Framework curricula
for vocational training in the construction industry

(Resolution of the Conference of Ministers of Education and
Cultural Affairs of 5 February 1999)

Part I Preliminary remarks

This framework curriculum for vocational education and training at vocational schools has been adopted by the Standing Conference of the Ministers and Senators of Education and Cultural Affairs of the Länder (KMK).

The framework curriculum is coordinated with the corresponding training regulations of the Federal Government (issued by the Federal Ministry of Economics or the competent ministry in agreement with the Federal Ministry of Education, Science, Research and Technology). The coordination procedure is governed by the "Gemeinsame Ergebnisprotokoll vom 30.05.1972" (Joint Results Protocol of 30 May 1972). The framework curriculum is basically based on the lower secondary school leaving certificate and describes minimum requirements.

The framework curriculum for assigned occupations is divided into basic training covering a broad range of occupational fields and specialised training building on this.

On the basis of the training regulations and the framework curriculum, which regulate the objectives and contents of vocational training, the final qualification in a recognised training occupation and - in conjunction with instruction in other subjects - the vocational school leaving certificate are imparted. This creates essential prerequisites for qualified employment as well as for entry into school-based and vocational further and continuing education and training courses.

The framework curriculum does not contain any methodological specifications for teaching. Independent and responsible thinking and acting as the overarching goal of training is preferably taught in those forms of teaching in which it is part of the overall methodological concept. In principle, any methodical procedure can contribute to achieving this goal; methods which directly promote the competence to act are particularly suitable and should therefore be taken into account appropriately in the lesson design.

The Länder adopt the framework curriculum directly or implement it in their own curricula. In the second case, they ensure that the result of the subject and time coordination with the respective training regulation taken into account in the framework curriculum is maintained.

Part II Educational Mission of the Vocational School

The vocational school and the training companies fulfil a joint educational mandate in dual vocational training.

The vocational school is an independent place of learning. It works as an equal partner with the other parties involved in vocational education and training. It has the task of imparting vocational and general learning content to the pupils with particular regard to the requirements of vocational training.

The vocational school aims to provide basic and specialised vocational education and extends the previously acquired general education. In doing so, it aims to enable students to fulfil their tasks in the workplace and to participate in shaping the world of work and society in a socially and ecologically responsible manner. It complies with the regulations of the Länder school laws applicable to this type of school. In particular, the vocationally related teaching is also oriented towards the vocational regulations issued for each individual state-recognised training occupation on a uniform federal basis:

- Framework Curriculum of the Standing Conference of the Ministers and Senators of Education and Cultural Affairs of the Länder (KMK)
- Federal training regulations for in-company training.

According to the framework agreement on the vocational school (KMK resolution of 15.03.1991), the aim of the vocational school is,

"- to provide a vocational skill that combines professional competence with general skills of a humane and social nature;

- to develop professional flexibility in order to cope with the changing demands in the working world and society, also with regard to the growing together of Europe;

- to awaken the willingness to engage in professional development and further education

- to promote the ability and willingness to act responsibly in shaping individual lives and in public life".

To achieve these goals, the vocational school must

- orientate teaching towards a pedagogy specific to their task, which emphasises manual competence;

- to impart cross-occupational and cross-field qualifications, taking into account necessary occupational specialisation;
- ensure a differentiated and flexible educational offer in order to meet different abilities and talents as well as the respective requirements of the world of work and society;
- provide comprehensive support and assistance to disabled and disadvantaged people within the scope of their possibilities;
- point out the environmental hazards and accident risks associated with the exercise of the profession and private lifestyle and point out ways of avoiding or reducing them.

In addition, the vocational school should, in general lessons and as far as possible within the framework of vocationally related lessons, address core problems of our time, such as

- Work and unemployment,
- Peaceful coexistence of people, peoples and cultures in a world of cultural identity,
- Conservation of the natural basis of life and
- guaranteeing human rights.

The listed goals are directed towards the development of action competence. This is understood here as the willingness and ability of the individual to behave appropriately, thoughtfully and in an individually and socially responsible manner in social, professional and private situations.

Action competence unfolds in the dimensions of professional competence, personal competence and social competence.

Professional competence refers to the willingness and ability to solve tasks and problems in a goal-oriented, appropriate, methodical and independent manner on the basis of professional knowledge and skills and to assess the result.

Personal competence refers to the willingness and ability to clarify, think through and assess development opportunities, requirements and restrictions in family, work and public life as an individual personality, to develop one's own talents and to formulate and develop life plans. It includes personal qualities such as independence and critical faculties,

Self-confidence, reliability, sense of responsibility and duty. It includes in particular the development of well thought-out values and self-determined commitment to values.

Social competence refers to the willingness and ability to live and shape social relationships, to grasp and understand attentions and tensions, and to engage and communicate with others rationally and responsibly. This includes in particular the development of social responsibility and solidarity.

Methodological and learning competence grow out of a balanced development of these three dimensions.

Competence refers to learning success in relation to the individual learner and his or her ability to act on his or her own responsibility in private, occupational and social situations. In contrast, qualification is understood as learning success in relation to usability, i.e. from the point of view of demand in private, professional and social situations (cf. German Education Council, Recommendations of the Education Commission on the Reorganisation of Secondary Level II).

Part IIIDidactic Principles

The objective of vocational education and training requires that teaching be geared to a pedagogy tailored to the tasks of the vocational school, which emphasises action orientation and enables young people to plan, carry out and assess work tasks independently within the framework of their occupational activity.

Learning in the vocational school basically takes place in relation to concrete, professional actions as well as in diverse mental operations, including mental comprehension of the actions of others. This learning is primarily linked to the reflection on the execution of actions (the action plan, the process, the results). This mental penetration of vocational work creates the prerequisites for learning in and from work. This means for the framework curriculum that the description of the objectives and the selection of the contents are occupation-related.

On the basis of learning theory and didactic findings, the following points of orientation are mentioned in a pragmatic approach for the design of action-oriented lessons:

- Didactic reference points are situations that are significant for the exercise of the profession (learning for action)
- The starting point of learning is action, if possible carried out by oneself or mentally reproduced (learning by doing).
- Actions must be planned, carried out, checked, corrected if necessary and finally assessed by the learners as independently as possible.
- Actions should promote a holistic understanding of professional reality, e.g. include technical, safety, economic, legal, ecological, social aspects.
- Actions need to be integrated into learners' experiences and reflected upon in relation to their societal impact.
- Actions should also include social processes, e.g. the declaration of interests or conflict management.

Action-oriented teaching is a didactic concept that interlinks subject and action system traces. It can be realised through different teaching methods.

The teaching offered by the vocational school is aimed at young people and adults who differ in terms of previous education, cultural background and experience from the training companies. Vocational schools can only fulfil their educational mandate if they take these differences into account and support pupils - including disadvantaged or particularly gifted pupils - according to their individual abilities.

Part IV Job-related preliminary remarks

The present framework curricula for vocational training in the construction industry are coordinated with the corresponding training framework curricula in the "Ordinance on Vocational Training in the Construction Industry".

The training occupations are assigned to the occupational field of construction technology according to the Vocational Basic Training Year Credit Ordinance of the Federal Ministry of Education and Research.

The framework curricula are the same in the 1st year of training for all assigned training occupations in the occupational field of construction technology. Insofar as the training in the 1st year is carried out in a school-based basic vocational

The framework curriculum for the vocational field-related learning area in the basic vocational training year for the vocational field of construction technology applies to the first year of vocational training.

Essential subject matter of the vocational school for the examination area of economics and social studies is taught on the basis of the "Elemente für den Unterricht der Berufsschule im Bereich Wirtschafts- und Sozialkunde gewerblich-technischer Ausbildungsberufe" (Elements for Teaching at Vocational School in the Area of Economics and Social Studies of Industrial-Technical Training Occupations) (resolution of the Standing Conference of the Ministers of Education and Cultural Affairs of 18.05.1984).

The selection of learning fields and the corresponding formulation of objectives is based on exemplary examples of professional reality. The sequence of the learning fields within a training year takes into account the coordination of theory and practice as well as the didactic annual planning. The listed contents are to be understood as minimum contents for achieving the formulated objectives.

The present framework curricula are based on the following overarching school objectives for all training occupations in the construction industry:

The pupils

- observe occupational safety and health principles and measures to prevent accidents and damage to health and to prevent occupational diseases,
- apply principles of ecological building, especially with regard to environmental protection and rational energy use,
- develop a sense of responsibility for an economically and ecologically sound use of materials
- develop the competence to act and make decisions in personal and professional situations, can accept tensions and conflicts of a personal and professional nature and help to balance them,
- use new technologies and work equipment when planning work processes and evaluating work results,
- ensure cleanliness and order in the workplace and dispose of waste in accordance with legal requirements and ecological necessity,
- take quality assurance measures into account during planning.

Overview of the learning fields for the vocational field of construction technology, basic vocational training (all occupations), technical theory

	Learning fields	Time guidelines in hours		
		Year 1	Year 2	Year 3
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Manufacture of a reinforced concrete component	60		
5	Making a wooden construction	60		
6	Coating and cladding of a component	60		
	Total 880	320	280	280

Field of study 1: Setting up a construction site	**1.Training year Time guideline value 20 hours**

Formulation of goals

The pupils plan a construction site installation to carry out a construction project, taking into account rational work processes, occupational health and safety regulations and environmental protection. They differentiate between the areas of responsibility in construction planning, implementation and

-acceptance.

Because of the variety of professions involved in construction, they develop an understanding for each other's work and realise that consideration and safety are prerequisites for successful work.

They take measures for setting up and closing off a construction site and are able to read plans for setting up a construction site. With the help of tables, they are to draw the required parking and traffic areas in a construction site layout plan, taking into account the existing traffic situation, and apply measuring methods for its implementation.

Contents

Construction trades

Employers' associations, workers' associations

Construction schedule

Client, planning office, construction

company Construction supervision

Construction site set-up and cordoning

off Length and right-angle

measurement

Lengths of pipelines and barriers, building site sizes, storage and parking areas,

working and parking areas, buildings

Scales, symbols

Traffic sign, line and routing plans Basic geometric

constructions

Field of study 2: Development and foundation of a building	**1.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils mentally retrace the development and foundation of a building. They plan the construction of building pits and trenches, taking into account the accident prevention regulations, make the corresponding drawings and determine the quantities.

The pupils distinguish, test and assess the types of soil and evaluate the influence of water. They carry out measurements to stake out and fix the height of excavations and trenches and select equipment for excavating, installing and compacting the soil.

The pupils construct a shallow foundation taking into account the type of soil and the existing load and represent it in drawings.

For the driveway, they select a suitable structure for the base course and a surfacing and take drainage into account.

Contents

Securing of excavations, securing of
trenches, soil types, soil classes, water
influence Slope angle, shoring types Load-
bearing capacity, frost-free foundation
Single foundation, strip foundation, slab foundation
Open dewatering
Subgrade, subsoil, unbound base course, paving and slabs made of artificial stones Edging
Pipeline types, building materials
Height measurements
Excavation pits and trenches in views and sections
Lengths, inclinations
Areas, volume, loosening up Force,
tension

Field of study 3: Masonry of a single-shell structure	**1.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils plan the production of a single-shell masonry unit from small- or medium-size artificial bricks including openings.

They make decisions for building materials and type of dressing. They select suitable materials for sealing against soil moisture and work out solutions for their installation.

Based on the work process, the pupils draw up a list of the working materials. In doing so, they consider the erection of scaffolding, taking into account occupational health and safety.

The pupils produce working drawings and determine quantities and materials using tables. They use measuring tools, make measurement sketches and draw up a catalogue of criteria to assess the work results.

Contents

Wall types and tasks
Artificial masonry units, density, compressive strength, airborne sound and thermal insulation Building limes
Masonry mortar, mortar groups Dimensional regulations in building construction Wall bracing
Working scaffolds
Waterproofing materials
Building materials requirements
Detailed drawings, dimension sketches
Isometry

Field of study 4: Manufacture of a reinforced concrete component	**1.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils plan the production of a reinforced concrete component and carry out the necessary computational and drawing work.
They design the formwork and the necessary auxiliary and supporting structures. They determine the composition of the concrete using tables.
The students consider the prerequisites for the interaction of reinforcing steel and concrete as well as the forces occurring in the component and determine the reinforcement.
They compare concrete with other building materials in terms of aesthetics, load-bearing capacity, durability, ease of repair and environmental compatibility.

Contents

Types of concrete, concrete
groups Cements, aggregates
Ready-mixed concrete
Concrete processing, concrete testing
Reinforcing steel, composite action
Reinforcing steel lists
Boarding, shuttering
panels Timber and
material lists Product line
analysis
Formwork and reinforcement drawings

Field of study 5: Manufacture of a wooden construction	**1.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils develop the construction of a wooden component, taking into account the appropriate choice of wood, connections and fasteners.
They take into account the course of forces in the component, select machining tools and make decisions on wood protection.
They recognise the social and ecological importance of the forest.
The pupils draw connections and wooden constructions and determine the material requirements.

Contents

Hardwoods and softwoods, growth, structure
Construction timber
Working of the wood, wood moisture
Wood pests, chemical and constructive wood preservation
Carpentry and engineering wood joints Wood list, offcuts
Nodes

Field of study 6: Coating and cladding of a component	**1.Training year** **Time guide value 60 hours**

Formulation of goals

The students plan the coating and cladding of horizontal and vertical building components. They assess substrates, distinguish, evaluate and select coating, cladding and covering materials. They draw conclusions for the structural design, taking into account thermal stresses and the influence of moisture. The pupils develop design solutions.

Contents

Plaster mortar
Screeds
Building plaster, board materials, substructures,
coverings, installation technology
Joints
Non-pressing water
Waterproofing, waterproofing
materials
Separation and insulation layers, insulation materials
Installation methods, installation plans
Cuts

Overview of the learning fields for the training occupation **Skilled building construction worker specialising in bricklaying** (1st level) and for the training occupation **bricklayer** (1st and 2nd level)

	Learning fields	Time guidelines in hours		
		Year 1	Year 2	Year 3
Skilled building construction worker				
	Vocational field breadth basic education (all professions) *)			
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Making a wooden construction	60		
5	Manufacture of a reinforced concrete component	60		
6	Coating and cladding of a component	60		
	Specialised training in bricklaying			
7	Bricklaying a single-skin wall		40	
8	Brickwork of a double-skin wall		80	
9	Making a solid ceiling		80	
10	Plastering a wall		40	
11	Making a wall in dry construction		20	
12	Manufacture of screed		20	
Bricklayer				
13	Making a straight staircase			40
14	Covering an opening with an arch			40
15	Making a natural stone wall			40
16	Walls of special components			100
17	Repair and renovation of a building component			60
	Total 880	320	280	280

*) see Basic vocational training, pages 08 to 14

Field of study 7: Bricklaying a single-skin wall	**2.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils plan the construction of a wall from large-format bricks. They select the appropriate building materials and the suitable setting technique from the point of view of building physics and economics. They define the work sequence and determine the use of equipment and machinery.
The students calculate the quantities of building materials and carry out a cost comparison between conventional and new backfilling techniques.
They recognise the importance of automatic setting techniques for the development of masonry construction.

