



Textbook of the masonry trade

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Textbook of the masonry trade

Introduction:

Introduction to the masonry trade

The introduction to the masonry trade gives an overview of the basic aspects of this traditional craft. Masonry has a long history and is one of the oldest building crafts that has been used for centuries to construct buildings and structures.

Significance and history of masonry

1. Importance of masonry:

Masonry is one of the oldest and most important crafts in construction. It includes the construction of masonry from different materials such as brick, natural stone or concrete. The importance of masonry lies in its central role in the construction of buildings, bridges, walls, tunnels and other structures. Without the skills and expertise of the bricklayers, the realization of such construction projects would not be possible. The masonry trade ensures that buildings are stable, durable and functional, thus contributing to people's safety and quality of life.

2. History of masonry:

The history of masonry dates back to the earliest civilizations. Even in ancient times, bricks and natural stones were used to build impressive structures such as pyramids, temples and fortresses. In the Roman Empire, masonry reached a high level of development, and the Romans introduced advanced techniques such as the use of mortar and concrete into architecture.

During the Middle Ages, the masonry trade continued to flourish, and the masonry guilds were founded to protect and promote the knowledge and skills of masons. The builders and masons of this period created impressive cathedrals, castles and city fortifications, which are still admired today as masterpieces of architecture.

With the progress of the Industrial Revolution and the modernization of construction, the techniques in the masonry trade also changed. New building materials, such as reinforced concrete, were developed, and the work of masons was optimized through the use of machines and modern construction techniques.

Today, masonry remains an essential part of the construction industry. The training of masons includes not only traditional techniques, but also the use of modern building materials and construction machinery. The heritage of masonry continues to be maintained in historical restoration projects in order to preserve valuable cultural treasures.



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On the whole, masonry has made a great contribution to the development of human civilization throughout history. From ancient structures to modern architectural projects, the knowledge and experience of masons is essential to create a sustainable and safe built environment.



Chapter 1: Fundamentals of masonry

1.1 Job description of the bricklayer

Tasks and activities of a bricklayer

The tasks and activities of a bricklayer are diverse and play a crucial role in the construction of buildings and other structures. Masonry requires specific skills, knowledge and care to ensure that structures are stable, durable and functional. The following are the main tasks and activities of a bricklayer:

1. Masonry construction:

Masonry construction is one of the central tasks of a bricklayer. He builds walls, ceilings, pillars and other supporting structures from bricks, natural stones, concrete blocks or other masonry units. It is important to set the individual stones or blocks precisely and to use the right type of mortar for the respective type of masonry.

2. Verputzarbeiten:

After masonry construction, the surfaces of the walls and ceilings are plastered to achieve a smooth and aesthetic surface.

Bricklayers are responsible for preparing the substrates, applying and smoothing the plaster.

3. Concrete work:

Bricklayers are also involved in concrete work, where they mix concrete mixtures and pour them into formwork to create foundations, buttresses, or other structural elements.

You need to compact the concrete properly and pay attention to possible voids.

4. Measuring and alignment:

A bricklayer needs to read and understand blueprints to know the exact dimensions and locations of the building elements.

He is responsible for measuring the individual construction phases and ensuring that they are correctly aligned.

5. Abdichtungsarbeiten:

Bricklayers also carry out waterproofing work to protect the structures from moisture and water penetration.

These include, for example, the insertion of waterproofing tapes and the application of water-repellent materials.

6. Restoration:

In restoration projects, masons are involved in preserving and renovating historic buildings and monuments.



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You will have to repair damaged masonry structures and use traditional construction methods to restore the original state of the structure.

7. Occupational safety:

Bricklayers must comply with current safety rules and regulations to avoid accidents on the construction site.

This also includes the correct handling of construction machinery and personal protective equipment (PPE).

The activities of a bricklayer require both manual skills and an understanding of blueprints and construction techniques. Masons often work in a team with other builders and architects to successfully implement complex construction projects. Their work is vital to the construction of safe and functional buildings that meet people's needs.

Requirements for a bricklayer (skills, knowledge, characteristics)

To be a successful bricklayer, various skills, knowledge and characteristics are required. Masonry is demanding and requires manual dexterity, technical understanding and care.

Here are some important requirements for a bricklayer:

1. Manual dexterity:

A bricklayer should have strong manual skills to handle tools and building materials precisely and carefully.

The ability to measure accurately and work precisely is essential to build stable and high-quality masonry.

2. Technical understanding:

A basic technical understanding of building structures and blueprints is essential.

Masons must be able to read blueprints and interpret the dimensions and symbols they contain in order to erect the structures according to specifications.

3. Materials science:

Knowledge of various building materials such as brick, natural stone, concrete and mortar is required. A bricklayer should understand the characteristics of building materials and know which building material is best suited for which task.

4. Physical fitness:

Masonry is physically demanding and requires good physical condition.



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Bricklayers often have to lift heavy material and move on scaffolding, so proper physical fitness is important.

5. Teamwork:

Masons often work in a team with other builders, so good teamwork and communication skills are important. Effective interaction with colleagues and other construction professionals is crucial for the smooth running of a construction project.

6. Care and accuracy:

Masons must work extremely carefully and accurately to ensure that structures are stable and safe. A small mistake in execution can have a big impact on the quality of the structure.

7. Flexibility and willingness to learn:

The construction industry is constantly evolving, new materials and techniques are being used. A good bricklayer is open to change and willing to continuously educate himself to keep up with current developments in the construction industry.

8. Sicherheitsbewusstsein:

Safety is a top priority on construction sites. A bricklayer must comply with current safety rules and regulations to avoid accidents.

In summary, masonry is a demanding profession that requires both manual skills and technical understanding. A successful bricklayer is characterized by precision, diligence, ability to work in a team and safety awareness. With these qualities and knowledge, a bricklayer will be able to erect high-quality structures and contribute to the further development of construction.



Career prospects in the masonry trade

The masonry trade offers a wide range of career prospects and development opportunities. Masons are indispensable in the construction industry and their skills are needed on construction sites of all types and sizes. Here are some of the career prospects in the masonry trade:

1. Maurergeselle:

After completing their training and passing the journeyman's examination, many bricklayers work as journeymen in construction companies or craft businesses.

As journeymen, they are able to carry out masonry work on their own responsibility and to participate in larger construction projects as part of a team.

2. Foremen and foremen:

As work experience and expertise increase, bricklayers have the opportunity to move up to senior positions.

Foremen take over the coordination of work processes on the construction site and are the contact persons for the employees.

Foremen have a higher level of responsibility and manage larger construction sites.

3. Independence:

Experienced bricklayers have the option of setting up their own construction company.

As entrepreneurs, they can accept orders and implement their own construction projects.

4. Continuing education and specialization:

Through targeted training, bricklayers can expand their skills and specialize in certain fields. This may include the restoration of historic buildings, work with special building materials or innovative construction techniques.

5. Instructors and teachers:

Bricklayers with extensive professional experience and an interest in education can work as trainers in vocational training.

They impart their knowledge and skills to apprentices and contribute to the training of the next generation of bricklayers.

6. Civil engineers or architects:

Some bricklayers opt for further training as civil engineers or architects after their craft career.

This allows them to work in planning offices or construction management positions and contribute their knowledge in construction planning and construction.

7. International projects:

With their manual skills, masons are in demand all over the world.



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They have the opportunity to participate in international construction projects and contribute their experience in different countries.

Overall, the masonry trade offers a wide range of career opportunities and career prospects. From apprenticeship as a journeyman to self-employment or working in specialized fields, there are numerous pathways that allow masons to use their skills and pursue a fulfilling career in construction.



1.2 Tools and equipment

Presentation of the most important tools (trowel, trowel, joint board, spirit level, etc.)

