadt Hamburg**

Senat der Freien und Hansestadt  
Hamburg  
Zentrum für Aus- und Weiterbildung  
zuständige Stelle nach § 73 Berufsbildungsgesetz  
Steckelhörn 12 (Gotenhof)  
D-20457 Hamburg  
E-mail: poststelle@personalamt.hamburg.de

■ **Niedersachsen**

Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und  
Naturschutz (NLWKN)  
Zuständige Stelle für die Berufsbildung  
An der Scharlake 39  
D-31135 Hildesheim  
E-mail: poststelle@nlwkn-hi.niedersachsen.de

■ **Nordrhein-Westfalen**

Bezirksregierung Düsseldorf  
Postfach 30 08 65  
D-40408 Düsseldorf  
E-mail: poststelle@bezreg-duesseldorf.nrw.de

■ **Rheinland-Pfalz**

Aufsichts- und Dienstleistungsdirektion  
Zuständige Stelle – Ref. 12  
Willy-Brandt-Platz 3  
D-54290 Trier  
E-mail: poststelle@add.rlp.de

■ **Saarland**

Ministerium für Umwelt  
Referat A3  
Keplerstraße 18  
D-66119 Saarbrücken  
E-mail: poststelle@umwelt.saarland.de

■ **Sachsen**

Regierungspräsidium Leipzig  
Referat 12  
Braustraße 2  
D-04107 Leipzig  
E-mail: poststelle@rpl.sachsen.de

■ **Schleswig-Holstein**

Verwaltungsakademie Bordesholm  
Heintzestraße 13  
D-24582 Bordesholm  
E-mail: fortbildung@vab-sh.de

■ **Thüringen**

Thüringer Landesverwaltungsamt  
Referat 420  
Postfach 22 49  
D-94403 Weimar  
E-mail: poststelle@tlvwa.thueringen.de