Contents

Large-format bricks
Wall panels Wall
elements Shifting
equipment
Working, protective scaffolding
Mortar, mortar groups, thin-bed mortar
Overbonding dimension
Recesses, slots, templates
Prefabricated parts
Waterproofing against non-pressurised
water Execution, detail drawings

Field of study 8: Bricklaying a double-skin wall	**2.Training year** **Time guideline 80 hours**

Formulation of goals

The pupils plan an external wall made of artificial bricks, taking into account double-shell constructions.

The pupils recognise the differences in construction and building physics between single and double-skin masonry and decide on a design taking into account economic and ecological aspects.

The pupils plan the work sequence for the construction of the double-skin masonry and determine the use of equipment and machinery.

The pupils make drawings and read execution plans. They determine quantities of building materials on the basis of drawings and tables as well as the costs of production. They carry out measurement and invoicing according to the rules and regulations.

Contents

Exterior, facing masonry
Masonry blocks, dressings
Insulation materials
Rear ventilation Jointing,
anchoring Window
connection Movement
joints
Installation and add-on parts
Floor plan, vertical section
Dimensioned sketch

Field of study 9: Manufacture of a solid ceiling	**2.Training year** **Time guide value 80 hours**

Formulation of goals

The pupils plan the construction of a reinforced concrete ceiling. They compare types of floor slabs with regard to construction, load-bearing behaviour and physical properties and the amount of damage.

The pupils select the concrete strength class according to the intended use and determine the structure of the formwork as well as the use of equipment and machinery. They read instruction plans and draw up a work and sequence plan for concrete processing.

The pupils make drawings and determine the required quantities of concrete and reinforcing steel.

Contents

Reinforced concrete slab, prefabricated slab Direction of tension, reinforcement guide Bearing
Ring anchor
Recesses, embedded parts
Concrete processing
Retarders, superplasticisers
Reinforcing steel mesh, reinforcing steel bars Fall protection, safety scaffolding Reinforcement drawing, steel list Slab section

Field of study 10: Plastering a wall	**2.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils assess the plaster base, determine the plaster structure taking into account the physical requirements of the building and select the building materials.
They plan the work sequence including preparatory activities and determine the use of equipment.
The pupils calculate the building material requirements.

Contents

Interior plaster, exterior
plaster Plaster mortar groups
Machine plaster, plaster
systems Thermal insulation
plaster Plastering machine
Plaster base Slots
Plaster mortar
requirements
Mixing ratio Measurement
sketch

Field of study 11: Making a wall using dry construction methods2 . Training year
Time guideline 20 hours

Formulation of goals

The pupils plan the substructure for a single stud wall, select building materials for the planking and determine the fasteners.

They describe the assembly processes, the work rules and the use of equipment. Quantity calculations are carried out with the help of tables on the basis of drawing and planning specifications.

Contents

Metal profiles

Plasterboard, gypsum fibreboard

Corner, joint connection

Wall section

Field of study 12: Production of screed	**2.Training year** **Time guideline value 20 hours**

Formulation of goals

The pupils plan the production of a floating screed. They determine the layer structure and the arrangement of the joints and select the building materials. They determine the work sequence including the preparatory work and the finishing treatment.

The pupils carry out mix calculations and determine the quantities of building materials.

Contents

Substrate Height

Marks Screed

Types

Sloping and levelling screed

Separating layer

Sound insulation

Insulation material

Movement joint

Reinforcement Wall

connection detail

Field of study 13: Making a straight staircase	**3.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils plan the construction of a single-flight staircase. They take into account the direction of travel, building material, position and construction in accordance with building regulations. They select the shape and covering of the steps taking into account safety and design.
They calculate the staircase taking into account the different floor structure and draw it.

Contents

Staircase shapes Staircase
designations Main
dimensions
Solid staircase, prefabricated staircase, brick
staircase Exterior, interior staircase
Tension direction, step
shape, stair covering Step
dimension rule Running
length Stair opening
dimensions Passage height
Plan view, stair section

Field 14: Covering an opening with a bow	**3rd year of training** **Time guideline 40 hours**

Formulation of goals

The pupils plan the construction of a brick segmental arch. They make decisions on the use of building materials and draw conclusions for the design of the abutments on the basis of the course of forces in an arch construction.

The pupils draw and calculate the arch. They determine the workflow for the production and installation of the arch formwork as well as for the bricklaying of the arch.

Contents

Bow types

Sheet parts

Shoring

Number of layers, joint thickness

Arch construction

View

Field 15: Making a natural stone wall	**3rd year of training** **Time guideline 40 hours**

Formulation of goals

The pupils compile options for the construction of a natural stone wall with openings and decide on a type of execution. In addition to structural and technical aspects, design and ecological considerations are also taken into account.

The pupils plan the workflow and produce working drawings.

Contents

Natural stones

Types of masonry, facing masonry

Execution rules

Joints

Cover

Field of study 16: Masonry of special components	**3.Training year** **Time guideline 100 hours**

Formulation of goals

Pupils apply bracing rules for piers and skewed wall corners and infill. They draw bracings and carry out quantity calculations.

The pupils know the possibilities of manufacturing chimneys from moulded parts. They plan a chimney with a ventilation shaft and draw it. They compile construction and processing rules, taking into account building physics interrelationships.

The pupils plan the waterproofing of a structure against pressing water, taking water retention into account.

Contents

Slenderness, stress verification

acute and obtuse angle corner

Steel, reinforced concrete skeleton, timber

framework Joints

Shaped bricks

Insulating materials

Cleaning opening

Roof, ceiling, wall duct Chimney head

Black tub, White tub Connections

Field 17: Repair and renovation of a building component **3rd year of training**
Time reference value 60 hours

Formulation of goals

The pupils plan the repair or renovation of an exterior wall. They recognise possible causes of damage and work out measures to limit and secure the damage. They observe building physics requirements and specifications and select appropriate building materials.
They develop an understanding for the careful handling of buildings worth preserving. They learn about architectural styles and their special constructive features.
The pupils create measurement and inventory sketches.

Contents

Damage assessment
Interception, underpinning
Thermal insulation
Drainage
Concrete refurbishment
Masonry refurbishment
Building materials recycling

Overview of the learning fields for the training occupation **skilled building construction worker specialising in concrete and reinforced concrete construction work** (1st level)				
	Learning fields	**Time guidelines in hours**		
		Year 1	Year 2	Year 3
Skilled building construction worker				
	Vocational field breadth basic education (all professions) [*)]			
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Making a wooden construction	60		
5	Manufacture of a reinforced concrete component	60		
6	Coating and cladding of a component	60		
	Specialist training in the focus area of concrete and reinforced concrete work			
7	Manufacture of a reinforced concrete column		60	
8	Construction of an external basement wall		60	
9	Bricklaying a single-skin wall		80	
10	Making a straight staircase		40	
11	Making a solid ceiling		40	
Concrete and reinforced concrete worker				
12	Manufacture of a prefabricated ceiling			80
13	Making a spiral staircase			40
14	Repair of a reinforced concrete component			40
15	Construction of a retaining wall			80
16	Manufacture of a truss from prestressed concrete			40
	Total 880	**320**	**280**	**280**

[*)] see Basic vocational training, pages 08 to 14

Field of study 7: Manufacture of a reinforced concrete column	**2.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils plan the construction of a reinforced concrete column with individual foundation and beam connection. They carry out the arithmetical and drawing work and determine the quantities.

Taking the existing soil into account, they make decisions on the type and dimensions of the individual foundations and their connections, and work out solutions for their production.

The pupils design the construction of the formwork and its bracing. They select a ready-mixed concrete and consider concrete technology processing rules.

They compare constructions made of in-situ concrete with prefabricated reinforced concrete elements.

Contents

Measurement

Board, system formwork

Reinforcing steel, steel list

Concrete processing

Reinforcement guidance

Formwork construction Parts

lists

Quality control

In-situ concrete, sleeve foundation

Field of study 8: Construction of an external basement wall	**2.Training year Time guide value 60 hours**

Formulation of goals

The pupils take into account economic and ecological aspects for the construction and selection of materials when constructing an external basement wall made of reinforced concrete. They carry out the calculations and drawings and select a waterproofing measure depending on the water stress.
The students choose the concrete and the method of execution according to the load case.
They observe the technologically correct sequence when creating the overall construction.

Contents

Frame, large-area formwork
Bar, mesh reinforcement
Supplementary, single-barrel,
connection reinforcement Joints
Pressing and non-pressing water Tray design
Wall duct
Installation plan, cutting sketch, material list Surface
design
Formwork, reinforcement plan

Field of study 9: Bricklaying a single-skin wall	**2.Training year Time guide value 80 hours**

Formulation of goals

The pupils plan the construction of a single-shell wall made of medium and large-sized artificial bricks, including possible prefabricated parts. According to the requirements of a wall, they make decisions on the selection of the required materials and the execution of the masonry as well as the erection of scaffolding.

The pupils produce working drawings and measurement sketches and carry out quantity and material calculations using tables.

They assess the relationship between the material structure and the physical properties of the individual building materials.

They compare modern working techniques with traditional manufacturing methods.

Contents

Wall types, wall tasks

Artificial building blocks

Opening, recess Masonry

mortar Wall bond

Capillarity, sealing Thermal insulation

Detailed drawing

Field of study 10: Making a straight staircase	**2.Year of training** **Time guideline 40 hours**

Formulation of goals

The pupils plan a straight staircase taking into account the applicable dimensioning and construction rules. They determine the type and design of the staircase.
The students construct a cast-in-place concrete staircase, taking into account the aspects of formwork, reinforcement and concreting.
They compare the advantages and disadvantages of switched and finished stair systems.

Contents

Regulations Stair
designations Constructions
Position Stair
calculation
Tensioning direction
Elevation, formwork,
reinforcement Precast
staircase, landing Installation,
working rules

Field 11: Making a solid ceiling	**2nd year of training** **Time guideline 40 hours**

Formulation of goals

The pupils plan the structural design of formwork and reinforcement for a cast-in-place concrete ceiling, taking into account sound and heat insulation.
The pupils draw the ceiling construction. They calculate the quantities for formwork, reinforcement and concrete.
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Contents

Installation plan, cutting sketch, mat list
Tensioning direction, reinforcement guidance
Formwork systems
Concrete processing
Floating screed
Ceiling cut

Field of study 12: Making a prefabricated ceiling	**3rd year of training** **Time benchmark 80 hours**

Formulation of goals

The pupils plan the installation of a prefabricated ceiling. When choosing the ceiling system, they compare different types of slab ceilings for a floor plan with regard to load-bearing capacity and cost-effectiveness. They draw up an installation plan taking into account the required formwork and necessary supporting structures.

The pupils plan the work steps and determine the quantities for building materials and auxiliary building materials.

Contents

Partial assembly, full assembly ceiling

Beam, ribbed, element panel ceiling

Support design

Ring anchor

Connection reinforcement

Joints

Field of study 13: Making a spiral staircase	**3.Year of training** **Time guideline 40 hours**

Formulation of goals

The pupils plan a spiral staircase taking into account the applicable dimensioning and construction rules. They design the formwork, taking into account the principles for stair treads.
The pupils compare the advantages and disadvantages of spiral staircases and straight staircases.

Contents

Shape, construction,
position calculation
Precast stair Drawing
distortion

Field of study 14: Repair of a reinforced concrete component	**3.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils recognise possible construction faults on the basis of damage pictures and make suggestions for their elimination.

They know different possibilities of the cause of damage, the relevant influencing factors, the degree of damage and the extent of damage. They develop a repair concept and propose appropriate working procedures for this.

The pupils describe the selected working method and identify the materials.

Contents

Preventive concrete
protection Concrete quality
Carbonation, concrete contamination, concrete
cracks Spot and full surface repair Impregnation,
injection
Filling method, spraying method
Surface protection Surface design

Field of study 15: Construction of a retaining wall	**3.Training year** **Time guide value 80 hours**

Formulation of goals

The pupils select the formwork and the concrete on the basis of the required and desired properties of a retaining wall and know the reinforcement.

They take into account that certain requirements are placed on concrete for special construction tasks and that concretes with special properties, special concretes and different placing methods are required for this.

The pupils describe these concretes and their typical characteristics. They observe production and process rules.

Contents

Concrete B I with special properties, Concrete B II

Concrete admixtures

Special concretes

Suitability, quality testing

Heavyweight, angle retaining wall

Joints

Field of study 16: Production of a truss from prestressed concrete	**3rd year of training** **Time guideline 20 hours**

Formulation of goals

The pupils describe the mode of action of prestressed concrete and explain the principles of prestressing. They observe the rules of concrete processing and take into account constructional relationships. With the help of drawings, they can describe the course of the prestressing and the design of the anchorages.

The pupils compare structural components made of prestressed concrete with slackly reinforced structural components.

Contents

Material requirements

Reinforcement guide

Clamping method

Prestressing steel, anchor

Cladding tube, grout

Construction joint

Overview of the learning fields for the training occupation **skilled building construction worker specialising in firing and chimney construction work (1st level)**
and for the apprenticeship occupation **fireplace and chimney fitter** (1st and 2nd stage)

	Learning fields	Time guidelines in hours		
		Year 1	Year 2	Year 3
Skilled building construction worker				
	Vocational field breadth basic education (all professions) *)			
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Making a wooden construction	60		
5	Manufacture of a reinforced concrete component	60		
6	Coating and cladding of a component	60		
	Skilled building construction worker, focus on fireplace and chimney construction work			
7	Concreting a chimney foundation		40	
8	Walls of a freestanding chimney		80	
9	Brick lining of a pig iron ladle		60	
10	Lining of a multilayer ring main		100	
Fireplace and chimney fitter				
11	Manufacture of a reinforced concrete chimney			80
12	Walls of a moulded stone vault			100
13	Lining of a boiler plant			60
14	Erection of a lightning protection system			20
15	Renovating a glass bathtub			20
	Total 880	320	280	280

*) see Basic vocational training, page 08 to14

Field of study 7: Concreting a chimney foundation	**2.Training year** **Time guide value 40 hours**

Formulation of goals

The pupils plan the production of a circular ring foundation for a free-standing chimney and carry out comparisons with other types of foundations.
They assess soils in terms of their load-bearing capacity and settlement behaviour and conclude on the type and size of the foundation.
The surveying work necessary for the excavation of building pits is carried out and the earthworks are planned taking into account the securing of the building pits.
The pupils draw the foundation formwork.

Contents

Surveying of excavations
Soil types
Drainage System
formwork Reinforcing
bar, steel list
Placing, compacting, curing Site plan,
drainage plan Foundation, formwork,
reinforcement plan Building material
tables
Quantity determination

Field of study 8: Masonry of a free-standing chimney	**2.Training year Time guide value 80 hours**

Formulation of goals

The pupils plan the production of a free-standing brick chimney, taking into account the mechanical, thermal and chemical stresses. They select a building material depending on the chimney construction and taking into account the general and special requirements in refractory construction. They know the types and installation of chimney equipment.

During execution, the pupils distinguish and compare single- and multi-shell chimneys with regard to the different mode of operation and construction.

The pupils produce working drawings and carry out calculations for chimney construction and material requirements.