In masonry, there are a variety of tools that are used for various tasks. Here are some of the most important tools and their features:

1. Trowel: The trowel is one of the most basic tools in masonry. It consists of a rectangular metal plate with a wooden or plastic handle. The trowel is used to pick up mortar and apply it to the bricks or components. It is also used for mixing mortar and smoothing surfaces.
2. Bricklayer's trowel: The trowel is similar to the trowel, but wider and more robust. It is mainly used for setting masonry blocks or blocks. With the trowel, the stones can be precisely positioned and mortar can be distributed between the stones.
3. Joint board: The joint board is a flat board with a handle and is used to smooth and compact the mortar in the joints between the bricks or blocks. It helps to achieve even and clean joints.
4. Spirit level: The spirit level is an important measuring tool in the masonry trade. It consists of a shallow tube filled with liquid with a bubble in the middle. When the bubble is exactly in the middle, the level indicates a horizontal or vertical orientation. The spirit level is used to ensure that walls, ceilings and other components are precisely aligned.
5. Guideline: The guideline consists of a stretched cord between two points and is used to mark horizontal or vertical reference lines on a construction site. It serves as an orientation aid for the exact alignment and setting of masonry blocks or other construction elements.
6. Mason's hammer: The mason's hammer is a heavy hammer with a smooth striking surface and a pointed claw. It is used to process masonry blocks, e.g. to adjust or split them. The claw can also be used to remove nails or destroy old masonry.
7. Smoothing trowel: The smoothing trowel is a flat trowel with a smooth metal plate and a wooden or plastic handle. It is used to apply plaster or putty to surfaces and smooth them out. The smoothing trowel ensures an even and smooth surface.
8. Mason's cord and cords: Mason's cord is used together with cord woods to draw horizontal or vertical reference lines on the construction site. The mason's cord is stretched between the cords to create a straight line that serves as a guideline for setting masonry blocks or other structural elements.

These tools are just a few examples of the extensive range of tools that masons use in their craft. Each tool has its specific function and is crucial for the precise and high-quality execution of masonry work.

Areas of application of the individual tools

The tools in the masonry trade have different areas of application and functions, which are specifically tailored to the various work steps. Here are the areas of application of the most important tools in the masonry trade:

1. Whose:



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Application: The trowel is used for applying and spreading mortar on bricks or other components.

Function: With the trowel, the mason can remove the mortar from the mortar vat and apply it to the bricks to be bricked. It is also used to mix mortar.

2. Maurerkelle:

Application: The trowel is mainly used for setting bricks or blocks.

Function: With the trowel, the stones can be precisely positioned and the mortar can be distributed between the stones to create a stable connection.

3. Fugbrett:

Application: The joint board is used for smoothing and compacting mortar in the joints between the masonry blocks or blocks.

Function: The bricklayer uses the joint board to remove the excess mortar in the joints and achieve an even and clean joint surface.

4. Level:

Application: The spirit level is used to check the horizontal or vertical orientation of walls, ceilings and other structural elements.

Function: The bricklayer attaches the spirit level to the components and adjusts them until the bubble is in the middle of the spirit level to ensure exact alignment.

5. Guiding principle:

Application: The guideline serves as an orientation aid for the exact alignment and setting of masonry blocks or other construction elements.

Function: The mason stretches the guideline between two points and uses it as a reference line for the straight or vertical alignment of structures.

6. Maurerhammer:

Application: The mason's hammer is used to work on masonry stones or blocks, e.g. to adjust or split them.

Function: The mason can strike the stones with the smooth face of the hammer to shape them, and use the claw to remove nails or destroy old masonry.

7. Glättkelle:

Application: The trowel is used to apply plaster or filler to surfaces and smooth them out.



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Function: The bricklayer uses the trowel to achieve an even and smooth surface, for example during plastering work.

8. Mason's cord and cords:

Application: Mason's cord and cords are used to draw horizontal or vertical reference lines on the construction site.

Function: The bricklayer stretches the mason's cord between the corded timbers and uses it as a guideline to align bricks or other building elements straight and precisely.

Each tool in the masonry trade fulfills a specific function and is indispensable for the precise and high-quality execution of masonry work. Through the skillful use of these tools, a bricklayer can ensure that the structures are stable, durable and aesthetically pleasing.



Care and maintenance of tools

The care and maintenance of masonry tools is crucial to extend their lifespan, maintain their functionality and ensure that they are ready for use at all times. Well-maintained tools make work easier, reduce wear and tear and contribute to safety on the construction site. Here are some important tips for caring for and maintaining the tools:

1. Cleaning:

Upon completion of work, the tools should be thoroughly cleaned to remove remnants of mortar, dirt and dust.

In the case of metal parts, it is important to prevent rust formation. Therefore, the tools should be stored in a dry and clean place.

2. Dry:

Tools that have come into contact with water should always be dried well before being stored. Moisture can cause rust to form and affect the functionality of the tools.

3. Sharpening and renewing:

Tools such as trowels or mason's hammers, which have a sharp edge or point, should be sharpened regularly.

Damaged or worn tools should be replaced or repaired in a timely manner to achieve optimal results and prevent accidents.

4. Deceased:

Metal parts of the tools can occasionally be protected with a thin film of oil to prevent rust formation. In the case of wooden handles, a wood oil can be used to protect and maintain the wood.

5. Storage:

Tools should be stored in a dry and protected place to protect them from moisture and dirt. Ideally, the tools should be stored on a tool wall or in tool boxes to keep them organized and close at hand.

6. Periodic inspection:

Carry out regular inspections to ensure that the tools are in good condition. Look for signs of wear, damage, or loosening of the handles.

7. Correct use:

Use the tools only for the intended tasks to avoid damage.

Do not exceed the load limits of the tools to prevent breakage or deformation.



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Care and maintenance of tools should be considered an integral part of the work process. By taking good care of their tools, bricklayers ensure that they remain in good condition and that their performance is maintained. Regular maintenance also saves time and money, as well-maintained tools need to be replaced less frequently.



1.3 Materials science

Building materials in masonry (brick, concrete, natural stone, etc.)

In masonry, various building materials are used, which are selected depending on the requirements and characteristics of the construction project. Here are some of the most common building materials in masonry:

1. Brick:

Bricks are fired claystones and are among the oldest building materials in the masonry trade. They are available in various shapes, sizes and colors and offer high load capacity and durability. Bricks are mainly used for the construction of walls, walls and facades.

2. Concrete:

Concrete is a versatile building material made by mixing cement, sand, gravel and water. It offers high strength and can be shaped into almost any desired shape. Concrete is used for foundations, ceilings, supporting pillars, stairs and many other structural elements.

3. Natural stone:

Natural stones such as granite, limestone, sandstone and marble are often used for decorative elements, façade cladding and high-quality structures. Natural stones are robust, durable and give the buildings a natural and aesthetic appearance.

4. Sand-lime brick:

Sand-lime bricks consist of lime, sand and water and are made without firing. They are characterized by good thermal insulation and high load-bearing capacity. Sand-lime bricks are used for masonry structures and interior walls.

5. Aerated concrete:

Aerated concrete consists of cement, sand and pore-forming agents and has a porous structure. It is lightweight and has good thermal insulation properties. Aerated concrete is often used for non-load-bearing interior walls and ceilings.

6. Clinker:

Clinker bricks are fired claystones with high strength and low water absorption. They are mainly used for facing facades, but also for the construction of walls and floors.

7. Lightweight concrete:



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Lightweight concrete is produced by adding light additives such as expanded clay or expanded glass and is therefore particularly light. It is often used for non-load-bearing components to reduce the weight of the structure.

Each of these building materials has specific properties that must be taken into account depending on the requirements of the construction project. Choosing the right building material is crucial for the quality, durability and functionality of the structure. Bricklayers therefore need to understand the properties of the various building materials and how to use them effectively to construct high-quality and durable structures.