Contents

Base, shaft, lining, chimney head, joints Masonry units,
formats, dressings
Shaped bricks, shaped pieces, masonry mortar, mastic
Movement joints
Thermal insulation materials
Chimney draught, exhaust gases, temperature
Climbing equipment, gangways, equipment eyes, measuring
equipment Flight warning lights, lightning rods
Sectional drawings, roof and ceiling penetrations Compressive
strength, stability

Field of study 9: Bricklaying of a pig iron ladle	**2.Year of training** **Time guideline 60 hours**

Formulation of goals

The pupils plan the production of a single-layer brick lining from refractory-solid dense unit formats. Taking into account the different operating factors, they make decisions about the selection of building materials and the way they are processed. They take into account mechanical, thermal and chemical stresses. They know the constructional differences between ring and spiral masonry. They describe the erection of scaffolding in compliance with accident prevention regulations.
The pupils produce working drawings and measurement sketches and carry out quantity take-offs.

Contents

Shaped dense unit formats Fire
mortar, fire putty Refractory
masses
Feeding technique, processing
instructions Thermal calculations Drying,
heating Quality properties
Building tables
Detailed drawing Quantity
take-off Material requirements
Tools and machines

Field of study 10: Lining a multi-layer ring circuit2	**. Training year** **Time guideline 100 hours**

Formulation of goals

The pupils plan the multi-layer lining of a ring pipe with moulded dense and moulded heat-insulating products for a blast furnace, including the bridging of openings. Special attention must be paid to the formation of bevels; keystones and expansion joints must be measured and machined very carefully. Taking into account the various operating factors, the pupils make decisions about the selection of building materials and the way they are processed.
In addition to the different types of stone and formats, they have to classify and select the associated fire mortars and fire cements as well as the various retaining structures.

Contents

Shaped dense products
Shaped heat-insulating products Movement joints
Welding technology
Retaining structures
Metallic materials
Transverse vaults
Bevels
Transitions

Field of study 11: Manufacture of a reinforced concrete chimney	**3.Training year Time guide value 80 hours**

Formulation of goals

The pupils plan the construction of reinforced concrete chimneys with the associated lining joints, support structures and chimney heads, paying particular attention to chimneys with accessible interstitial space and storey linings.

You plan the structural design of formwork and reinforcement for the chimney shaft, including recesses. You observe the installation of chimney equipment.

With regard to the required properties and strengths of the concrete, they make a selection of the individual concrete components and the machines for placing and compacting the concrete.

The pupils distinguish between different ways of protecting concrete and reinforced concrete parts from acid attack and examine different measures for repairing concrete components.

They read and create formwork, reinforcement and working drawings and carry out strength and quantity calculations.

Contents

Concrete with special properties

Concrete processing

Machines, equipment

Concrete admixtures

Sliding and climbing formwork

Bracket, crampons, protective bracket, climbing ladder

Thermal insulation

Bonded screed Protective

coating

Field of study 12: Masonry of a shaped stone vault	**3.Training year** **Time guideline 100 hours**

Formulation of goals

The pupils plan the production of a multi-layer moulded stone vault. They consider the different types of stress and take into account the basic static principles of a vault construction, represent them in drawings and calculate them. They determine the material quantities using tables and diagrams.

The pupils calculate arches and describe the differences in construction. They pay particular attention to the construction and execution of work and training scaffolding in compliance with accident prevention regulations.

The pupils produce working drawings and determine quantities and materials. They use measuring tools, make measurement sketches and draw up a catalogue of criteria for assessing the work results.

Contents

Transverse, full arch bricks, double full arch
bricks Thermally curing masses
Ceramic fibre products Anchoring elements
Abutment structures, abutment stones
Segmental arch, round arch
Dome, tunnel, dome vault adhesives

Field of study 13: Lining a boiler system	**3.Training year** **Time guide value 60 hours**

Formulation of goals

The pupils plan the construction of a boiler system from unshaped and ceramic products. In doing so, they take into account the special processing instructions for gunning, ramming and pouring masses.

When working with ramming mixes, special attention must be paid to the design instructions.

Contents

Site equipment Work
preparation Refractory
concrete Ceramic fibre
products Anchoring elements
Adhesives Evaporation holes
Formwork
Concrete processing Steel
construction work
Drying, heating, heating up and heating down

Field 14: Installation of a lightning protection system	**3rd year of training** **Time guideline 20 hours**

Formulation of goals

The pupils plan the installation of a lightning protection system for the external lightning protection of chimneys. They determine the earthing resistances of common types of earth electrodes and determine their dimensions.

When installing the earth electrode in the ground, pay special attention to laid cables and pipelines.

The pupils measure and assess the resistances of earthing and lightning protection systems.

Drawings are made and calculations are carried out for documentation purposes.

Contents

Electrical basic variables

Resistance calculations

Surface earth electrode, deep earth electrode

Fastening systems

Circuit diagram

Potential equalisation

Inventory plan

Implementation plan

Field of study 15: Renovation of a glass tank	**3.Training year** **Time guideline 20 hours**

Formulation of goals

The pupils determine the damage to a glass tank as a result of mechanical, thermal and chemical stresses. They know measures to limit damage and estimate the type and extent of repair. They observe the safety measures when working on the repair of the fireproof masonry.

During demolition work, they observe occupational health and safety regulations, in particular measures to prevent the inhalation of harmful substances.

They inform themselves about escape and rescue routes and about the measures to be taken in an emergency.

Contents

Building survey
Thermal and fire protection
Special shaped bricks, ramming
mixes Building material recycling
Protective clothing, respiratory
protection Hazardous substances,
dusts Calculation of working time
As-built sketches

Overview of the learning fields for the training occupation **finishing skilled worker with a focus on carpentry** (1st level) and for the training occupation **carpenter** (1st and 2nd level)				
	Learning fields	**Time guidelines in hours** Year 1	Year 2	Year 3
Finishing craftsman/-woman				
	Vocational field breadth basic education (all professions) *)			
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Making a wooden construction	60		
5	Manufacture of a reinforced concrete component	60		
6	Coating and cladding of a component	60		
	Finishing skilled worker, focus on carpentry work			
7	Tying and straightening a gable roof		60	
8	Erecting a load-bearing wooden wall		60	
9	Installing a lightweight partition wall		40	
10	Installing a wooden beam ceiling		40	
11	Making a single-flight straight staircase		40	
12	Shifts on the hipped roof with the same pitch		40	
Carpenter				
13	Pitching on the unevenly pitched hipped roof			60
14	Installation of a dormer and a roof window			40
15	Fabricating a hall truss			40
16	Constructing a spiral wooden staircase			60
17	Repairing a timber frame			40
18	Maintaining a low-energy house			40
	Total 880	320	280	280

*) see Basic vocational training, pages 09 to16

Field of study 7: Tying and straightening a gable roof	**2.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils compare different roof constructions for a given ground plan and assess their load-bearing behaviour. They decide on a construction, determine the rafter position and rafter length according to the roof covering used and take into account the requirements of structural wood preservation.
The pupils describe the work process and consider the use and maintenance of the machines. They determine the joinery data and represent details in drawings.

Contents

Roof shape
Purlin roof, rafter roof
Suspended and sprinkler
roofs
Longitudinal and transverse bracing, load
transfer Roof structure
Roof tiles, roof stones
Fire protection
requirements Angle
functions
Elevation, longitudinal and
transverse profiles Ridge point,
base point Timber selection,
timber list, offcuts

Field of study 8: Erecting a load-bearing timber wall	**2.Training year** **Time guideline 60 hours**
Formulation of goals The pupils work out the requirements for a load-bearing wall and the different constructions in timber construction. Based on this understanding, they select, justify and draw a functional wall construction. The pupils take into account aspects of energy saving. They avoid structural damage through quality assurance measures and pay attention to occupational safety during production and assembly. They also trace the development of timber construction, classify half-timbered construction in particular in terms of building history and justify its conservation value.	
Contents Timber frame construction Timber frame construction Load transfer, bracing Insulation, wind tightness, dew point heat transfer, insulation thickness connections, installation Design, cladding Window installation	

Field of study 9: Erecting a lightweight partition wall	**2.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils design a stud wall and a pre-set shell for a roof extension. They determine substructures, select insulation and planking and take into account building physics requirements. They attach importance to system-compatible connections and efficient assembly.
They provide for mounting options for installations and the installation of doors.
The pupils create drawings for the execution and calculate the material requirements.

Contents

Metal profiles, wooden cross-sections

Plasterboard, gypsum fibreboard

Wood-based materials

Airborne sound insulation, structure-

borne sound insulation Fire

protection, column cladding Wall,

ceiling, floor connection Movement

joints

Field of study 10: Installation of a wooden beam ceiling	**2.Training year Time guide value 40 hours**

Formulation of goals

The pupils choose the construction for a wooden beam ceiling. To do this, they select a type of wood, classify the beam position including a replacement and represent it spatially.
They take into account the influencing variables for beam cross-sections and spans as well as fire and sound protection. They determine the ceiling and floor construction.
The pupils plan the construction of a flat roof. They decide on a constructive structure.
They determine support forces and carry out cost calculations.

Contents

Joints, supports, anchoring Plank
flooring, dry screed Sound insulation
Underblanket
Ventilated, non-ventilated roof
Waterproofing, edge formation Fire
protection
Load cross
section
Standard labour values, wage costs, material
costs Isometry

Field of study 11: Manufacture of a single-flight straight staircase2 . Training year
Time guideline 40 hours

Formulation of goals

The pupils calculate the structural dimensions of a single-flight straight wooden staircase with saddled treads, taking into account the technical rules. When choosing the type of wood and the surface design, they also consider aesthetic aspects. They take into account measures to protect the treads from damage by covering them until the component is removed.
The pupils represent the formwork construction for a corresponding reinforced concrete staircase. When selecting the formwork skin and the supporting scaffolding, they take into account the dimensions of the construction parts and the possibilities of cost-saving work organisation. They draw a longitudinal section of the formwork.

Contents

Bullet height Step size rule
Pitch ratio Start, exit, run
length
Sealer, wax, glaze
Supporting structure Board
formwork, shuttering board
End board
Shuttering
deadlines
Formwork plan

Field of study 12: Pitching on a hipped roof with the same	2.**Training year** **Time allowed 40 hours**

Formulation of goals

The pupils determine the roof lines and roof surfaces of a hip roof with the same roof pitch. They determine the dimensions required for marking out the hip rafter and the scribe using possible solutions by calculation and drawing, transfer them to the elevation and depict the elaborated timbers.

The pupils compare design variants for eaves and ridge.

Contents

Ridge, eaves, ridge, point of incidence
Roof determination
Discharging the ridge rake
Vertical and horizontal sections, trimming True lengths
and areas
Stitching dimension, ridge rafter
profile Views

Field 13: Pitching on unevenly pitched hipped roofs **3rd year of training**
Time reference value 60 hours

Formulation of goals

The pupils develop the construction for a hipped roof with unequal roof pitch over a composite ground plan. They determine the different roof li- nies and roof surfaces for the main and secondary roofs.

Pupils produce ground plans and roof profiles and acquire the knowledge necessary for carrying out, marking out and finishing hip, valley and jack rafters.

They plan the necessary work processes for setting and straightening the roof. They take into account the use, operation and maintenance of woodworking machines.

Contents

Ridge line, throat line

Ridge, Throat, Decay Ridge

Stitching dimension

Schifterschmiege

Witch cut

Scribing aids

Roof safety scaffolding

Field 14: Installation of dormers and skylights **3rd year of training**
Time guideline 40 hours

Formulation of goals

The pupils distinguish between the different types of dormers according to their shape and construction. They plan the installation of a dormer in a purlin or rafter roof, including the roof connections, taking into account the local building regulations.
You select a skylight and are able to install it in accordance with the building regulations.
The pupils prepare the measurement for the billing.

Contents

Tapered roof dormer, gable roof dormer
Dormer rafters, mullions, transoms
Rafter replacement, plank sheathing
Manufacturer's information
Hand sketch
Views
Dormer cross-section
Contract Regulations

Field of study 15: Making a hall truss	**3.Training year** **Time guideline 40 hours**

Formulation of goals

Pupils describe advantages of trusses and compare construction features.
They design a truss, recognise tension and compression members as well as occurring stresses and construct the nodes with the arrangement of the fasteners. They take into account the relationship between span width and truss height and name wind and buckling bracings, taking into account force dissipation.
The pupils draw views, sections, nodes and the arrangement and distribution of nails and dowels.

Contents

Binding forms
Solid wall, lattice girders
Bottom chord, top chord, vertical and diagonal bar Nail
trusses, squared timber trusses, glulam trusses Wire pins,
dowels, sheet metal mouldings
Nail picture
Tensile, compressive
stress Transport,
assembly

Field 16: Construction of a spiral wooden staircase **3rd year of training**
Time reference value 60 hours

Formulation of goals

The pupils determine the shape and type of staircase for a given staircase opening. Taking into account the construction rules and the pitch ratio, they draw and calculate the steps of the spiral staircase.
They check the passage height and draw the stair in the ground plan as well as the development of a stringer.

Contents

State Building Code
Inserted mortised staircase
Step, riser
Undercutting
Cutlery size
Lanyards
Allocation, proportional method
Handrail, post

Field of study 17: Repair of a timber frame	**3.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils examine a truss construction for damage, document it and determine possible causes. They decide on measures to limit the damage and determine the type and scope of the repair. In doing so, they take into account necessary safety measures.
They consider various wood preservation measures to maintain the value of the structure. They determine how to safely store and dispose of hazardous materials.
The pupils sketch the junctions to be repaired and produce working drawings for them.

Contents

Inventory Damage
analysis Wood
selection,
maintenance Use
Moisture, wood pests, UV radiation Replacement,
lashing, supplementation Plastic dentures
Interception, working scaffold
Structural and chemical wood preservation Surface
treatment

Field of study 18: Maintenance of a low-energy house	**3.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils check the components of a low-energy house built in timber panel or timber frame construction with regard to the necessary care and maintenance measures.
In addition to repairing the surface coating of the wooden exterior façade, the structural-physical properties of a low-energy house must be maintained.
In this context, recommendations are to be given for planned changes of use or minor conversions, in particular how the wind tightness of the exterior building components can be maintained.
As proof of the value-preserving maintenance measures, the work carried out must be documented.

Contents

Energy balance
dew point
Driving rain, condensation
Varnish, stain, wax
Wood protection, wood care
measures Installations, windows
Installation level

Overview of the learning fields for the training occupation **finishing craftsman specialising in plastering** (1st level) and for the training occupation **plasterer** (1st and 2nd level)				
	Learning fields	**Time guidelines in hours** Year 1	Year 2	Year 3
Finishing craftsman/-woman				
	Vocational field breadth basic education (all professions) *)			
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Making a wooden construction	60		
5	Manufacture of a reinforced concrete component	60		
6	Coating and cladding of a component	60		
	Finishing worker, focus on stucco work			
7	Cleaning a living space		80	
8	Plastering an exterior wall		40	
9	Pulling and attaching a stucco profile		80	
10	Making a wall in dry construction		80	
Plasterer				
11	Producing a heat-insulating plaster system			40
12	Manufacture of application stucco			60
13	Creating a suspended ceiling in dry construction			80
14	Creating a wire plaster construction			40
15	Renovation of a building component			20
16	Installing a screed			40
	Total 880	**320**	**280**	**280**

*) see Basic vocational training, pages 09 to 16

Field of study 7: Cleaning a living space	**2.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils determine the technique for producing wall and ceiling plaster, identify suitable plaster mortars and clarify their production. They assess the plaster base, derive preparation measures depending on the local conditions and select the application technique.
The pupils develop the execution of a door closure in the living room as a wire plaster construction. They evaluate the effects of improper manufacture and incorrect mixing ratios.
The pupils determine the material requirements for the plaster work and the wire plaster construction using tables. They produce an execution drawing.

Contents

Types of mortar, mixing ratio of plaster
mortar groups, mineral plasters
Plaster base, bonding bridge, plaster base, plaster
reinforcement Measurement, billing
Fastening, hangers
Plaster structure
Slots Working
scaffold
Wall and ceiling cut Door
end

Field of study 8: Plastering an exterior wall	**2.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils know the functions of exterior plaster. They determine a plaster system for an exterior wall with openings and select the plaster mortar. They assess the plaster base, decide on preparation measures and application techniques taking into account the weather conditions. They evaluate the effects of the weather conditions and the application technique on the plaster quality.
The pupils plan the erection of working and protective scaffolding, taking into account occupational safety. They determine the material requirements using tables and create detailed drawings for the necessary connections.

Contents

Mortar types
Mineral plaster, synthetic resin finishing plaster Plaster base, plaster base, plaster reinforcement Plaster structure
Weathering Impact of driving rain Thermal, sound insulation Facade scaffolding Post-treatment
Cut plaster system
Window, door cut

Field of study 9: Drawing and attaching a stucco profile	**2.Training year Time guide value 80 hours**

Formulation of goals

The pupils design a ceiling with a circumferential cornice. They determine a cornice profile with four edges and identify the work steps for producing it on the drawing table and attaching it to the ceiling.

The pupils draw the ceiling soffit, the cornice profile section and determine the building material requirements. For a stucco profile in need of renovation, they determine the technique for moulding a model and making casts.

Contents

Stucco plaster
Tools for template construction
Cornice profile types
Building styles
Stencil construction
Stencil guidance
Mortar composition
Rough draft, fine draft
Surface treatment Profile
cutting Positioning,
fixing Rendering
Glue, silicone rubber
Disposal

Field of study 10: Building a wall using dry construction methods	**2.Training year Time guide value 80 hours**

Formulation of goals

The pupils define the tasks of a room partition wall in stud construction, select the layered structure of the construction, describe basic assembly procedures, work rules and the use of equipment.
Quantity take-offs are carried out on the basis of drawing and planning specifications. The pupils produce working drawings and detailed drawings using product information.

Contents

Gypsum building materials
Substructure
Thermal, sound and fire protection
Joint design
Corner,
connection
built-in parts
Fasteners, lanyards Measurement,
billing

Field of study 11: Production of a heat-insulating plaster system3	**. Training year** **Time guideline 40 hours**

Formulation of goals

The pupils assess the construction of an exterior wall with regard to thermal insulation and moisture protection. They determine which measures are required to reduce the heat transfer and ensure moisture protection of the wall surface. Based on the considerations of building physics and the local conditions, they develop the structure of a heat-insulating plaster system and select suitable plaster surfaces.

The pupils calculate the layer thicknesses of the construction and draw sections and details.

Contents

Water-repellent plaster systems Thermal insulation
plaster
External thermal insulation
composite system
Manufacturer's instructions
Substrate, fastening Corner
formation Plinth formation
Window, door connection Thermal
resistance

Field of study 12: Production of application stucco **3rd year of training**
Time reference value 60 hours

Formulation of goals

The pupils draw up a plan for designing a wall mirror. They design profiles and determine the work steps for drawing on site. They plan a coloured mirror back panel to match the stucco framing. They draw the elevation and sections and assess the result from a design point of view.

Contents

Stucco profiles
Head template, centre template
Rough draft, fine draft, straight and round draft
Pulling over core
Reinforcement
Stucco marble, Stuccolustro, Sgraffito
Modelling
Building history

Field 13: Creating a suspended ceiling **3rd year of training**
Time reference value 60 hours

Formulation of goals

The pupils develop the construction of a heat- and sound-insulating suspended ceiling in dry construction for a living room. Taking into account design, static and building physics requirements, they select building materials for the substructure and the ceiling cladding and determine the work steps for execution.
The pupils carry out comparative calculations on the building material requirements for different ceiling constructions. They produce a drawing of the ceiling soffit with the course of the substructure and a ceiling section with wall connection.

Contents

Underground
Fastener
Planking
Sound, fire and heat insulation
Processing instructions
Installation parts
Joint partitioning

Field 14: Creating a wire plaster construction **3rd year of training**
Time guideline 40 hours

Formulation of goals

The pupils plan the construction of a suspended, arched wire plaster ceiling. They determine the construction depending on the spatial specifications and the planned vault shape.
The pupils select suitable building materials and determine the necessary working steps for construction. They determine the building material requirements. They produce spatial representations, sections and working drawings.

Contents

Connecting and fastening devices
Teaching sheet
Substructure
Plaster base
Plaster gauges
Working scaffolds
Columns
Aprons
Arch forms

Field 15: Renovation of a building component **3rd year of training**
Time guideline 20 hours

Formulation of goals

The pupils know criteria for assessing the building substance of a wall plaster in the basement area. They describe the examination procedure and recognise the interaction of causes and damage.
The pupils select measures for securing, supplementing and refurbishing the building fabric. They determine tools and equipment for the execution, prepare a drawing documentation and produce sections and views of the building component.

Contents

Surface treatment
Humidity, movement, vibration
Putzfestiger
Adhesion promoter
Restoration plaster
Hazardous substances
Disposal

Field 16: Installation of a screed — **3rd year of training**
Time guideline 40 hours

Formulation of goals

The pupils know the general conditions for installing a flowing screed in a living space and determine the screed structure. They assess the substrate, derive preparatory measures and describe the work processes for applying the flowing screed.
The pupils evaluate the effects of the consistency of the screed, the preparatory measures and the processing technique on the screed quality. They compile criteria for finishing the surface.
The pupils determine the building material requirements and make a ceiling section with wall connection.

Contents

Screed structure
Flowing screed systems
Dry subfloor elements
Substrate condition
Levelling layers
Impact sound insulation
Frame, rails
Joints
Surface treatment

Overview of the learning fields for the training occupation **finishing craftsman specialising in tile, slab and mosaic work** (1st level)
and for the training occupation **tile, slab and mosaic layer** (1st and 2nd level)

	Learning fields	Time guidelines in hours		
		Year 1	Year 2	Year 3
Finishing craftsman/-woman				
	Vocational field breadth basic education (all professions) *)			
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Making a wooden construction	60		
5	Manufacture of a reinforced concrete component	60		
6	Coating and cladding of a component	60		
	Finishing skilled worker, focus on tiling, slab and mosaic work			
7	Attaching a wall covering		40	
8	Producing an insulated floor structure		60	
9	Tiling a bathroom		60	
10	Production of coverings in the swimming pool area		60	
11	Producing a terrace covering		60	
Tile, slab and mosaic layers				
12	Cladding a facade			40
13	Occupying a staircase			40
14	Designing an entrance hall			40
15	Cladding of supports			40
16	Cladding of an arch construction			40
17	Modernising a pavement structure			80
	Total 880	320	280	280

*) see Basic vocational training, pages 09 to 16

Field of study 7: Attaching a wall covering	**2nd year of training** **Time guideline 40 hours**

Formulation of goals

The pupils plan the cladding of a wall surface within a room without moisture load. They apply the technique "thick bed on raw wall". They observe the effect of mortar adhesion, assess substrates and derive preparation measures.
The pupils select a setting mortar and describe the working steps for its production. On the basis of the chosen covering material, they divide the area taking symmetry into account. They draw the wall in plan and elevation and determine the quantities of building material.

Contents

Masonry
Mortar calculation
Ceramic wall tiles
Joints

Field of study 8: Manufacture of an insulated floor construction2 . Training year
Time reference value 60 hours

Formulation of goals

The pupils plan the production of a thermally and impact sound insulated floor construction and take care to avoid sound and thermal bridges. They select insulating materials and describe the installation.

The pupils distinguish between types of screed and know procedures for repairing cracks and cavities. They determine measures for substrate preparation and compare laying methods with regard to adhesion, laying performance and ergonomic working methods.

You plan the arrangement and installation of movement joints.

Contents

Floor tiles

Thermal, impact sound

insulation materials Covering

Floating screed, load distribution layer heating screed,

heating protocol

Screed installation, non-static reinforcement, post-treatment

Ready for covering

Flatness tolerances Wall

connection, plinth Apparent

joints, movement joints

Doorway

Material requirements

Wall-floor connection

Field of study 9: Tiling a bathroom	**2.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils plan the production of ceramic claddings and coverings for a bathroom. They assess the moisture stress and select ceramic covering materials, thin-bed mortar, adhesives and sealants. They apply product information, pay attention to hazard warnings and make decisions on substrate preparation and working procedures.

The pupils develop and evaluate design solutions for wall and floor coverings, taking into account installations and sanitary objects. They recognise the need for cooperation with other trades. They produce planning sketches and working drawings, in particular for wall unwindings and the covering connection at the bath cross-section.

Contents

Working methods, installation
techniques Alternative
waterproofing Hazardous
substances
Connection joints
Shower and bath tubs, sound insulation, equipotential bonding
Pre-wall installation
Decking layout, installation
plan Breakage, cutting loss

Field of study 10: Production of coverings for swimming pools2 . Training year
Time reference value 60 hours

Formulation of goals

Taking into account functional and design aspects, the pupils plan surfacing work for individual components of a swimming pool facility.
Depending on the subfloor and use, they decide on the preparatory work, choice of material and installation method.
They compare design options for the pool head, pool surround and drainage areas. They plan movement joints and the transition from the wet to the dry area.
The pupils select a partition wall system for a row shower, describe the construction and illustrate the structural design of the floor and wall connection.

Contents

Concrete pool
waterproofing
Covering material, fittings, measurement Pipe lead-through, floor drain, gutter Maintenance joints
Chemical exposure Slip resistance Partition wall system
Gradient

Field of study 11: Manufacture of decking	**2.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils plan the construction and execution of a terrace covering over an inhabited room. When selecting and arranging the constructive layers, they take into account the requirements for heat, sound and moisture protection. They select frost-resistant decking and installation materials and note that, in addition to correct planning, special craftsmanship is also necessary to prevent damage later on. They compare different systems in terms of construction height, production and maintenance costs and susceptibility to damage.

The pupils represent the connection details in sectional drawings. They develop design solutions, produce working drawings and determine the material requirements.

Contents

Laying technique
Covering surface
Layer build-up
Waterproofing
Gravel bed, stilt
bearing
Drainage system Edge
formation Wall connection

Field 12: Cladding a façade **3rd year of training**
Time guideline 40 hours

Formulation of goals

The pupils compare façade constructions made of tiles and slabs, taking into account the use of the building and aspects of building physics. They plan the construction of an insulated mortared façade including anchors and connections. They observe the safety regulations when selecting the working scaffold.
The pupils develop design solutions depending on the chosen covering material and the planning of movement joints. They draw sections and elevations and determine the building material requirements.

Contents

Environmental impact
Rear ventilation
Surfacing material
Reinforced flush-mounted
Attachment procedure
Insulation
System scaffolding
Facade view
Section with window connection

Field 13: Covering a staircase **3rd year of training**
Time guideline 40 hours

Formulation of goals

The pupils plan the covering of a single-flight straight reinforced concrete staircase. They take into account the safety requirements and design aspects as well as the influence of water and thermal stresses on outdoor stairs. They select covering materials.
Pupils develop design solutions for stairs and adjacent wall coverings.

Contents

Designations
Staircase dimensions
Ceramics, moulded parts
Installation technology
Impact sound insulation
Ceiling, platform connection
Plinth development
Stair cut
Step detail

Learning Area 14: Designing an Entrance Hall **3rd year of training**
Time guideline 40 hours

Formulation of goals

The pupils design a representative entrance hall. They use the possibilities that arise from the surface, format, colour and joint.
They select covering materials, especially natural stones, and describe laying techniques.
The pupils draw design variations in accordance with architectural specifications and assess them. They observe reference lines, divide the area and determine the need for building materials and auxiliary building materials.

Contents

Mortar
Joint material
Discolourations
Adhesives
Design criteria
Colour effect
Diagonal laying

Field of study 15: Cladding of supports **3rd year of training**
Time guideline 40 hours

Formulation of goals

The pupils develop the decking structure for pillars and columns. They take into account the shape of the ground plan, the shell construction and the stress on the column. They select decking material, describe the application technique and use the advantages of templates and other aids.
The pupils determine cutting dimensions, joint widths and the position of partial tiles, taking into account division principles. They present the results in plan and view.

Contents

Mosaic, split tiles, brick slips
Column head, column foot
Mortar carrier
Connection joint
Edge protection
Offcut

Field 16: Cladding of an arch construction **3rd year of training**
Time guideline 40 hours

Formulation of goals

The pupils plan the covering of a wall opening or niche with an arch construction. They divide the covering mathematically and represent design solutions in drawings.
The pupils take into account the setting up of teaching sheets, the production of templates and document the steps of work preparation for the plating of sheets.

Contents

Arch constructions
Sheet division
Cut, joint width
Fighter point
Vertical section
View

Field of study 17: Modernisation of a pavement construction	**3.Training year Time guide value 80 hours**

Formulation of goals

The pupils describe methods to check the existing building fabric of an old building and name causes of damage. They develop proposals for the repair and redesign of the pavement structure. They recognise building fabric worth preserving and take measures to protect it.

The pupils select building materials, building material systems and techniques. They take into account building physics and building regulations as well as the concerns of the protection of historical monuments.

They ensure that waste is separated according to type and disposed of in an environmentally friendly manner. They take measurements, make sketches, draw construction details and calculate the building material requirements.

Contents

Inventory Damage assessment,
causes of damage Decoupling layer
Dry construction Vapour
diffusion, dew point
Thermal insulation, sound insulation, fire
protection Building history, building
styles Contracting regulations

Overview of the learning fields for the training occupation **skilled finishing worker specialising in screed work** (1st level) and for the training occupation **screed layer** (1st and 2nd level)				
	Learning fields	**Time guidelines in hours**		
		Year 1	Year 2	Year 3
Finishing craftsman/-woman				
	Vocational field breadth basic education (all professions) *)			
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Manufacture of a reinforced concrete component	60		
5	Making a wooden construction	60		
6	Coating and cladding of a component	60		
	Finishing skilled worker, focus on screed work			
7	Preparing the substrate for screed work		40	
8	Producing a bonded screed		40	
9	Producing a screed on a separating layer		40	
10	Producing a floating screed		80	
11	Installation of interior floor coverings		80	
Screed layer				
12	Testing screeds			20
13	Manufacture of a floor in industrial construction			60
14	Manufacture of a floor in residential construction			60
15	Tempering floors			60
16	Repairing a floor			80
	Total 880	320	280	280

*) see Basic vocational training, pages 09 to 16

Field of study 7: Preparing the substrate for screed work2	**. Training year** **Time guideline 40 hours**

Formulation of goals

The pupils assess the condition of the subfloor as a prerequisite for screed work in accordance with the regulations. With reference to the type of screed to be installed, they recognise the different requirements on the substrate and the supporting structure. They check and evaluate these with regard to the building materials and installation technologies to be used.