Properties of building materials and their use

Here are the characteristics of the main building materials in the masonry trade and their most common areas of use:

1. Brick:

Features: Bricks are sturdy, durable and offer a high load-bearing capacity. They are fireproof and have good thermal insulation properties.

Usage: Bricks are mainly used for the construction of walls, walls, facades and interior walls. They are also suitable for use in fire walls and fireproof structures.

2. Concrete:

Properties: Concrete is extremely versatile and can be shaped into almost any desired shape. It offers high strength and durability.

Usage: Concrete is used for foundations, supporting pillars, ceilings, stairs, sidewalks, roads, and many other structural elements. It is one of the most important building materials in modern construction.

3. Natural stone:

Characteristics: Natural stones such as granite, limestone, sandstone and marble are robust, durable and have a natural aesthetic appeal.

Use: Natural stones are used for high-quality facades, floor coverings, stairs, facings, monuments and decorative elements.

4. Sand-lime brick:

Features: Sand-lime bricks have good thermal insulation and high load-bearing capacity. They are relatively light and easy to work with.

Usage: Sand-lime bricks are used for load-bearing and non-load-bearing masonry structures, interior walls and partitions.

5. Aerated concrete:

Characteristics: Aerated concrete is lightweight and has good thermal insulation properties. It has a porous structure, which leads to low thermal conductivity.

Use: Aerated concrete is mainly used for non-load-bearing interior walls, ceilings and insulation.

6. Clinker:

Properties: Clinker bricks are fired and have high strength and resistance to weathering. They have a characteristic color scheme.

Use: Clinker bricks are often used for facing facades, but also for the construction of walls, pillars and floors.



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7. Lightweight concrete:

Characteristics: Lightweight concrete is particularly light because it is produced by adding light aggregates. Nevertheless, it offers a certain load-bearing capacity.

Use: Lightweight concrete is used for non-load-bearing components, such as non-load-bearing interior walls, ceilings and insulation, in order to reduce the weight of the structure.

The selection of the appropriate building material depends on the specific requirements of the construction project, including load-bearing capacity, thermal insulation, aesthetic design and other characteristics. Masons need to understand the characteristics of building materials in order to make the right decisions in the choice of materials and erect high-quality structures.



Storage and transport of building materials

The storage and transport of building materials are important aspects in the construction industry in order to maintain the quality of the materials and prevent accidents on the construction site. Here are some recommendations for storing and transporting building materials:

Storage of building materials:

Dry, protected area:

Building materials should be stored in a dry and protected place to protect them from moisture, rain and other weather conditions. The storage surface should be level and stable to prevent the materials from slipping or tipping over.

Cover:

Materials such as bricks, concrete blocks, and wooden boards should be protected with tarpaulins or covers to protect them from moisture and pollution.

Stack:

Building materials should be stacked neatly to prevent them from tipping over or slipping. Heavy materials should not be stacked too high to avoid accidents.

Separation of different materials:

Building materials should be stored in such a way that different materials are separated from each other to avoid confusion and contamination.

Marking:

It is advisable to label the building materials in order to quickly and easily identify the materials needed and better organize them.

Transport of building materials:

1. Safety:

When transporting building materials, safety is a top priority. Heavy materials should be moved with suitable means of transport, such as forklifts or cranes.

For manual transport, appropriate lifting and carrying techniques should be used to avoid back injuries.

2. Loading:

Materials on transport vehicles must be properly secured to prevent them from slipping or falling during transport.

Webbing, lashing straps or other suitable devices may be used to secure the load.



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3. Protection against weather conditions:

Materials should be protected from the weather during transportation by covering them with covers or tarpaulins.

4. Traffic regulations:

When transporting building materials on public roads, all applicable traffic regulations and weight restrictions must be observed.

5. Caution when unloading:

When unloading the building materials, appropriate lifting and carrying techniques should be used to avoid accidents or damage.

Proper storage and safe transport of building materials can reduce material losses and optimize workflows on the construction site. Compliance with these measures will help to ensure that the building materials remain in the best possible condition and that the construction work can be carried out smoothly and safely.



Chapter 2: Masonry work in building construction

2.1 Reading and understanding the blueprint

Basics of blueprint reading

Reading construction plans is an important skill in the construction industry to understand, interpret and successfully put into practice construction drawings and plans.

Here are the basics of blueprint reading:

1. Types of blueprints:

There are different types of blueprints, which may differ depending on the construction project. The most common types include floor plans, sectional drawings, elevations, facades and detail drawings.

2. Scale:

Construction plans are often drawn up at scale to represent the proportions of the building elements. The scale indicates how the measurements on the plan are converted in reality. For example, 1:100 can mean that 1 cm on the plan corresponds to 100 cm (or 1 meter) in reality.

3. Legend and symbols:

Blueprints contain a legend that explains the symbols used and their meanings. The symbols represent different building elements, materials or construction techniques.

4. Linienarten:

Different types of lines are used on blueprints to represent different information. These include solid, semicolon and dash lines, which are used, for example, for visible, concealed or existing components.

5. Orientation:

The orientation of the blueprint is usually indicated by a north arrow representation, which indicates in which direction the north lies.

6. Floor plan:

The floor plan shows a top view of the building or the building elements and reflects the spatial arrangement and dimensions of the rooms and areas.

7. Schnittzeichnung:

The sectional drawing shows a vertical view of the building or a component, which makes the internal structure and elevation clear.



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8. Views:

Views show the building or components from different sides, such as from the front, back or sides.

9. Facades:

Facades are drawings that show the external appearance of the building or a component.

10. Detailzeichnungen:

Detailed drawings provide accurate information about specific components or connections to enable precise execution.

Reading blueprints requires a basic understanding of sign language, scales, and line styles. It is an important skill for construction professionals such as bricklayers, carpenters, architects, and engineers to successfully plan and implement construction projects.



Interpreting symbols and dimensions on blueprints

Interpreting symbols and dimensions on construction plans is crucial to understand the information correctly and to successfully implement the construction project. Here are some important symbols and measurements on blueprints and their meanings:

Symbol:

Doors:

Doors are often depicted as rectangular symbols. The direction of opening can be indicated by an arrow.

Window:

Windows are usually represented as rectangular icons. The number of vertical and horizontal lines can indicate the number of window panes.

Staircases:

Stairs are represented by specific symbols that indicate the number of steps and the direction of ascent or descent.

Sanitary:

Sanitary facilities such as toilets, sinks and showers have specific symbols to distinguish them from other elements.

Electrical connections:

Sockets, switches and electrical wiring are represented by specific symbols on construction plans.

Water and sewage pipes:

These are represented with specific line styles and symbols.

Heating and ventilation:

Heating and ventilation systems have specific symbols to indicate their position and function on the plan.

Metrics:

Length measurements:

The length measurements on blueprints are usually given in meters or centimeters. The scale of the plan indicates how these measurements are converted in reality.

Höhenmaße:

Height measurements are often given in meters or centimeters and indicate the height of walls, ceilings or other structural elements.

Breitenmaße:

Width measurements are also given in meters or centimeters and indicate the width of doors, windows and other structural elements.



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Distances:

Distances between building elements are usually measured in meters or centimeters and indicate the distance between doors, windows, walls and other elements.

It is important to observe the scale of the construction plan in order to correctly interpret the dimensions. For example, if the scale is 1:100, it means that 1 cm on the plan is equal to 100 cm (or 1 meter) in reality.

When interpreting symbols and dimensions on construction plans, care and accuracy is required to avoid mistakes and to implement the construction project according to the plans. Construction professionals such as bricklayers, carpenters, and architects must master these skills in order to work efficiently and precisely.



Creation of sketches and measurements

The creation of sketches and measurements is an important step in the construction industry to plan, visualize and accurately document the construction project. Here are some steps and tips for creating sketches and measurements:

Creation of sketches:

Collection of information:

Collect all relevant information, plans and data for the construction project. This includes floor plans, sectional drawings, elevations and other technical documentation.