The students recognise possible impairments of the substrates and are able to take countermeasures. Furthermore, they know preparation and processing techniques and technologies for substrates and supporting structures.

They prepare measurement sketches and working drawings and carry out quantity and cost calculations.

Contents

Substrate, supporting structure

Composite effect Load types

Evenness Binder

compatibility Damage

Steel, wood substrates

Field 8: Producing a bonded screed **2nd year of training**
Time guideline 40 hours

Formulation of goals

The pupils plan the production of a bonded screed. They select the building materials and determine the recipes for screed mortar. Knowing the constructional and material characteristics of composite screeds and their installation techniques, they take into account the special importance of the substrates and are able to assess and prepare them for installation.
The pupils know the after-treatment measures for freshly installed screed. They produce dimensioned sketches and working drawings and carry out quantity and cost calculations.

Contents

Bonding bridge
Binder
Surcharge
Additions
Single and multi-layer screeds
Stresses

Field of study 9: Producing a screed on a separating layer **2nd year of training**
Time guideline 40 hours

Formulation of goals

The pupils plan the production of a screed on separating layer and are able to select building materials and to calculate mixing ratios.
They determine the interface materials in relation to requirements such as impermeability or sliding behaviour.
The pupils produce dimensioned sketches and working drawings and carry out material-, cost- and construction-related calculations.

Contents

Requirements
Stresses
Site screed, prefabricated screed
Expansion
Waterproofing
Vapour barrier
Separating layer
Edge strip, edge joint

Field of study 10: Production of a floating screed	**2.Training year** **Time guideline 80 hours**

Formulation of goals

The pupils plan the production of an insulated floor construction as a floating screed. They assess the subfloor, select suitable materials and determine the design and construction method depending on the use. They evaluate the floor construction with regard to sound and heat insulation and name possible solutions for problems that occur. They plan the production of the floor construction, taking into account the safety at work for screed work. They draw up lists of materials and requirements.

The pupils assess the heat storage capacity and sound insulation of individual building materials. They draw up a catalogue of criteria for assessing the work process and the work results.

Contents

Substructure Insulation
Separating layer, insulation layer
Thermal, sound bridge, moisture
protection Edge insulation, levelling
layer Wet, dry construction method
Flowing screed, heated screed Joint
formation
Detailed drawings, dimension sketches, joint plan

Field of study 11: Installation of interior floor coverings2	**. Training year** **Time benchmark 80 hours**

Formulation of goals

The pupils plan the installation of resilient and textile floor coverings in the interior. They are familiar with different substrates and are able to evaluate and pre-treat them with regard to the installation of selected coverings. Knowing the types, requirements, stress and properties, they determine the structure and installation technique.

The pupils know the connection between the use and the optical effect of floor coverings. They select fasteners and accessories.

Contents

Substrate, substrate treatment Textile
and non-textile coverings Installation
technique
Design Fasteners,
accessories Surface treatment
Stairs

Field 12: Testing screed **3rd year of training**
Time guideline 20 hours

Formulation of goals

The pupils test screeds and their base materials with regard to suitability, quality and hardening.
They describe laboratory and construction site tests.
The pupils save the test results and compare them with the standard specifications. They work out changes to the recipes and evaluate the effects.

Contents

Aggregate, binder
Mixing ratio
Influencing factors
Compressive, flexural strength
Abrasion resistance
Hardness, wear
Flatness

Field of study 13: Manufacture of a floor in industrial construction	**3rd year of training Time reference value 60 hours**

Formulation of goals

The pupils plan the production of highly stressed floors in the building and industrial sector. They have knowledge of the design of utility floors and the types of installation and select constructions and building materials. They are able to determine the types of screed according to the type and size of the stress, wear and subsequent use.
The pupils produce sketches and working drawings of floor structures and carry out quantity take-offs and construction calculations.

Contents

Substrate preparation, substrate treatment
Recipes
Planning, tendering
Reinforcement
Grinding wear
Joints
Synthetic resins
Hard materials

Field of study 14: Manufacture of a floor in residential construction3 . Training year
Time reference value 60 hours

Formulation of goals

The pupils plan the production of a floor construction for residential and administrative buildings. They plan floating screeds as heating screeds, know the requirements for the building materials, the special construction features and the construction types of heating screeds.

The pupils take into account the type of underfloor heating and the dependence of the screed thickness on the position of the heating elements. They consider the connection between heat emission and floor covering.

Contents

Wooden beam, solid

ceilings Prefabricated, dry

screed Flowing screed

Joints

Direct heating, storage heating, climate floor

Wet, dry installation

Insulation, cover, separating layer Thermal resistance

Field of study 15: Quenching and tempering of floors	**3rd year of training** **Time reference value 60 hours**

Formulation of goals

The pupils know consolidation and curing measures for concrete and screed surfaces using synthetic resins. They assess the substrate condition and describe procedures for preparing the substrate for impregnation, sealing and coating work.
The pupils are familiar with quenching and tempering technologies and describe the structure and function of quenched and tempered floors. They assess the environmental compatibility of synthetic resins and are familiar with disposal options.

Contents

Primer
Product systems
Impregnation
Fluation
Coating
Synthetic resin covering
Synthetic resin screed
Filler, aggregate, pigment

Field 16: Repair of floors	**3rd year of training** **Time benchmark 80 hours**

Formulation of goals

The pupils recognise design and manufacturing errors in screeds as well as processing and laying errors in coverings.
On the basis of damage pictures, they name possible causes, evaluate them and develop solution proposals to eliminate the faults. To do this, they carry out tests independently.
The students develop selective and large-scale repair concepts.

Contents

Manufacturing, processing, installation faults
Aftercare
Incompatibility
Installation errors
Damage assessment

Overview of the learning fields for the training occupation **fitter specialising in heat, cold and sound insulation work** (1st level) and for the training occupation **heat, cold and sound insulation fitter** (1st and 2nd level)				
	Learning fields	**Time guidelines in hours**		
		Year 1	Year 2	Year 3
Finishing craftsman/-woman				
	Vocational field breadth basic education (all professions) *)			
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Making a wooden construction	60		
5	Manufacture of a reinforced concrete component	60		
6	Coating and cladding of a component	60		
	Finishing worker, focus on heat, cold and sound insulation work			
7	Insulating a heating and domestic hot water system		60	
8	Creating a partition wall		40	
9	Insulating a product pipe		100	
10	Insulating a pipeline for cold protection		80	
Heat, cold and sound insulation fitter				
11	Removing a cold store			60
12	Capsules of a machine			40
13	Insulating a ventilation duct for fire protection			80
14	Installing a suspended ceiling			40
15	Renovating one of the insulation district heating pipes			60
	Total 880	320	280	280

*) see Basic vocational training, pages 09 to 16

Field of study 7: Insulating a heating and domestic hot water system2 . Training year
Time reference value 60 hours

Formulation of goals

The pupils plan the insulation of the pipe system for a heating and domestic hot water system, taking into account the basic interrelationships of thermodynamics and thermal insulation. They distinguish, evaluate and select insulation materials, materials for the sheathing and the necessary fasteners.

Specifications of regulations are taken into account when dimensioning the insulation thickness.

The pupils draw up measurement sketches and draw penetrations of sheathing in views and development. They use tables for the dimensioning of insulation thicknesses and for quantity take-offs.

Contents

Insulation materials for building services

systems Sheathing, elevation, unwinding

Screws. Insertion rivets, adhesive, binding

wire

Heat content, thermal expansion, heat transfer Heat

transfer

Insulation thickness

allowance

Isometry

penetrations

Field of study 8: Creating a partition wall	**2.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils plan a lightweight partition wall, select the layered structure of the construction according to the planning specifications, describe basic assembly procedures, work rules and the use of equipment.

Quantity calculations are carried out on the basis of drawing and planning specifications with the help of tables for material determination and using product information.

Pupils produce working drawings and detailed drawings that show the constructive layered structure.

Contents

Metal stud gypsum building
materials
Fastening and connecting means Connection seals
Thermal, sound and fire
protection Cavity damping
Processing instructions
Corners, connections Wall
section

Field of study 9: Insulating a product pipe	**2.Training year** **Time guideline 100 hours**

Formulation of goals

The pupils plan the construction of a thermal insulation for a product pipe. They select the suitable building materials taking into account their material properties and the object and environment-related requirements. They plan the execution of all work steps from the measurement to the preparation of the sheets to the installation of the insulation on the object. The students take into account the regulations for the storage of residual and recyclable materials.

The pupils document their planning with the help of detailed drawings. They create drawings of sheet metal components in views and sections. They use their own dimension sketches to determine the material requirements and calculate the production costs.

Contents

Insulation materials for technical thermal protection
Sheathing, elevation, unwinding Substructures
Spacer rings
Screws, rivets, locks, steel bandages, binding wire Bend,
main pipe, spigot
Sliding seam
Waterproofing, rain deflectors
Working rules
Material requirements
Wage, material costs

Field of study 10: Insulating a pipeline for cold protection2 **. Training year**
Time benchmark 80 hours

Formulation of goals

The pupils plan the production of insulation for a cold-flow piping system. They consider the physical peculiarities of cold protection and select the building material taking this knowledge into account. They distinguish between different object details and their particular construction problems and develop detailed solutions, especially for the formation of end points and the insulation of caps. The pupils mentally carry out the necessary manual work steps. They note that special care must be taken when carrying out cold insulation in order to avoid leaks due to water vapour diffusion and air flow.
Pupils produce construction sketches and carry out quantity take-offs.

Contents

Insulation materials for cold protection
Diffusion-inhibiting materials, vapour barrier
Sheathing, elevation, unwinding Fasteners
Adhesives, sealants
Corrosion, corrosion
protection Structure
Assembly, work technique
terminal, cap training

Field 11: Dismantling a cold storage room **3rd year of training**
Time reference value 60 hours

Formulation of goals

The pupils mentally retrace the construction of a cold storage room. They determine the tasks that a cold storage room has to fulfil and select the building material, taking into account the requirements for cold insulation.

They determine the layer structure of the insulation system and describe basic installation procedures, work rules and the use of equipment.

The pupils draw up a catalogue of criteria for assessing the work process and the work results, whereby typical weak points and possible processing errors are thematised. The construction of the insulation is documented using detailed sketches.

Contents

Plates, large panels

Primer

Hot bitumen layer, glass fleece bitumen sheet, aluminium foil

Adhesive

Joint formation

Corners, connections

Door stop, door threshold

Wall, ceiling cut

Field 12: Capsules of a machine **3rd year of training**
Time guideline 40 hours

Formulation of goals

The pupils develop the construction of an enclosure as a protective measure against the noise development of a machine. They know the basic technical possibilities of reducing the sound level by combining sound-insulating and sound-absorbing measures.
The pupils select the materials and plan the construction as well as the execution of openings and connections.

Contents

Types of sound
Sound transmission, sound insulation, sound attenuation
Profile frame
Resilient elements
Anti-drumming agent
Vibration damper
Flexible shells, perforated sheets
Openings, connections
Dimensioning

Field of study 13: Insulating a ventilation duct for fire protection3 . Training year
Time benchmark 80 hours

Formulation of goals

The pupils construct fire protection insulation for a sheet steel duct. They know the basics of fire protection and the requirements for ventilation systems depending on the type and use of the building. They select materials and plan the structural design. They determine the processing steps, taking into account the required tools, draw cross-sections and determine quantities.

Contents

Fire behaviour, building material classes, fire resistance classes
Mineral wool, fibre silicate boards
Gypsum fibreboard Spray
insulation Partitions
Assembly sequence, processing
instructions Working, protective
scaffolding

Field of study 14: Installation of a suspended ceiling	**3.Training year Time guide value 40 hours**

Formulation of goals

The pupils plan a closed suspended ceiling, taking into account the tasks of ceilings, the construction structure, the fastening of the substructure to the load-bearing building component, the connections to walls and the building physics requirements.
The pupils describe basic assembly procedures. The erection of the ladders or working scaffolds is planned in compliance with the manufacturer's instructions and the accident prevention regulations.
The weight per unit area and the material requirements are determined on the basis of drawing and planning specifications.
Pupils produce working drawings and detailed drawings of the ceiling structure and wall connections.

Contents

Metal profiles
Dowels Suspension
systems Corrosion
protection
Perforated, slotted
panel Ceiling
cladding Wall
connection Fitting
parts
Rapid erection, trestle and rolling
towers Building material
requirements, offcuts
Ceiling construction, wall connection, shadow gap

Field 15: Renovating the insulation of a district heating pipe	**3rd year of training Time reference value 60 hours**

Formulation of goals

The pupils recognise the defective structure of an insulation for an above-ground district heating pipe that is no longer functional. They carry out all planning steps for its renovation. Taking into account the environmental conditions, they develop a thermal break-free insulation system and select materials for surface protection.

The pupils plan the work steps including dismantling and disposal of the existing insulation. In doing so, they pay particular attention to the rules for handling rods.

They document their planning by means of execution sketches and determine the material requirements using isometric measurement sketches.

Contents

Pipe insulation materials

Sheet metal cladding

Auxiliary materials

Building material requirements

Heat flux density, surface temperature

Breathing protection

Disposal

Overview of the learning fields for the training occupation **skilled finishing worker specialising in dry construction work** (1st level) and for the training occupation **dry construction fitter** (1st and 2nd level)

	Learning fields	Time guidelines in hours		
		Year 1	Year 2	Year 3
Finishing craftsman/-woman				
	Vocational field breadth basic education (all professions) *)			
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Making a wooden construction	60		
5	Manufacture of a reinforced concrete component	60		
6	Coating and cladding of a component	60		
	Finishing skilled worker, focus on drywall work			
7	Building a room partition		80	
8	Renovating an exterior wall		60	
9	Building an office partition		80	
10	Installing a suspended ceiling		60	
Drywall fitter				
11	Removing a room contaminated with moisture			100
12	Installation of a special ceiling			80
13	Conversion of an attic			100
	Total 880	320	280	280

*) see Basic vocational training, pages 09 to 16

Field of study 7: Building a room partition	**2.Training year** **Time guide value 80 hours**

Formulation of goals

The pupils plan a single partition wall taking into account all construction materials for planking, substructure including fastening and connecting materials with their properties, tasks and areas of application.
The pupils determine the tasks of the partition wall, select the layered structure of the construction, describe basic assembly procedures, work rules and the use of equipment, taking into account the accident prevention regulations.
Quantity calculations are carried out on the basis of drawing and planning specifications with the aid of tables and by using product information.
Pupils produce working drawings and detailed drawings showing the constructive layered structure.

Contents

Wood, metal profiles
Gypsum, gypsum
building materials
Frames Connection seals
Transom, stud
construction Corner,
connection Joint
formation
Floor plan, wall cross-
section Oblique parallel
projection

Field of study 8: Renovation of an exterior wall	**2.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils develop a renovation concept for an exterior wall of an old building, taking into account the rules of building physics. They select the insulation, sealing, barrier and cladding materials and work out solutions for their installation.

Pupils consider measures on how to mitigate the generation of dusts during remediation activities and how to carry out dismantling, sorting, storage and disposal.

On the basis of drawing and planning specifications, heat-related length changes, cladding areas and the weight per unit area of exterior walls are calculated using tables. Sufficient thermal insulation of the exterior wall is verified with the help of forms. Detailed drawings are prepared with the help of as-built drawings.

Contents

Insulation materials, ecological
assessment Vapour barrier, painting
External wall cladding
Wall dry plaster, facing shell Thermal
transmittance
Condensation
Hazardous
substances Wall
cut

Field of study 9: Building an office partition wall	**2.Training year Time guide value 80 hours**

Formulation of goals

The pupils plan the construction of a partition wall, taking into account the floor construction, the stability of the walls, the basic problems of fire and sound protection and the execution of the connection details in compliance with the regulations. They describe the assembly procedures in compliance with the accident prevention regulations.

The pupils determine material requirements, material costs and the weight per unit area of the selected constructions with the help of product information as well as drawing and planning specifications.

The pupils create wall connection detail drawings taking into account fire and sound insulation requirements as well as static specifications.

Contents

Screed

Prefabricated components

Double stud wall Wall

corner, wall connection

Movement joints, edge protection strips, elastic joint material

Stability

Sound insulation, fire protection, radiation

protection Blend

Costing

Field of study 10: Installation of a suspended ceiling	**2.Training year Time guide value 60 hours**

Formulation of goals

The pupils develop a design for a closed suspended ceiling or ceiling cladding, taking into account the tasks of ceilings, the structural design, the attachment of the substructure to the load-bearing component, the connections to walls and the structural-physical requirements.
When selecting the substructure or fasteners, sufficient corrosion protection is taken into account.
The pupils describe the basic assembly procedures, the setting up of ladders or working scaffolds in compliance with the manufacturer's instructions and the accident prevention regulations.

Contents

Wood, metal
profile Dowels
Suspension systems
Corrosion
protection
Perforated, slotted
plate
Ceiling cladding, suspended ceiling
Fire protection
Installation parts
Rapid erection, trestle, mobile scaffold
Erection plan
Ceiling construction, wall connection, shadow gap
Dimension sketch

Field of study 11: Removal of a room contaminated with moisture **3.Training year**
Time guideline 100 hours

Formulation of goals

The students develop solutions for the complete fitting out of a room exposed to moisture in an existing building. This includes the installation of doors, fixed glazing, support and fastening systems, sanitary walls, pre-wall installation walls, sheathing and partitioning as well as floors with installation guides. In addition, the pupils analyse the properties of the installation materials and systems with regard to their usability and assess the constructions to be created with regard to sound, moisture and fire protection.

Protective measures are taken for the processing of substances that may be hazardous to health. On the basis of planning specifications, they carry out the mathematical and graphical soil classification and determine the need for building materials and auxiliary building materials.

The pupils use assembly instructions and document the work steps. They determine the static requirements of installation parts and constructions.

Contents

Door leaf, fire glazing
Cavity wall anchors
Installation wall Wall
suspension load Sealing
Installation penetration
Cavity floors Calculation
table Floor, wall section

Field of study 12: Installation of a special ceiling	**3.Training year Time guide value 80 hours**

Formulation of goals

The pupils compare constructions and systems of suspended ceilings with regard to their structural-physical properties and design possibilities. They select a suitable ceiling type and check whether the requirements are met. When selecting the substructure, they take into account the ceiling structure, ceiling layer, construction site conditions and the installation of installation elements.

The pupils observe the assembly instructions of the manufacturing companies as well as the accident prevention when determining and describing the work sequence. The calculation of the weight per unit area is necessary for the selection of the anchoring elements. They determine the suspension system and dimension the hangers.

The pupils design the ceiling layout by drawing and calculating, taking into account design criteria and installations to be installed. They create perspectives of the underside of the ceiling as a basis for their work.

Contents

Acoustic, chilled ceiling
Suspension, mounting
rail Insertion, push
mounting
Louvre ceiling, panel ceiling, lamella ceiling, ribbon ceiling
Room acoustics, reverberation time
Electrical, heating, air conditioning, ventilation, lighting system
Voltage determination
Laying plan parallel
perspective Unwinding, true
length

Field of study 13: Conversion of an attic storey	**3.Training year** **Time guideline 100 hours**

Formulation of goals

The pupils compare the advantages and disadvantages of the different types of roof insulation and prefabricated screed systems. They take into account the requirements for heat, moisture and fire protection in accordance with the building regulations.

The pupils assess the usability of cladding, bulkheading and boarding and describe the importance of the windproofness of the roof construction with regard to the comfort inside the room.

The pupils know the rules for damage-free construction of flat and pitched roof structures. They examine the necessity of constructive and chemical wood preservation in attic conversions.

By drawing temperature curves through external components, pupils determine the internal wall surface temperature and the frost area of the construction.

Contents

Wood panel material, wood panels
Prefabricated screed
Raised floor
Insulation, levelling fill Rafter
insulation construction Impact
sound insulation
K-value, insulation
thickness Sd-value
Measurement sketch

Overview of the learning fields for the training occupation **skilled civil engineering worker specialising in road construction work** (1st level) and for the training occupation **road builder** (1st and 2nd level)				
	Learning fields	**Time guidelines in hours**		
		Year 1	Year 2	Year 3
Civil engineering technician				
	Vocational field breadth basic education (all professions) *)			
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Making a wooden construction	60		
5	Manufacture of a reinforced concrete component	60		
6	Coating and cladding of a component	60		
	Civil engineering technician, focus on road construction work			
7	Construction of a development road		60	
8	Making an earth dam		80	
9	Installing a pipeline		60	
10	Paving an area with artificial stones		80	
Road builder				
11	Building an asphalt road			100
12	Paving an area with natural stone			100
13	Paving a concrete road surface			40
14	Repair of a road			40
	Total 880	320	280	280

*) see Basic vocational training, pages 09 to 16

Field 7: Construction of an access road **2nd year of training**
Time reference value 60 hours

Formulation of goals

The pupils plan the route of a road and select a standard cross-section taking into account the function of the road and the environmental conditions. They plan the course of the construction project, the installation of the road construction site and secure it.
They read and prepare drawings, determine the quantities of building materials and apply the measuring procedures for setting out the road axis and the cross sections.

Contents

Road design
Site plan, elevation plan
Cross profile
Subsoil, substructure, superstructure
Building classes
Securing work sites on roads
Stationing, NN heights
Position and height measurement
Inclinations

Field of study 8: Construction of an earth dam	**2.Training year** **Time guide value 80 hours**

Formulation of goals

The pupils plan the construction of an earth dam. They select a suitable method to investigate the ground. They make decisions about fill height, embankment construction, slope protection and compaction measures. They take into account the soil used and the respective soil properties. They determine the required quantities of soil with the help of the cross sections. They select suitable construction machines for loosening, transporting, installing and compacting the soil.
Pupils consider the ecological importance of topsoil.

Contents

Embankment, incision, cut
Planum
Loosening Soil improvement
Proctor test, load plate compression test Soil
types, soil classes

Field of study 9: Installation of a pipeline	**2.Training year** **Time guide value 60 hours**

Formulation of goals

The pupils plan the installation of a pipeline. Taking into account the accident prevention regulations, they observe the securing of trenches and select suitable drainage systems.

The pupils distinguish, check, assess and select drainage pipes and determine the location and construction of manholes.

They plan the backfilling of trenches, select suitable equipment for compaction and determine the quantities and materials. They carry out the necessary calculations and produce drawings.

Contents

Mixed system, separated system Drainage

pipes, connections, supports Installation rules

Drainage plan Gradient

calculation

Field 10: Paving an area with artificial stones	**2nd year of training** **Time benchmark 80 hours**

Formulation of goals

The pupils plan the production of a paved surface taking into account the requirements for the superstructure. They determine the widths according to the formats and dimensions of the artificial stones and specify an edge reinforcement. They construct the back support and the watercourse.
The pupils distinguish and assess paving stones according to material, format, properties and use. They draw dressings and calculate the material requirements, describe the preparation and execution of paving work and can inspect and assess finished paving slabs.

Contents

Kerbstone, trough, gutter
Bedding, back support
Dislocation rules
Arch constructions, staking methods
Concrete blocks, clinker
Slabs, joints
Association
Installation technology

Field of study 11: Construction of an asphalt road	**3.Training year** **Time guideline 100 hours**

Formulation of goals

The pupils select a suitable asphalt road surface taking into account the road function. They distinguish, test, assess and select the materials for the individual layers and learn about the installation methods.

The pupils make drawings, determine the installation quantities and check their work for performance and quality according to the requirements.

Contents

Standardised construction methods

Bitumen, minerals, waste recycling Base course, binder

course, surface course Road drainage

Edge formation

trough, ditch

Field of study 12: Paving a surface with natural stone	**3.Training year** **Time guideline 100 hours**

Formulation of goals

The pupils compare and assess paving stones made of natural stone according to their formation and properties.

You construct a superstructure with natural stone paving, plan and draw the design of paving surfaces according to beauty and practicality. You select materials and paving dressings and calculate material requirements.

The pupils plan the work sequence and apply the work rules for setting. They check the plaster according to the requirements.

They design, draw and calculate surface drainage facilities.

Contents

Large, small, mosaic paving, natural stone slabs

Bedding

Transverse and inclined

forces

Joints

Gutters, road gullies

Measurement

Field of study 13: Installation of a concrete road surface	**3.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils select a suitable concrete road surface taking into account the function of the road. They distinguish, test, assess and select materials for the individual layers, learn about the installation methods and the requirements for installation. They solve the typical problems of the building material by correct joint construction and sensible joint arrangement.
The pupils make drawings, determine the installation quantities and check their work for performance and quality according to the requirements.

Contents

Standardised construction
methods Concrete B II, air
entraining agent Joint types
Dowels, anchors Soil
consolidation
Hydraulic-bound base course

Field of study 14: Repairing a road	**3.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils analyse any damage that has occurred, select suitable renovation measures and carry out the planning of the construction measures.
They apply the work rules and work techniques for repairing existing roads.

Contents

Bituminous emulsion, bituminous
chippings Bituminous slurry, surface
treatment Reshaping of the road surface
Roughening
Material requirements

Overview of the learning fields for the training occupation **Civil engineering specialist in the focus area of pipeline construction work** (1st level) as well as for the training occupation of **pipeline constructor** (1st and 2nd level)

	Learning fields	Time guidelines in hours		
		Year 1	Year 2	Year 3
Civil engineering technician				
	Vocational field breadth basic education (all professions) *)			
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Making a wooden construction	60		
5	Manufacture of a reinforced concrete component	60		
6	Coating and cladding of a component	60		
	Civil engineering skilled worker, focus on pipeline construction work			
7	Securing a construction site in the traffic area		20	
8	Making a pipe trench		60	
9	Making a shaft		60	
10	Installing a water pipe		100	
11	Restoring pavements and slabs		40	
Pipe fitter				
12	Securing an excavation pit			40
13	Installation of a pressure pipe			80
14	Making a house connection			60
15	Asphalt pavement reconstruction			20
16	Rehabilitation of a pressure pipeline			80
	Total 880	320	280	280

*) see Basic vocational training, pages 09 to 16

Field of study 7: Securing a construction site in the traffic area	**2.Training year Time guideline value 20 hours**
Formulation of goals The pupils develop a traffic regulation for a construction site in the area of public or private traffic areas. They take into account the safety of road users and people working at the construction site. Pupils check and select suitable measures for marking and cordoning off the construction site according to the regulations. They draw up a traffic sign plan on the basis of the standard plans for submission to the competent authorities. For the settlement of the construction site, a needs assessment is drawn up and recorded in a protocol.	
Contents Location, lane, cycle track, footpath Traffic signs Traffic facilities Safety distances Safety markings Lighting Traffic routing, traffic regulation Legal basis Site length	

Field of study 8: Making a pipe trench	**2.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils describe the removal and storage of various road surfaces. They know features that indicate the presence of underground pipes and obstacles and mark their course and location. They make decisions in relation to loosening, loading, transporting and storing different soil classes.
The pupils determine and construct the type of shoring or embankment for the pipe trench, taking into account and evaluating the water content in the soil. Existing pipelines and cables are secured in order to avoid environmental pollution.

Contents

Road surface
Signs, road caps Search slots
Soil types, soil classes
Contamination, contaminated
sites Large-scale shoring
elements Open dewatering
Slope, berm
Pipe bridge, suspension

Field of study 9: Making a shaft	**2.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils plan the construction of a test shaft in compliance with the work procedures and health and safety regulations.

They make decisions about the shape of the shaft and determine the choice of materials with regard to economic efficiency, durability and environmental compatibility.

Pupils recognise the dangers of soil and groundwater contamination and propose solutions.

They produce working drawings and determine the need for building materials and auxiliary building materials.

Contents

Shaft bottom, shaft base, shaft rings Bottom channel,

bottom drop

Bricks, in-situ concrete, prefabricated

parts Breakthroughs, drillings

Embedments, installation parts

Manhole neck, support rings Manhole

cover

Field of study 10: Installation of a water pipe	**2.Training year** **Time guideline 100 hours**

Formulation of goals

The pupils recognise that different media, such as drinking water and service water, are to be routed to where there is a demand. With the help of existing pipe network plans, they name the type of pressure pipe and select the materials, dimensions and connections, thus creating a technically sensible supply system.

The pupils assess finished pipelines with regard to stability, tightness and strength. They apply different test methods and document the test results. They calculate the forces that occur and the pipe abutment sizes, plan the required concrete abutments and adapt them to the course of the pipeline.

The pupils determine the demand for pipe parts and fresh concrete.

Contents

General plan, as-built plan, junction

plan Plastic, steel, cast iron pipes Pipe

connections, pipe sealing

Valves, fittings, symbols, abbreviations Nominal

pressure, operating pressure, test pressure

Nominal pressure stages, nominal width stages

Abutment tables

Field of study 11: Restoring pavements and slabs2	**. Training year** **Time guideline 40 hours**

Formulation of goals

The pupils distinguish, test and assess different soil types. They make decisions for the installation and compaction of the different soil classes.
They know the possibilities of soil cultivation with different water content as well as the necessity of checking the degree of compaction.
The pupils select equipment for the installation and compaction of the materials. The choice of the ceiling is made according to ecological and aesthetic considerations.
The pupils develop design solutions. They determine quantities and dimensions, taking into account the degree of loosening and compaction.

Contents

Compactability, water content
subgrade, subgrade,
superstructure, compaction
equipment Proctor test
Paving, slabs, bandage joints
Laying technique Bulk
density

Field 12: Securing an excavation pit	**3rd year of training** **Time guideline 40 hours**

Formulation of goals

The pupils plan an excavation pit for a shaft structure in an inner-city area for a construction project. The size of the pit and the way it is secured is determined by the size of the shaft and the local conditions and implemented in the planning. Contamination of the soil and groundwater is taken into account. They develop safeguards for crossing and parallel pipelines.
The pupils calculate the excavation and estimate the costs for transport, siting and landfill fees of the different soil types.

Contents

Road surface
Pavement
Storage
Sheet pile wall, soldier pile wall
Vacuum, gravity process
Flushing filter

Field of study 13: Installation of a pressure pipeline	**3.Training year Time guide value 80 hours**

Formulation of goals

The pupils plan the installation of a pressure pipeline taking into account the different techniques of trenchless pipeline construction. They select pipe materials and connections for the transport of flammable and vapour media. They determine the pipe metierials for the use of casing pipes.
The pupils plan the installation and removal of underground and above-ground valve stations. The high stresses on the pipelines are taken into account and appropriate precautions and safety devices are installed in the course of the pipeline. To facilitate production and assembly, they draw an industrial pipeline in isometric representation.