Selection of scale:

Decide on a suitable scale to represent the sketches proportionally. The scale depends on the size of the construction project and the desired level of detail.

Use simple forms:

Start with simple geometric shapes to outline the basic structure of the project. For example, rectangles can be used for rooms and lines for walls.

Adding details:

Gradually add more details, such as doors, windows, stairs, plumbing, electrical connections and other structural elements.

Pay attention to the proportions:

Make sure that the proportions and proportions of the elements on the sketch are realistic and correspond to the actual construction project.

Identify the components:

Label each component on the sketch so that it can be easily identified.

Use colors or shades:

By using colors or shades, you can make the sketches more vivid and highlight different materials or functions.

Preparation of measurements:

Prepare tools:

Prepare a suitable tape measure, laser distance meter or other measuring tools to record the dimensions of the rooms and building elements.

Write down the measurements:

Measure the lengths, widths and heights of the rooms, as well as the distances between the building elements, and carefully note the dimensions.

Precision:



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Be sure to record the measurements accurately to avoid mistakes in later planning and execution.

Photographs:

If necessary, supplement the measurements with photographs to document certain details or special features of the construction project.

Check the measurements:

Make sure all measurements are consistent and check again if necessary.

Documentation:

Record the measurements in a suitable format, be it digital or on paper, so that they are easily accessible later.

Creating sketches and measurements requires accuracy and creativity to bring the ideas and plans into a visual form. These steps are crucial for the planning, communication and implementation of construction projects.

2.2 Masonry construction

Basics of masonry construction (walls, ceilings, pillars)

Masonry construction is a traditional and widely used method of construction in which masonry is erected from masonry blocks or blocks that are joined together by mortar. Here are the basics of masonry construction for walls, ceilings and pillars:

1. Mauerwerksarten:

There are several types of masonry, including brick masonry, concrete masonry, sand-lime brick masonry, and natural stone masonry. Each species has its specific characteristics and applications.

2. Mauerwerkswände:

Masonry walls serve as load-bearing or non-load-bearing elements in a building. Load-bearing masonry walls support the weight of the building and transfer it to the foundations. Non-load-bearing masonry walls have no structural function and are mainly used to divide space or as cladding.

3. Mauersteinarten:

Masonry blocks can be made of brick, concrete, sand-lime brick or natural stone. The choice of masonry block depends on the structural requirements and aesthetic preferences.

4. Mortar:

Mortar is a mixture of cement, sand and water that is used to join the masonry blocks.



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There are different types of mortar, depending on the application, such as cement mortar, lime mortar or trass cement mortar.

5. Mauerverbände:

Masonry dressings are specific arrangements of masonry blocks to ensure a stable and aesthetic structure.

Well-known wall associations are the "runners' association" and the "cross association".

6. Ceiling construction:

Masonry can also be used for ceiling structures, combining horizontal masonry layers with reinforced concrete slabs.

This type of construction is called masonry slab and provides a cost-effective solution for ceilings in residential and industrial buildings.

7. Pier:

Pillars are upright masonry elements that serve as columns or beams for roofs, beams or other components.

They are especially important for carrying horizontal loads and keeping the building stable.

8. Foundations:

For masonry construction, suitable foundations are required to transfer the weight of the structure to the substrate.

There are different types of foundations, such as strip foundations or slab foundations.

Masonry construction offers a proven and robust construction method that is used in many construction projects. Careful planning, precise execution and compliance with building regulations are crucial to ensure a stable and durable masonry structure.

Types of masonry (solid stone masonry, hollow block masonry, etc.)

There are several types of masonry that are used in construction projects, depending on the structural requirements and aesthetic preferences.

Here are some of the most common types of masonry:

Full stone masonry:

Solid stone masonry consists of solid masonry blocks, which are made of brick, concrete, sand-lime brick or natural stone. This type of masonry is often used for load-bearing walls, as it provides high load-bearing capacity and stability. Full-stone masonry can also be used for non-load-bearing walls if increased robustness is desired.

Hohlblockmauerwerk:



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Hollow block masonry consists of masonry blocks that have hollow interiors to reduce the weight of the masonry. This type of masonry provides good thermal insulation, so it is particularly suitable for non-load-bearing interior walls and exterior walls. The cavities can be filled with concrete or insulating materials to further improve strength and thermal insulation properties.

Porenbetonmauerwerk:

Aerated concrete masonry consists of aerated concrete blocks, which have a low density due to the addition of pores or cavities. This type of masonry is lightweight and has good thermal insulation properties, which is why it is often used for non-load-bearing interior walls, ceilings and insulation. Aerated concrete blocks are also easy to work with and provide good sound insulation.

Kalksandsteinmauerwerk:

Sand-lime brick masonry consists of sand-lime bricks produced by pressing lime sand. This type of masonry offers a high load-bearing capacity and is ideal for load-bearing interior and exterior walls. Sand-lime bricks also have good thermal insulation properties and provide high fire resistance.

Leichtbetonmauerwerk:

Lightweight concrete masonry consists of masonry blocks, which are made by adding light aggregates, such as expanded clay or expanded glass. This type of masonry is particularly light and is therefore well suited for non-load-bearing interior walls and insulation.

Lightweight concrete masonry also offers good thermal insulation properties.

Choosing the right type of masonry depends on various factors, including load-bearing capacity, thermal insulation properties, fire safety requirements and aesthetic aspects of the construction project. Each type of masonry has its specific advantages and disadvantages, and it is important to choose the appropriate type of masonry in accordance with the requirements of the construction project.



Types of mortar and their processing

There are different types of mortar that are used depending on the structural requirements and the masonry blocks or blocks used.

Here are some of the most common types of mortar and how to process them:

Cement mortar:

Cement mortar consists of cement, sand and water. It is one of the most common types of mortar in masonry construction.

Processing:

The components are mixed dry, and then gradually mixed with water to form a homogeneous mass. The mortar is applied with a trowel or mortar board and the bricks are glued with it.

Lime mortar:

Lime mortar consists of lime, sand and water. It is often used in historic buildings or in the renovation of old masonry.

Processing:

The processing of lime mortar is similar to cement mortar. However, it requires special care and longer drying times to achieve optimal strength.

Trassementmörtel:

In addition to cement, trass cement mortar also contains trass, a finely ground volcanic ash product. Trass increases resistance to sulfates and improves the elasticity of the mortar.

Processing:

The processing is similar to cement mortar, but due to the addition of trass, the mortar hardens a little more slowly.

Porenbetonmörtel:

Aerated concrete mortar is specially designed for processing aerated concrete blocks and contains cement, sand and special additives for good adhesion.

Processing:

The processing of aerated concrete mortar requires an even and full-surface application on the aerated concrete blocks to ensure an optimal connection.

Kalksandsteinmörtel:

Sand-lime brick mortar is optimized for the processing of sand-lime bricks and contains cement, lime and sand.



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Processing:

The processing is carried out in a similar way to cement mortar, whereby care must be taken to ensure that the mortar adheres well with the sand-lime bricks.

During the processing of mortar, it is important to maintain the correct proportions of the components and apply the mortar evenly and over the entire surface to the bricks or blocks. The mortar should not be too dry or too liquid to ensure good adhesion and strength. In addition, it is important to respect the drying times before the wall is further processed. Processing mortar requires skill and experience to ensure high-quality masonry structures.



2.3 Verputzarbeiten

Preparation of substrates

The preparation of the substrates is a crucial step in the construction industry to ensure that the surfaces are suitable for further processing or the application of building materials. Proper preparation of the substrates contributes to the quality, durability and aesthetics of the structures.