Contents

Start, target pit Jacking
method Press abutment
Target accuracy
Steel, cast iron, plastic, concrete pipes Jacket
friction, support, lubricant recycling Fittings
Measuring equipment
Compensation fixed
point, pipe sliding
bearing
Thermal insulation, corrosion
protection Pipe drying
Pressure test

Field of study 14: Making a house connection	**3.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils plan the construction of a house connection to the existing supply system. They select materials, machines and equipment that guarantee a speedy construction process without unnecessarily blocking the existing system. They describe control measures and quality assurance to avoid damage that leads to unnecessary pollution of the environment.
The pupils mark and document the location of the line.

Contents

Supply lines as-built plan
Start, target pit, pile driving Pipe
blocking
Tapping valve, weld-on spigot, gate valve Wall bushing,
sealing
Flushing Corrosion
protection Pressure test
Connection
measurement
Measurement sketch

Field of study 15: Reconstruction of asphalt pavements	**3.Training year** **Time guideline 20 hours**

Formulation of goals

The pupils plan the finishing work after the installation of the pipeline. They recognise the particular importance of the degree of compaction for the subsequent road surface made of asphalt. The pupils determine the road structure according to the traffic load and select suitable machines and equipment. They take particular account of the connecting seams. They calculate the required amount of asphalt.

Contents

Base course, anti-frost layer Binder
course
Adhesive top coat
Hot, warm, cold installation
Tamper, vibrating screed, rollers Surface treatment

Field 16: Rehabilitation of a pressure pipeline	**3.Training year Time guide value 80 hours**

Formulation of goals

The students know the high demands that are placed on supply lines. They carry out damage detection and determine whether partial or complete renovation is necessary.
The pupils describe the different procedures of renewal.

Contents

Pipe cleaning inventory
Welding, outer seal, sleeve seal Coating, relining
Long pipe relining, pipe strand
relining U-liners, rolldown, swage
lining Pipe splitting method Pipe
replacement method

Overview of the learning fields for the training occupation **skilled civil engineering worker specialising in sewer construction work** (1st level) and for the training occupation sewer **constructor** (1st and 2nd level)

	Learning fields	Time guidelines in hours		
		Year 1	Year 2	Year 3
Civil engineering technician				
	Vocational field breadth basic education (all professions) *)			
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Making a wooden construction	60		
5	Manufacture of a reinforced concrete component	60		
6	Coating and cladding of a component	60		
	Civil engineering technician, focus on sewer construction work			
7	Securing a construction site in the traffic area		20	
8	Making a pipe trench		60	
9	Making a shaft		60	
10	Installation of gravity lines		100	
11	Restoring pavements and slabs		40	
Sewer constructor				
12	Securing an excavation pit			40
13	Manufacture of a fall structure			60
14	Installation of a sewage pressure pipe			80
15	Asphalt pavement reconstruction			20
16	Rehabilitation of a gravity sewer			80
	Total 880	320	280	280

*) see Basic vocational training, pages 09 to 16

Field of study 7: Securing a construction site in the traffic area	**2.Training year Time guideline value 20 hours**

Formulation of goals

The pupils develop a traffic regulation for a construction site in the area of public or private traffic areas. They take into account the safety of road users and people working at the construction site.
Pupils check and select appropriate measures for marking and cordoning off the construction site according to the regulations.
They draw up a traffic sign plan on the basis of the standard plans for submission to the competent authorities. For the settlement of the construction site, a needs assessment is drawn up and recorded in a protocol.

Contents

Location, lane, cycle track, footpath
Traffic signs Traffic facilities Safety
distances Safety markings Lighting
Traffic routing Traffic regulation
Legal basis
Site length

Field of study 8: Making a pipe trench	**2.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils describe the removal and storage of various road surfaces. They know features that indicate the presence of underground pipes and obstacles and mark their course and location. They make decisions regarding the loosening, loading, transporting and storing of different soil classes.
The pupils determine and construct the type of shoring or embankment for the pipe trench, taking into account and evaluating the water content in the soil. Existing pipelines and cables are secured in order to avoid environmental pollution.

Contents

Road surface
Signs, road caps Search slots
Soil types, soil classes
Contamination, contaminated
sites Large-scale shoring
elements Open dewatering
Slope, berm
Pipe bridge, suspension

Field of study 9: Making a shaft	**2.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils plan the construction of a test shaft in compliance with the work procedures and health and safety regulations.

They make decisions about the shape of the shaft and determine the choice of materials from the point of view of economic efficiency, durability and environmental compatibility.

Pupils recognise the dangers of soil and groundwater contamination and propose solutions.

They produce working drawings and determine the need for building materials and auxiliary building materials.

Contents

Manhole bottom, manhole base, manhole rings Bottom

channel, bottom drop

Bricks, in-situ concrete, prefabricated

parts Breakthroughs, drillings

Embedments, installation parts

Manhole neck, support rings Manhole

cover

Field of study 10: Installation of open-circuit pipelines	**2.Training year** **Time guideline 100 hours**

Formulation of goals

The pupils know and assess the building ground. They make decisions about the design and dimensions of the pipe support. Pipe materials are selected from an economic and ecological point of view. Special consideration is given to the dangers of environmental pollution caused by pipeline construction.

The pupils know the special importance of the test as well as the danger of the pipe in the pipe zone during embedding. They draw a pipe collapse, calculate the required materials and determine the amount of water during the pressure test.

Contents

Building plot

Sand-gravel mixture, soil, concrete

Vitrified clay, concrete, reinforced concrete, plastic pipe

Pipe connection, pipe seal

Fittings

Pressure testing, mirroring, camera inspection

Embedding, backfilling

Field of study 11: Restoring traffic areas	**2.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils distinguish, test and assess different soil types. They make decisions for the installation and compaction of the different soil classes.
They know the possibilities of soil cultivation with varying water content as well as the necessity of checking the degree of compaction.
The pupils select equipment for installing and compacting the materials. The choice of the ceiling is made according to ecological, aesthetic and economic aspects.
The pupils develop design solutions. They determine quantities and dimensions, taking into account the degree of loosening and compaction.

Contents

Compactability, water content
subgrade, subgrade,
superstructure, compaction
equipment Proctor test
Paving, slabs, bandage joints
Laying technique Bulk
density

Field 12: Securing an excavation pit	**3rd year of training** **Time guideline 40 hours**

Formulation of goals

The pupils plan an excavation pit for a shaft structure in an inner-city area for a construction project. The size of the pit and the way it is secured is determined by the size of the shaft and the local conditions and implemented in the planning. Contamination of the soil and groundwater is taken into account. They develop safeguards for crossing and parallel pipelines.
The pupils calculate the excavation and estimate the costs for transport, siting and landfill fees of the different soil types.

Contents

Road surface
Pavement
Storage
Sheet pile wall, soldier pile wall
Vacuum, gravity process
Flushing filter

Field of study 13: Construction of a fall structure	**3rd year of training** **Time reference value 60 hours**

Formulation of goals

The pupils plan the construction of a fall structure made of reinforced concrete. They determine the size of the excavation pit and how to secure it, taking into account the groundwater. They draw the bottom drop structure with all the necessary details.
The pupils consider protective measures against corrosion and chemical attack. They calculate the quantities required for the structure.

Contents

Hinge piece
Gutter formation
Gutter, manhole lining, coating
Precast concrete parts, manhole cover
Crampons
Pressure test
Sealing against pressing water
Protective scaffolding
Sectional drawing

Field of study 14: Installation of a sewage pressure pipeline	**3.Training year Time guide value 80 hours**

Formulation of goals

The pupils know the problems of installing wastewater pipes with insufficient slopes and in the area of obstacles. They take into account the change from a gravity pipeline to a pressure pipeline. They are familiar with various methods of laying culverts and plan safety precautions.

Contents

Start pit Material
change Connection
change Controlled
jacking Culvert
channel Target pit
Accident container
Emergency power generator, spare pump, gate valve, screw
Electronic monitoring, automatic alarm system Dükerschnitt

Field of study 15: Reconstruction of asphalt pavements	**3.Training year** **Time guideline 20 hours**

Formulation of goals

The pupils plan the finishing work after the installation of the pipeline. They recognise the particular importance of the degree of compaction for the subsequent road surface made of asphalt. The pupils determine the road structure according to the traffic load and select suitable machines and equipment. They take particular account of the connecting seams. They calculate the required amount of asphalt.

Contents

Base course, anti-frost layer Binder
course
Adhesive top coat
Hot, warm, cold installation
Tamper, vibrating screed, rollers Surface treatment

Field 16: Rehabilitation of a gravity line **3rd year of training**
Time benchmark 80 hours

Formulation of goals

The pupils know that damage to the sewage system can be kept to a minimum by regularly recording its condition. They recognise the cause and extent of the damage.

The pupils determine the type of sewer system rehabilitation with procedures adapted to the case of damage. The environmental impact decides whether partial or total rehabilitation is carried out.

Contents

Scavenging procedure
Mechanical methods, high pressure flushing
Damage classes
Sewage diversion
Repair procedures
Coating process, lining process
Environmental pollution, pH value

Overview of the learning fields for the training occupation **skilled civil engineering worker specialising in well construction work** (1st level) and for the training occupation **well constructor (1st and 2nd level)**

	Learning fields	Time guidelines in hours		
		Year 1	Year 2	Year 3
Civil engineering technician				
	Vocational field breadth basic education (all professions) *)			
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Making a wooden construction	60		
5	Manufacture of a reinforced concrete component	60		
6	Coating and cladding of a component	60		
	Civil engineering technician, focus on wells/special civil engineering work			
7	Exploration of the subsoil		60	
8	Installing a pipeline		40	
9	Sinking a borehole		40	
10	Maintenance and servicing of drilling rigs		40	
11	Establishment of a groundwater measuring point		40	
12	Manufacture of workpieces		20	
13	Carrying out special civil engineering work		40	
Well builder				
14	Removal of a well			100
15	Developing a fountain			60
16	Construction of a well completion structure			40
17	Regeneration and rehabilitation of a well			40
18	Installing a water supply system			40
	Total 880	**320**	**280**	**280**

*) see Basic vocational training, pages 09 to 16

Field of study 7: Exploring the subsoil	**2.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils have basic geological knowledge, including the formation of soils and their mechanical properties, as a basis for exploring the building ground. They name and describe soil and rock, fill in strata inventories and draw strata profiles.

Pupils recognise the purpose of soil exploration and soil investigation and describe procedures for soil and rock exploration and soil sampling for environmental protection. They know investigation procedures in cased and uncased boreholes.

Contents

Plasticity, consistency
Shaking test, friction test, roll-out test, sieve analysis Hardness,
granularity, rock type, completeness, interfaces Extraction tools,
core drilling, oriented drilling Diamond drilling tools
WD tests, SPT test, geophysical investigations Drill
sample, special sample, grade, preservation Transport,
storage
Contamination, contaminated sites
Abbreviations, symbols

Field of study 8: Installation of a pipeline	**2.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils assign the different pipe materials to the corresponding areas of application. They plan pipeline trenches, the installation of pipes, fittings and armatures and mark the pipe route. They measure pipelines, draw position sketches and read as-built drawings.

Contents

Nominal pressure stage, nominal size
graduation Water supply systems Pipe
connections Pipe trench protection
Pipe support, concrete abutment, cover, pipe zone integration,
house connection
Protection of underground supply systems Corrosion
protection, pressure testing, disinfection Abbreviations,
symbols
Pipe sequence plan
Pipe trench calculation, degree of compaction Pipe
calculations, friction loss

Field of study 9: Sinking a borehole	**2.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils explain the application and the limits of the different drilling methods as well as measures for the use of drilling fluids and for occupational safety, especially when drilling in contaminated areas.
The pupils select tools and drilling parameters depending on the drilling depth, drilling diameter and drilling target. They calculate compressive and tensile stresses and create detailed drawings of drilling tools.

Contents

Dry drilling methods, flush drilling methods Down-the-
hole hammer drilling, combined drilling methods Drill
pipes, pipe connections
Drill pipes
Mud additives, mud calculation Safety
rules, safety devices Hydraulic, mud
pressure

Field of study 10: Maintenance and servicing of drilling rigs2	**. Training year** **Time guideline 40 hours**

Formulation of goals

The pupils name the different basic and add-on parts for drilling equipment. They explain the function of the hydraulic system and the tasks of the attachments.
The pupils draw up maintenance plans and describe the inspection of components for integrity and functionality. They know possible sources of faults and describe how to rectify them.

Contents

Chassis, frame, drive, power head, mast, winch pump,
compressor, percussion unit, rod handling Drilling rig
hydraulics, assemblies, mode of operation, troubleshooting
Hydraulic pumps
Control valve
Hoses, connections, oils Flushing
pump
Flushing tank, mixing and dosing system, sampling device Drilling ropes,
care, discarding
Drilling cable calculation, pulley
pressure, lifting force, torque

Field of study 11: Establishing a groundwater measuring	2.**Training year** **Time guideline 40 hours**

Formulation of goals

The pupils have an overview of the importance of groundwater measuring points, know the special structural features and can explain measuring and sampling procedures. They name the well fittings, the requirements placed on them and their significance. They draw up design drawings for groundwater monitoring wells.

Contents

GW measuring points, GW quality
measuring points Expansion criteria
Water sample, sample container
Sampling Groundwater equilibrium
triangles Slope calculation
GWM removal drawing, measuring
point completion Quantity calculation,
bulk loss

Field of study 12: Manufacture of workpieces	**2.Training year Time guideline value 20 hours**

Formulation of goals

The pupils select materials, especially metals and plastics, for the production of typical well construction workpieces. They explain the manufacturing processes of manual and mechanical machining. They describe different cutting processes with special regard to safety at work and distinguish joining techniques according to their mode of operation and application. They produce production drawings and calculate the material requirements.

Contents

Material properties Manufacturing
process
Sawing, drilling, thread cutting, cut-off grinding Flame
cutting
Screw, welded connections
Bolt standardisation, strength classes, tightening torque, locking elements Metal arc welding, gas-shielded welding
Valve flap, strainer, well head

Field of study 13: Execution of special civil engineering work	**2.Training year** **Time guideline value 40 hours**

Formulation of goals

The pupils compare the special civil engineering equipment with well drilling equipment. They describe the different fields of application of special civil engineering, especially methods of securing excavations, dewatering and trenchless pipe-laying.

Contents

Special civil engineering equipment
Sheet pile wall, pile wall, diaphragm wall, soldier pile wall
shoring Bored pile, prefabricated pile, in-situ concrete pile
Vacuum drainage, gravity drainage Water
discharge wells, operation, decommissioning
Displacement methods, pile driving Pressing,
control system

Field of study 14: Developing a well	**3.Training year** **Time guideline 100 hours**

Formulation of goals

The pupils explain the inflow conditions at the well. They describe the advantages and disadvantages of different types of casing and casing materials. They describe the preparations for the well casing, determine the suitable filter grain size and plan the work steps for the installation of the casing and the bulk materials. They draw up support sketches and as-built drawings and determine the installation quantities.