Here are some important aspects of preparing the substrates:

1. Cleaning:

Before further processing, the substrates must be thoroughly cleaned to remove dirt, dust, grease, oil and other contaminants. Cleaning can be done by brushing, dusting, washing or, if necessary, by using detergents.

2. Removal of loose parts:

Loose or brittle parts must be removed from the surface to create a solid base. This can be done by knocking off, sanding or prying.

3. Check flatness:

The flatness of the substrate is important to ensure a uniform and stable application of building materials. Unevenness or depressions must be leveled or leveled.

4. Check moisture content:

The moisture content of the substrate should be checked to ensure that it is dry enough for further processing. Too high a moisture content can impair the adhesion of building materials and lead to damage.

5. Undercoat:

In some cases, it is necessary to apply a primer to improve the adhesion and durability of building materials. The primer serves as a link between the substrate and the material applied to it.

6. Substrate preparation for specific building materials:

Depending on which building material is to be applied to the substrate, specific pre-treatments may be required. For example, plasters, tile adhesives or paints may require special preparation steps.

7. Observance of safety measures:

When preparing the substrates, it is important to observe the appropriate safety measures. This may include the use of protective equipment, fall protection or special tools.



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Thorough preparation of the substrates is an important basis for high-quality structures. Observing these steps will help ensure that the building materials adhere properly and that the construction project is successfully and safely implemented.



Selection and mixing of plaster mortar

The selection and mixing of plaster mortar is crucial to achieve high-quality workmanship and an aesthetically pleasing result. Plaster mortar is used to plaster and smooth surfaces of walls and ceilings.

Here are some important steps for selecting and mixing plaster mortar:

1. Choosing the right cleaning mortar:

There are different types of plaster mortar that are suitable for different applications. For example, there are lime-cement plasters, cement plasters, gypsum plasters and clay plasters. The choice depends on the specific requirements of the construction project, including the nature of the subsoil, the desired surface texture and the environment (indoor or outdoor).

2. Untergrundvorbereitung:

Before applying the plaster mortar, the substrate must be thoroughly cleaned, freed from loose parts and, if necessary, primed to ensure good adhesion.

3. Anmischung des Putzmörtels:

The exact mixing of the plaster mortar is crucial for the quality of the plaster. Depending on the type of plaster mortar, the proportions of the components may vary. For cement plasters, 1 part cement, 3 parts sand and a sufficient amount of water are usually used. For lime plasters, the proportions may be different.

4. Wasserzugabe:

The amount of water added to the plaster mortar is important for consistency and workability. The mortar should have a smooth consistency that can be easily applied to the surface, but not be too liquid to prevent running.

5. Mixing the cleaning mortar:

The ingredients are mixed dry, and then water is gradually added, while the mortar is thoroughly mixed. Mixing can be done manually with a trowel or by machine with a mortar mixer.

6. Rest period:

The ready-mixed plaster mortar should have a short rest period to allow better bonding of the materials. After that, it should be mixed again before it is applied.

7. Verarbeitungszeit:

The plaster mortar has a limited processing time, during which it must be applied to the surface before it becomes too dry. It is important to observe the processing time and apply the mortar in small sections.



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Correct selection and mixing of plaster mortar is crucial to obtain a smooth and uniform surface. It is advisable to adhere to the manufacturer's recommendations and, if necessary, seek professional assistance to achieve the best result.



Application and smoothing of the plaster

The application and smoothing of the plaster are crucial steps to obtain an even and aesthetically pleasing surface.

Here are the steps to apply and smooth the plaster:

Application of the plaster:

1. Preparation of the area:

Make sure that the surface to be plastered is thoroughly cleaned, freed from loose parts and, if necessary, primed.

2. Pre-wetting of the surface:

In the case of highly absorbent substrates, it is recommended to slightly moisten the surface before applying the plaster. This prevents the plaster from drying out too quickly and allows for better adhesion.

3. Application of the plaster:

Apply the plaster mortar to the prepared area with a trowel or plaster spatula. As a rule, start from the bottom and work your way up. Be sure to apply the plaster evenly to avoid bumps.

4. Putzdicke:

The thickness of the applied plaster should meet the requirements and specific needs of the project. Make sure that the plaster is evenly distributed and not applied too thin or too thick.

Smoothing the plaster:

1. Waiting for the "start of setting":

Before smoothing the plaster, you need to wait until the plaster has reached its initial strength, this is called the "beginning of setting". The time it takes for the plaster to start setting depends on the type of plaster mortar and the ambient temperature.

2. Moistening the plaster surface:

Before smoothing the plaster, it is useful to slightly moisten the surface. This prevents the plaster from drying out too quickly and makes smoothing easier.

3. Using the smoothing tool:



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Use a smoothing board, smoothing disc, or smoothing trowel to smooth the plaster. Use the smoothing tool to walk over the plaster surface in circular or horizontal motions to eliminate unevenness and achieve an even structure.

4. Finishing touches:

When the plaster is almost set, you can use a sponge board or sponge board smoother to further smooth and polish the surface for a finer finish.

5. Final check:

Check the smooth surface for any irregularities or defects and, if necessary, correct them before the final hardening of the plaster.

Careful application and smoothing of the plaster is important in order to obtain a high-quality and aesthetically pleasing surface. The right technique and the use of the appropriate tools are crucial to achieve a successful result. It is advisable to familiarize yourself with the specific requirements of the chosen plaster mortar and, if necessary, seek professional assistance.



Chapter 3: Special masonry work

3.1 Concrete work

Production of concrete mixes

The production of concrete mixes requires the correct selection and dosage of components in order to obtain a high-quality and durable concrete. Concrete usually consists of cement, sand, gravel or aggregates and water.

Here are the basic steps for making concrete mixes:

1. Selection of ingredients:

Cement: Choose the appropriate type of cement according to the requirements of the project. Usually, Portland cement is used for most construction projects.

Sand: Use fine sand that is clean and free of contaminants.

Gravel or aggregates: Choose the right grain size and type of aggregates based on the requirements of the concrete.

Water: Use clean drinking water that is free of contaminants and pollutants.

2. Determination of mixing ratios:

The mixing ratio depends on the specific requirements of the construction project, including the required strength, durability and consistency of the concrete.

The most common mixture specification is the ratio of cement to sand to gravel, e.g. 1:2:3, which means that for every 1 part cement, there are 2 parts sand and 3 parts gravel. The mixing ratio may vary depending on the application.

3. Mix dry components:

Mix the cement, sand and gravel in a concrete mixer or on a clean, flat surface to achieve an even distribution.

4. Addition of water:

Gradually add the water to the dry components and mix continuously to achieve the desired consistency. The consistency can vary depending on the application, from dry and stiff concrete for foundations to wetter concrete for smooth surfaces.

5. Mixing the concrete:

Mix the concrete thoroughly to ensure that all components are evenly distributed and a homogeneous mixture is obtained.



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6. To check consistency:

Check the consistency of the concrete to make sure it's not too dry or too wet. The right consistency allows for easy processing and good adhesion.

The production of concrete mixes requires experience and accuracy to obtain high-quality concrete. It is important to follow the manufacturer's specific instructions and, if necessary, seek professional assistance for best results.



Formwork and reinforcement

Formwork and reinforcement are important steps in concrete construction to ensure a stable and dimensionally correct structure.

Here are the basics of these two aspects:

Schalungsarbeiten:

Definition:

Formwork refers to the temporary shaping and support of concrete structures before the concrete is introduced and cured.

Schalungsmaterial:

The formwork can be made of wood, steel, plastic or other materials. Wooden formwork is usually economical and suitable for simple shapes, while steel formwork is used for more complex structures and reusability.

Schalungsplan:

Before starting the formwork work, a detailed formwork plan should be drawn up, which determines the exact dimensions, shapes and requirements of the components.

Schalungsaufbau:

The formwork is assembled according to the formwork plan and carefully fastened to avoid slipping during concrete pouring.