Contents

Drilled wells, shaft wells, horizontal filter wells
Incoming flow, sinking funnel, inlet resistance
Withdrawal quantity, capacity
Filter and solid wall tubes, perforation
type Free inlet area
Filter gravel
removal
accessories
Clay products, insulating, cementing Well
cleaning, well testing Filter installation
methods,
Grain distribution line, characteristic grain, filter factor Ring
space dimensioning, differentiated gravel fills
Single fill, single flush method, multiple fills, gravel cover filter Installation
weight, tensile calculation
Pure density, bulk density, bulk density

Field of study 15: Developing a well	**3.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils describe the various desanding measures for dewatering a well and determine the residual sand content. They plan pumping test measures, document the results and evaluate them graphically.

Contents

Clear pump, piston, shock
Intensive desanding method, cuff distance, partial stream extraction Water volume measurement
Power pumping test, monitoring pumping test
Energy supply, water discharge and injection Water level measurements, pump selection, installation
Data acquisition, transmission, data evaluation
Water sampling, water sample container
Disinfectant, neutralisation Pumping test diagram, yield curve Desanding, pumping test calculation

Field of study 16: Construction of a well completion structure	**3.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils design well completion structures depending on the respective requirements. They explain the function of the individual components and measure wells according to different methods for correct position and height.

The pupils draw well completion structures and well heads. They calculate the need for building materials and auxiliary building materials, evaluate levelling and draw site plans.

Contents

Construction
Precast concrete, plastic, stainless steel Well
equipment, well heads, fittings Wall penetration,
cover, ladder, ventilation Electrical equipment,
monitoring equipment Length and height measuring
devices,
Gauss-Krüger coordinates

Field of study 17: Regeneration and rehabilitation of a well3	**. Training year** **Time guideline 40 hours**

Formulation of goals

The pupils know the different types of well ageing. They apply investigation measures to assess the ageing condition and draw up concepts for the various well rehabilitation and remediation measures.

They assess the effectiveness of mechanical, chemical and hydraulic regeneration processes and their possibilities and limitations.

Contents

Siltation, ochreisation, sintering, slime formation, corrosion Camera
inspection, power pump test, pavement sample Geophysical
measurement methods
Regenerator,
Dosing, solution capacity, process technologies, online inspection Insertion casing,
overdrilling method, sealing measures Well plugging, well dismantling
Redevelopment drawing
Quantity and dosage calculation

Learning outcome 18: Installation of a water supply system3	**. Training year Time guideline 40 hours**
Formulation of goals The pupils explain the mode of operation and areas of application of pumps in water supply. They know the physical principles, the design and the function of pumps and pressure vessel systems. They select pumps and pressure vessels according to the intended use on the basis of characteristic data and plan micro water supply systems.	
Contents Suction head, pressure head, friction loss head, pump performance Piston pump, diaphragm pump, worm pump Centrifugal pump, Q-H line, efficiency Connection types, connection cables, cable connections *Pressure vessel size*, air cushion volume, switching frequency Installation, fittings, armatures Pump calculations Flow rate, flow velocity Delivery pressure Installation plan	

Overview of the learning fields for the training occupation **civil engineering technician specialising in special civil engineering work** (1st level) and for the training occupation **special civil engineering technician** (1st and 2nd level)				
	Learning fields	**Time guidelines in hours** Year 1	Year 2	Year 3
Civil engineering technician				
	Vocational field breadth basic education (all professions) *)			
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Making a wooden construction	60		
5	Manufacture of a reinforced concrete component	60		
6	Coating and cladding of a component	60		
	Civil engineering technician, focus on well / special civil engineering work			
7	Exploration of the subsoil **)		60	
8	Installing a pipeline **)		40	
9	Sinking a borehole **)		40	
10	Maintenance and servicing of drilling rigs **)		40	
11	Establishment of a groundwater measuring point **)		40	
12	Manufacture of workpieces **)		20	
13	Carrying out special civil engineering work **)		40	
Special civil engineer				
14	Maintenance and servicing of special civil engineering equipment			60
15	Production of deep foundations			60
16	Securing excavations			60
17	Carrying out subsoil improvements			20
18	Building in groundwater			40
19	Trenchless installation of pipes			20
20	Repairing environmental damage			20
	Total 880	320	280	280

*) see Basic vocational training, pages 09 to 16, **) see Learning fields Well digger, p. 147 to 153

Field of study 14: Maintenance and servicing of special civil engineering equipment	**3rd year of training Time reference value 60 hours**

Formulation of goals

The pupils know the application possibilities and differences of the various special civil engineering tools as well as measures for occupational safety in general and for drilling in contaminated areas in particular.

The pupils name the different basic and additional components, the function of the unit hydraulics and the tasks of the add-on units. They read circuit diagrams and produce detailed drawings of individual components.

Contents

Piping equipment

Grapple drills

Large rotary drilling rigs

Drilling rigs for small drilling diameters, anchor drilling rigs

Ramming

Diaphragm wall units

Force, torque

Field of study 15: Making deep foundations	**3.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils name reasons for choosing a deep foundation instead of a shallow foundation. They determine and assess the variant to be selected, taking into account the foundation depth and production technique in different ground situations. They determine and check the pile length and embedment depth.

Contents

Bored pile, foot extension
Displacement pile, grouted pile
Reinforcement cage Concrete
placement method
Ballast columns, mortared plug columns (VSS), concrete vibrated columns (BRS)
Well foundation, caisson foundation
Quantity calculations
Tensile, compressive load, permissible floor loads
Foundation plan
Pile documentation

Field of study 16: Securing excavations	**3.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils recognise the problems of securing excavation pit walls, especially in built-up areas, without endangering the building structure. They determine earth pressure forces and describe shoring measures for different requirements.

The pupils describe the anchoring of excavations and slopes as well as the securing of slopes.

Contents

Girder pile wall sheet pile

wall Bored pile wall

Diaphragm wall

In front of the wall Piles

Underpinning Foundation

Rehabilitation

Soil nailing, shotcrete work Anchor testing

Ground pressure, shear angle, friction

Field of study 17: Carrying out subsoil improvements3	**. Training year** **Time guideline 20 hours**

Formulation of goals

The pupils recognise the necessity of improving unsuitable subsoil conditions through suitable measures. They know different ways of improving the subsoil and describe drainage and injection methods.

Contents

Deep vibration method
Vibratory pressure, vibratory tamp
compaction Deep drainage
Sand drains, sand piles, plastic drains
Dynamic intensive compaction
Consolidation, sealing Pore injection
Dosing and pressure calculation

Field of study 18: Building in groundwater	**3.Training year** **Time guideline 40 hours**

Formulation of goals

The pupils recognise the problems of building in groundwater and apply procedures to keep water out of excavations. They know the dangers that exist for construction sites and nature due to the procedures used.

The pupils design closed water retention systems and compare them with groundwater cut-off methods, especially from an ecological point of view. They produce working drawings and detailed sketches.

Contents

Permeability of soils, groundwater gradient, flow direction Vacuum
method, gravity method, combination method, electroosmosis method,
drainage piles and slots
Lowering funnel, lowering radius
Narrow wall, driven profile cut-off wall, sheet pile
wall, overcut bored pile wall, slotted cut-off wall
Waterproofing injection, soil freezing Injection base
Groundwater culvert Water
discharge Flow calculation

Field of study 19: Trenchless pipe installation	**3.Training year** **Time guideline value 20 hours**

Formulation of goals

The pupils know the different methods of laying pipes under obstacles in a controlled or uncontrolled manner using a closed construction method. They plan the construction of start and target pits with special consideration of ecological aspects and measure the course of the pipeline.
The pupils select methods and pipe materials for the different local conditions, calculate compressive and tensile stresses and draw starting pits.

Contents

Earth displacement
hammers Pressing,
expanding equipment
Pile driving, press
drilling equipment
Pilot drilling method, press drilling method
Shield tunneling
Pressing method Hydraulic
presses

Field of study 20: Repairing environmental damage	**3.Training year** **Time guideline value 20 hours**

Formulation of goals

The students know the different possibilities of using special civil engineering methods to carry out measures in the service of environmental technology.
They plan the securing and sealing of existing landfills and the repair of environmental damage by means of cleaning and encapsulation. In doing so, they take into account the impact of different processes on people and the environment.

Contents

Landfill construction, sealing, encapsulation Capacity
expansion
Compaction of existing landfills Soil clean-up
procedures Groundwater clean-up procedures
Immobilisation of pollutants, solidification of sludge

Overview of the learning fields for the training occupation **skilled civil engineering worker specialising in track construction work** (1st level) and for the training occupation **track construction worker** (1st and 2nd level)

	Learning fields	Time guidelines in hours		
		Year 1	Year 2	Year 3
Civil engineering technician				
	Vocational field breadth basic education (all professions) *)			
1	Setting up a construction site	20		
2	Developing and founding a structure	60		
3	Walls of a single-shell structure	60		
4	Making a wooden construction	60		
5	Manufacture of a reinforced concrete component	60		
6	Coating and cladding of a component	60		
	Civil engineering technician, focus on track construction work			
7	Making an earth body		60	
8	Drainage of traffic areas		60	
9	Manufacture of a track system		80	
10	Paving traffic areas		80	
Track layer				
11	Making a track curve			40
12	Mounting a turnout			60
13	Construction of a slab track			60
14	Maintenance of track systems			40
15	Repairing a broken rail			20
16	Making a level crossing			60
	Total 880	320	280	280

*) see Basic vocational training, pages 09 to 16

Field of study 7: Manufacture of an earth structure	**2.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils plan the construction of an earth structure for a track system, taking into account the existing soil and the ecological significance of the topsoil. They make decisions about the height of the fill, compaction measures and securing the embankment.

The pupils describe methods of soil investigation, plan the use of machines for soil cultivation and select methods for soil improvement. They consider the possibilities of securing the soil during earthworks.

The pupils calculate quantities and earth masses, they determine machine requirements and machine use. They read soil mechanics drawings and draw profiles.

Contents

Embankment, cut, cut Soil types, soil
classes Soil samples
Solubility, compactability
Soil improvement Geogrid
Loosening, degree of
compaction Soil mechanical
symbols Longitudinal,
transverse profile

Field 8: Drainage of traffic areas **2nd year of training**
Time reference value 60 hours

Formulation of goals

The pupils plan the drainage for a paved area and consider possibilities to drain surface water as quickly as possible. When choosing the slopes, they take into account the nature of the surface and know the design of an open drainage system as well as the possibilities of a closed drainage system. When planning the drains, they take into account the catchment area and the capacity of the underground drainage.
The pupils produce drainage drawings, represent drainage structures and calculate the quantities to carry out the construction work.

Contents

Trough gutter, paving trough, kerb gutter
Box channel, slotted channel
Bedding
Longitudinal, transverse slope
Inlet, manhole
Seepage device
Area division, NN heights
Gutter cross-section, installation constructions
Trough, ditch

Field of study 9: Building a track system	**2nd year of training** **Time benchmark 80 hours**

Formulation of goals

The pupils plan the construction of a railway track in compliance with the legal principles. They take into account the special hazards of track work and accident prevention.
You select a superstructure type and describe the tasks of the small iron.
The pupils assign the corresponding permanent way materials to the permanent way types and calculate the material requirements for ballast, sleepers, rails and small iron.

Contents

Subsoil, geotextile, formation protection layer
Gravel
Threshold, load capacity, wheel load, pressure distribution
Rail, stress
Fastener
Tabs
K-Build, W-Build
Bedding cross-section
Standard light space

Field 10: Paving traffic areas	**2nd year of training** **Time benchmark 80 hours**

Formulation of goals

The pupils know the terms of traffic route construction and can differentiate between traffic areas. They plan the covering of a track system and select the structure according to the load. They determine types of dressing, drainage surfaces and drainage facilities including edging and design samples for paved surfaces.

Pupils draw cuts, calculate slopes, determine quantities and consider machine requirements and use.

Contents

Substructure, subgrade, superstructure

Edge fixation

Bedding

Interlocking paving

Concrete slabs

Natural stone paving, bond

Inclination ratio, percent

Height, laying plan

Field 11: Making a track curve — **3rd year of training**
Time guideline 40 hours

Formulation of goals

The pupils know the legal basics and technical terms of track construction. They know the dangers of track work and the importance of accident prevention. They know the forces in the track, especially in curves, the necessity of a transition curve and a cant.
The pupils calculate the arrow heights, the cant and the cant ramps. They determine the start and end of the arch, mark the main geometric points and write down values. They check the track layout according to height and direction.

Contents

Centripetal force
Curvature
Driving speed, longitudinal, lateral inclination
Arch radius, superelevation, superelevation ramp
Arrow heights
Transitional sheet
Reference rail
Gauge
Levelling, arrow height setting device

Field 12: Assembling a turnout **3rd year of training**
Time reference value 60 hours

Formulation of goals

The pupils plan the construction of a turnout taking into account the standard dimensions and the inclination of the turnout. They read turnout plans and distinguish the main parts of the turnout with their details.

The pupils describe the work steps in the assembly of the turnout, check important turnout dimensions and enter them in turnout card sheets. They draw up a list of materials and identify construction and auxiliary materials.

Contents

Shape, radius, inclination

Switch shocks

Tongues

Shuttering device

Switch test

Heart

Field of study 13: Production of a slab track	**3.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils know the advantages and possible applications of slab track. They select the base courses according to the requirements and determine the work steps for installation.
They prepare the sleeper or yoke laying and draw up sleeper laying and loading plans.

Contents

Hydraulically bound base course Bituminous
base course, asphalt base course Concrete
base course
Geotextile
Prestressed concrete sleeper,
dowel block Sound absorber Rail
fastening, small iron

Field 14: Maintenance of track systems	**3rd year of training** **Time guideline 40 hours**

Formulation of goals

Pupils know the importance of an intact track and the need for regular inspection and maintenance. They check important measurements and check the individual components for their condition. The pupils determine maintenance measures, determine necessary quantities, select transport vehicles and estimate the time required.

Contents

Gauge

Wear

Ballast, sleepers, rails, small iron

Randweg

Embankment

Drainage

Field 15: Repairing a broken rail **3rd year of training**
Time guideline 20 hours

Formulation of goals

The pupils know the different rail breaks and their causes and can distinguish them according to the trafficability. They carry out safety measures in accordance with the responsible body. They calculate deceleration distances (braking distances).
The pupils know possibilities to temporarily secure and repair broken rails. They select separation methods, fitting rails and emergency lugs and prepare the welding. They describe the clearing of the construction site and the track clearance.

Contents

Rail breakage (passable/unpassable)
Slow speed signals
Tabs
Cutting-off
Welding process

Field of study 16: Construction of a level crossing	**3.Training year** **Time guideline 60 hours**

Formulation of goals

The pupils know the problems of level crossings of different traffic routes and their safety options. They select the supporting structure according to the requirements and adjust the substructure accordingly.

The pupils determine the superstructure and plan the drainage.

They calculate the demand for construction materials and auxiliary materials and draw up a schedule (time demand schedule). They draw a section and plan view of the level crossing.

Contents

St. Andrew's Cross, Barriers, Light Signs

Construction Types, Deutsche Bahn AG

Association of Public Transport Operators Large Area

Plates

Elastomer small surface slabs large

pavers

Asphalt ruts