Schalungsabstützung:

The formwork must be sufficiently supported to support the weight of the fresh concrete and the operating loads.

Schalungsdichtungen:

Gaskets are used at the formwork joints to prevent concrete leakage and ensure a clean appearance of the concrete surface.

Reinforcement:



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Definition:

Reinforcement is the introduction of steel rods or gratings into the concrete to increase its strength and prevent cracking.

Bewehrungsarten:

There are several types of reinforcement, including rebar (reinforcing bars and concrete wires), steel fibers, and fiberglass.

Bewehrungsplan:

Before pouring the concrete, a reinforcement plan should be drawn up, which will determine the exact arrangement, diameter and lengths of the reinforcing bars.

Bewehrungseinbau:

The reinforcing bars are positioned inside the formwork in accordance with the reinforcement plan and connected to each other.

Concrete:

After the reinforcement is correctly positioned, the concrete is poured into the formwork and evenly distributed.

Connection with existing reinforcement:

In construction projects where new concrete structures are connected to existing ones, the reinforcing bars must be connected to each other to ensure continuous strength.

Both formwork and reinforcement are essential aspects for the quality and durability of concrete structures. Careful planning and execution of this work can ensure that the concrete components meet the necessary requirements and can withstand the loads. It is important to pay close attention to the construction plans and technical specifications and, if necessary, to call in experts to ensure successful implementation.



Concreting and compacting

Concreting and compacting are two essential steps in concrete construction to ensure a high-quality concrete structure with high strength and durability. Here are the basic steps in concreting and compaction:

Concrete:

1. Preparation: Make sure that the formwork and reinforcement are properly prepared before you start concreting. Also check the availability of sufficient concrete and labor.
2. Concrete mix: Make sure that the concrete mix contains the correct proportions of cement, sand, gravel and water according to the specifications of the formwork plan and reinforcement plan.
3. Introduction of the concrete: The concrete is poured into the prepared formwork. Avoid air pockets and dirt in the concrete.
4. Uniform distribution: The concrete should be evenly distributed in the formwork to ensure uniform strength characteristics.
5. Stratification: For thicker concrete structures, it may be necessary to pour the concrete in several layers. Each layer should be sufficiently compacted before applying the next layer.

Condense:

1. Compaction equipment: Special compaction equipment such as vibrating plates, vibrating bottles, vibrating rods or vibrating bottles are used to compact the concrete. The choice of the appropriate compaction device depends on the size and shape of the concrete structure.
2. Start of compaction: Start compacting the concrete immediately after concreting, as long as the concrete is still plastic and malleable.
3. Compaction technique: Carefully and evenly guide the compactor over the surface of the concrete. As a result, air pockets are reduced and the concrete is compacted.
4. Overlap of compaction areas: Make sure that the compaction areas of the successive compaction joints overlap each other to ensure uniform compaction.
5. Depth of compaction: Compaction should be carried out to the desired depth in order to compact the entire concrete structure evenly.
6. Check compaction: Check the degree of compaction of the concrete by visually looking for air pockets or cavities. If necessary, recompaction must be carried out.

It is important to carefully carry out concreting and compaction in order to obtain a uniform and homogeneous concrete structure. The right concrete consistency, the use of appropriate compaction equipment and compliance with technical requirements are crucial to achieve a high-quality concrete structure that can withstand the loads and is durable.

3.2 Natural stone work

Selection and procurement of natural stones



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The selection and procurement of natural stones requires careful planning and attention to various factors in order to obtain high-quality and aesthetically pleasing stones for the construction project.

Here are some important steps and considerations when choosing and sourcing natural stones:

1. Clarify project requirements:

Define the specific requirements of the project, including the type of natural stones, their use, size, color, texture, and the amount needed.

2. Natursteinarten:

There are different types of natural stones such as marble, granite, sandstone, limestone, slate, quartzite, and more. Each stone has its own characteristics and aesthetic features. Select the appropriate stone for the respective construction project.

3. Quality and features:

Pay attention to the quality of natural stones, especially their strength, hardness, water absorption, abrasion resistance and frost resistance, depending on the requirements of the project.

4. Color and texture:

The color and texture of the natural stones have a strong influence on the appearance of the structure. Choose stones that match the desired design and environment.

5. Origin:

Take into account the origin of the natural stones. Some quarries produce high-quality stones with uniform quality, while others may have natural variations.

6. Research suppliers:

Look for reliable and experienced natural stone suppliers or quarries. Read reviews, look for recommendations, and make sure they offer high-quality and certified stones.

7. Request samples:

Request samples of the natural stones to check their color, texture and quality before purchasing. Compare the patterns and choose the best options.

8. Negotiate prices and terms of delivery:

Negotiate prices and delivery terms with suppliers to get the best deal. Make sure that the delivery is on time.

9. Transportation and storage:



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Plan the transport and storage of the natural stones carefully to avoid damage. Store the stones in a dry and safe place until they are used.

10. Seek expert advice:

For complex projects or special requirements, it can be helpful to seek advice from an experienced architect or a natural stone specialist.

The selection and procurement of natural stones takes time and attention, but it is an important step in achieving the desired results in the construction project. Invest in high-quality and suitable natural stones to improve the aesthetics and durability of the structure.



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Processing and laying of natural stones

The processing and installation of natural stones requires expertise and care in order to obtain a high-quality and aesthetically pleasing surface.

Here are the basic steps for processing and laying natural stones:

Processing of natural stones:

1. **Measurement and planning:** Carefully measure the dimensions of the laying area and draw up a detailed plan for the placement of the natural stones. Consider joint widths and patterns to ensure a uniform appearance.
2. **Cutting:** If the natural stones are not the right size or shape for installation, they must be cut to size. This can be done with special stone tools such as cut-off grinders, stone saws or stone hammers.
3. **Surface finishing:** Depending on the desired appearance, the natural stones can have different surface finishes, such as sanded, polished, flamed, split or sandblasted.
4. **Joint processing:** Make sure that the joints between the natural stones are processed properly and evenly. Smooth and clean joints improve the appearance and durability of the installation.

Laying of natural stones:

1. **Substrate preparation:** Make sure that the substrate is clean, level, stable and free of dirt, dust or oil. Proper substrate preparation is important to enable permanent and uniform installation.
2. **Laying bed:** Apply a layer of mortar or glue to the substrate to create the laying bed. The type of laying bed depends on the type of natural stones and the structural requirements.
3. **Laying:** Place the natural stones on the laying bed according to the planned pattern and dimensions. Gently tap the stones with a rubber mallet to ensure good adhesion and align the stones at the same level.
4. **Joint filling:** Fill the joints between the natural stones with mortar or grout to obtain an even surface and securely fix the stones.
5. **Cleaning:** Remove excess mortar or grout from the surface of the natural stones before they harden completely. Thorough cleaning will improve the appearance of the installation.
6. **Finishing work:** Check the entire laying for irregularities or deviations and make corrections if necessary. Carry out final cleaning and maintenance work to protect and preserve the installation.

The processing and laying of natural stones requires experience and craftsmanship. It is important to use the right tools and materials, as well as carefully follow the techniques of processing and laying. The careful execution of these steps helps to achieve a high-quality and durable natural stone installation that meets the requirements of the project.

Care and protection of natural stones



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The care and protection of natural stones are crucial to maintain their beauty and longevity. Natural stones are delicate materials that have specific maintenance requirements depending on their type and use, whether indoors or outdoors. Here are some important tips for caring for and protecting natural stones:

1. **Regular cleaning:** Clean the natural stone surfaces regularly to remove dirt, dust and other debris. Use mild detergents and warm water to gently clean the surface.
2. **Avoid harsh detergents:** Do not use aggressive or acidic detergents, as they can damage the surface of natural stones.
3. **Protection against stains:** Natural stones can be susceptible to stains, especially marble and other absorbent stones. Use coasters under glasses and plates and wipe off any spills immediately.
4. **Avoid scratches:** Be careful not to use sharp or abrasive objects directly on the natural stone surface to avoid scratches.
5. **Joint care:** Keep the joints between the natural stones clean and intact to prevent dirt and moisture from entering.
6. **Sealing:** Depending on the type of natural stone and the application, a sealant may be recommended to protect the surface from moisture, stains and dirt. Consult a professional to choose the appropriate sealant for your specific stone.
7. **Protection from the elements:** For outdoor natural stones, it is important to protect them from extreme weather conditions such as frost, heat and direct sunlight. Use appropriate means of protection and follow the recommendations of the stone supplier.
8. **Professional repair:** If damage or wear and tear occurs, contact professionals or stone experts to carry out the repairs professionally and prevent further damage.
9. **Regular inspection:** Carry out regular inspections of natural stone surfaces to identify and treat potential problems at an early stage.
10. **Long-term care planning:** Create a long-term care plan for your natural stones to ensure their beauty and durability over the years.

The care and protection of natural stones requires attention and expertise. By taking the right care and protection measures, you can extend the life of your natural stones and preserve their aesthetic appearance.

3.3 Restoration work

Detection and assessment of damage to historic buildings

Detecting and assessing damage to historic buildings requires expertise, experience and care, as historical structures often present unique challenges. Here are some important steps to identify and assess damage to historic buildings:

1. **Historical documentation:** Start with a thorough historical documentation of the structure. Study plans, historical photographs, archival documentation, and other information to gain an understanding of the original design and materials.
2. **Walk-through and inspection:** Conduct a careful walk-through of the entire structure to identify possible damage. Look for cracks, deformations, moisture, wear and tear, and other abnormalities.



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3. Categorization of damages: Categorize the detected damages according to their type, severity, and cause. Examples of damage can include: moisture damage, cracks, rot, pest infestation, material decay, and more.
4. Root Cause Analysis: Try to determine the causes of the damage. For example, moisture damage can be caused by leaking roofs, defective gutters or rising damp.
5. Damage Impact Assessment: Assess the impact of the damage on the structure and its integrity. Identify whether the damage is causing structural or aesthetic problems and whether it affects the safety or stability of the building.
6. Risk Assessment: Assess the risk posed by the damage detected. Determine if the damage requires immediate action or if it can be stabilized for the time being.
7. Consultation of professionals: When assessing damage to historic buildings, it is advisable to consult professionals who have experience in the restoration and conservation of historic buildings. Architects, engineers and monument conservators can offer valuable expertise and advice.
8. Conservation planning: Based on the assessment of the damage and the risk assessment, a conservation plan should be developed. The plan should include measures to repair the damage, stabilize and protect the historic building.
9. Consideration of monument protection guidelines: If the historic building is a listed building, the relevant monument protection guidelines and regulations must be observed during damage assessment and treatment.
10. Ongoing monitoring: Damage to historic buildings can evolve over time. It is important to regularly observe the structure and, if necessary, adjust the conservation plan.

Recognizing and assessing damage to historic buildings requires a holistic approach and analysis. The aim is to preserve the valuable historical substance while ensuring the safety and stability of the building. Careful planning and expertise are crucial.

Repair and restoration techniques

Repair and restoration techniques for historic buildings require a deep understanding of the construction techniques and materials used in the original construction. It is important to preserve the original character and authenticity of the building, while at the same time repairing the damage and restoring the stability and safety of the structure. Here are some common repair and restoration techniques for historic buildings:

1. Cleaning and conservation: Remove dirt, debris, and contaminants from the surface of the historic building to restore its original beauty. Conservation measures can be applied to slow down the deterioration of surfaces and protect the integrity of the materials.
2. Joint repair: In historic masonry constructions, damaged or weathered joints can be repaired or renewed to improve the stability and watertightness of the masonry.
3. Crack repair: Small cracks can be repaired with special injection materials to prevent further damage and stabilize the structure.
4. Mortar replacement: Damaged mortar can be replaced with new, matching mortar to stabilize the structure and restore its original character.
5. Additions and replications: In the case of missing or damaged components, suitable additions or replications can be created and inserted to preserve the original appearance of the building.
6. Stone replacement: Damaged or decayed natural stones can be replaced with new stones with similar properties to ensure structural integrity.



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7. Wood restoration: Historic wooden components can be restored by drying, conservation, injection of wood preservatives and repair of damage.
8. Metal turned parts: Historic metal parts can be restored or replaced with replications to preserve the originality of the building.
9. Heritage-compliant materials: When restoring, use heritage-compliant materials that meet the specific requirements and regulations of the historic building.
10. Conservation advice: For complex restoration projects, it is advisable to call in conservation experts or conservationists to ensure proper restoration and preservation of historical value.

When repairing and restoring historic buildings, it is crucial that the techniques and materials are applied with the utmost care in order to preserve the unique character and historical significance of the building. It is advisable to call in professionals with experience in the restoration and conservation of historic buildings in order to achieve a successful result that complies with the preservation of historical monuments.

Observe monument protection regulations

When dealing with historic buildings and buildings, it is of great importance to observe the monument protection regulations. Monument protection regulations are legal regulations and guidelines that regulate the preservation and care of historic buildings and cultural assets. They are designed to ensure that a society's cultural heritage is preserved and that historic buildings are preserved for future generations. Here are some key points to consider when observing monument protection regulations:

1. Contact the relevant authorities: Check with the relevant monument protection authorities or monument offices for information on the specific regulations and procedures for dealing with historic buildings.
2. Obtaining permits: In most cases, it is necessary to obtain a permit from the Historic Preservation Authority before carrying out any repair or restoration work on a historic building. The permit is often dependent on the type of work planned and its impact on the protection of historical monuments.
3. Obtain technical expertise: Work on historic buildings often requires specialized expertise and craftsmanship. Bring in professionals with experience in the restoration and conservation of historic buildings to apply the right techniques and materials in accordance with monument protection regulations.
4. Use of heritage-compatible materials: In the restoration and maintenance of historic buildings, heritage-compatible materials should be used that correspond to the original materials and construction techniques.
5. Maintain authenticity: Be sure to preserve the authenticity of the historic building and carefully plan any changes or additions to respect the original appearance.
6. Archaeological investigations: In some cases, archaeological investigations may be required before any work is carried out on historic buildings, especially if the building is located on an archaeologically significant site.
7. Continuous monitoring: One-time monument protection permits are often not valid indefinitely. It is important that compliance with monument protection regulations is continuously monitored, especially when it comes to long-term restoration projects.
8. Raising awareness among employees: Ensure that all employees involved in the work are informed about the importance of monument protection and follow the appropriate procedures.



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Monument protection regulations are designed to preserve historic buildings and preserve their cultural significance for society. Compliance with these regulations is crucial to protect cultural heritage and preserve historic buildings for future generations.



Chapter 4: Occupational safety and environmental protection

4.1 Occupational safety in the masonry trade

Sources of danger on construction sites

There are various sources of danger on construction sites that can lead to accidents and injuries. Safety on construction sites is vital to prevent accidents and ensure the well-being of workers. Here are some common sources of danger on construction sites:

1. Risk of falling: Inadequate protection of working areas at height, lack of railings on stairs and work platforms, unsecured manhole openings or lack of fall protection can lead to falls.
2. Falling objects: Objects falling from higher levels, such as tools, building materials, or debris, can cause serious injury if they hit people on the construction site.
3. Machinery and equipment: Improper use of construction machinery and equipment, lack of maintenance and poor operation can lead to accidents, such as crushing, cuts or collisions.
4. Electrical hazards: Improper handling of electrical tools or inadequate safety precautions when working near power lines can cause electric shocks and electrical accidents.
5. Hazardous materials: The handling and storage of hazardous materials such as chemicals, paints or asbestos requires special care to prevent poisoning or health problems.
6. Pits and excavation pits: Insufficiently secured excavation pits or pits can cause collapses and bury workers under them.
7. Noise pollution: Noise-intensive construction machinery and equipment can cause hearing damage if appropriate protective measures are not taken.
8. Hazardous substances: Improper handling or storage of hazardous substances such as paints, solvents or construction chemicals can cause damage to health.
9. Weather conditions: Extreme weather conditions such as heat, cold, rain or snow can affect the safety of workers and lead to health problems.
10. Lack of personal protective equipment (PPE): The absence or improper wearing of personal protective equipment such as helmets, safety shoes, gloves or goggles increases the risk of injury.

To ensure safety on construction sites, it is important that construction companies and employers implement strict safety measures and policies, and that all workers are trained and sensitized accordingly. Compliance with safety regulations, regular inspection of the construction site and open communication about potential hazards are essential to minimize the risk of accidents and injuries.

Personal protective equipment (PPE)

Personal protective equipment (PPE) is an essential safety measure on construction sites and in various work environments to protect the health and safety of workers. PPE consists of special garments, equipment and protective devices that are worn individually to protect against danger and injury. Here are some important types of personal protective equipment:

1. Safety helmet: Protects the head from falling objects, bumps and blows. There are different types of safety helmets that are selected depending on the working environment.



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2. Safety footwear: Special footwear with steel toe caps or other reinforced toe caps that protect the feet from injury caused by falling objects, sharp materials or tripping hazards.
3. Goggles: Protects the eyes from dust, sparks, chemicals and other particles that can affect vision.
4. Hearing protection: earplugs or earmuffs to protect hearing from noise exposure and prevent hearing damage.
5. Respirator: Protects the respiratory tract from harmful dust particles, fumes, smoke or toxic gases.
6. Protective gloves: Depending on the working environment, there are a variety of protective gloves that protect against mechanical injury, heat, chemicals or other hazards.
7. Protective clothing: Special workwear that protects the body from various hazards such as chemicals, heat, sparks, flames or dirt.
8. Fall protection: Harnesses, ropes, and safety systems that protect workers from falling when working at height.
9. Knee pads: Protect the knees from strain that can occur when working on the knees.
10. Skin protectants: Creams or ointments that protect the skin from harmful agents such as chemicals or irritants.

The selection of appropriate personal protective equipment depends on the type of work, the sources of danger and the specific requirements of the workplace. It is important that PPE is regularly checked, used correctly and maintained to ensure the protective effect. Training and employee awareness of the importance of PPE are also critical to promoting workplace safety and preventing accidents.



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Accident prevention and first aid

Accident prevention and first aid are crucial aspects to ensure the safety and well-being of people in working environments. Here are some important measures for accident prevention and first aid care:

Accident prevention:

1. Risk Assessment: Conduct a thorough risk assessment to identify potential sources of danger and take appropriate safety measures.
2. Safety policies and training: Ensure that clear safety policies are established and that all employees receive regular training on safety measures.
3. Personal protective equipment (PPE): Ensure that all employees are using the required PPE correctly and that it is regularly maintained.
4. Safety signs: Clearly mark hazardous areas, emergency exits, fire extinguishers, and other safety-related equipment.
5. Regular inspections: Conduct regular inspections of the working environment to identify potential hazards and eliminate them early.
6. Machinery and equipment: Ensure that all machinery and equipment is properly maintained and that only trained personnel operate it.
7. Safe Work Practices: Implement safe work practices and encourage employees to take responsibility for their safety and the safety of their colleagues.

First aid:

1. First Responders: Designate trained first responders in the work environment and ensure they have up-to-date knowledge and skills in first aid.
2. First aid kit: Make sure that a complete first aid kit is easily accessible and regularly checked.
3. First aid plans: Create contingency plans and ensure that all employees know how to respond in the event of an emergency.
4. Emergency call: Make sure all employees know the emergency numbers and how to call for help quickly.
5. Emergency responses: Train staff on emergency responses such as treating wounds, stabilizing injured people, or performing life-saving operations.
6. Emergency drills: Conduct regular emergency drills to ensure employees know how to act properly in emergency situations.

Accident prevention and first aid go hand in hand to minimize the risk of accidents and injuries in the workplace. Through careful planning, training and preparation, work environments can be made safer and accidents can be avoided or effectively treated.

4.2 Environmental protection measures

Responsible handling of building materials and waste

Responsible use of building materials and waste is of great importance in order to protect the environment and promote sustainable construction practices. Here are some key actions that can help:



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1. **Choosing sustainable building materials:** Choose building materials that are environmentally friendly and have a low environmental impact. Use recycled or reusable materials where possible, and give preference to certified building materials that meet sustainable standards.
2. **Resource-saving use:** Use building materials sparingly and efficiently. Avoid waste and ensure that materials are properly stored and protected to minimize losses.
3. **Recycling and reuse:** Promote the recycling of building materials and the reuse of materials. Recycle construction site waste such as concrete, metal or wood to extend its lifespan and reduce landfilling.
4. **Separate waste disposal:** Separate waste on the construction site by material type to enable proper and environmentally sound disposal. Ensure that hazardous waste, such as paints, solvents, or chemicals, is disposed of properly.
5. **Avoidance of harmful substances:** Use building materials and materials that are free of harmful chemicals and pollutants to protect the environment and the health of workers.
6. **Minimizing construction site noise:** Reduce noise pollution to the surrounding area by using noise barriers and performing noisy work at appropriate times.
7. **Water conservation measures:** Employ erosion control and wastewater management measures to minimize pollution of water resources from construction site runoff.
8. **Energy efficiency:** Consider energy efficiency measures when choosing building materials to reduce energy consumption and environmental impact.
9. **Training and awareness-raising:** Raise awareness among all stakeholders of the importance of responsible use of building materials and waste. Train the construction team on sustainable practices and inform them about the environmental impact of their decisions.
10. **Environmental compliance:** Ensure compliance with all applicable environmental regulations and laws to protect the environment and society from negative impacts.

Responsible use of building materials and waste is an important step towards sustainable construction practices and the careful use of natural resources. By incorporating environmental considerations into their decisions, construction companies and construction teams can contribute to the preservation of the environment while implementing more sustainable and future-proof construction projects.

Energy-efficient construction

Energy-efficient construction is a concept that aims to plan, construct and operate buildings in such a way as to minimise energy consumption in order to ensure a more sustainable and environmentally friendly use of energy. Energy-efficient construction can reduce environmental pollution and reduce energy costs in the long term. Here are some important aspects and measures of energy-efficient construction:

1. **Building Planning and Orientation:** Proper orientation and planning of the building in relation to solar radiation can reduce heat demand and maximize the use of passive solar energy.
2. **High-quality thermal insulation:** The use of high-quality insulation materials in walls, roof and floor minimizes heat loss in winter and heat absorption in summer.
3. **Energy-saving windows and doors:** Energy-saving windows and doors with good thermal insulation and double glazing reduce heat transfer and contribute to energy efficiency.
4. **Ventilation and airtightness:** Efficient ventilation and good airtightness of the building envelope help to reduce energy consumption for heating and cooling.
5. **Use of renewable energy:** The integration of renewable energy sources such as solar energy, wind energy or geothermal energy can reduce the need for conventional energy sources.



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6. Efficient heating and cooling systems: The use of high-efficiency heating and cooling systems, such as heat pumps or district heating, reduces energy consumption for building air conditioning.
7. Lighting: The use of energy-saving LED lamps and smart lighting systems helps reduce power consumption.
8. Energy management and building automation: The implementation of intelligent energy management systems and building automation enables optimized control and use of energy in the building.
9. Sustainable building materials: The selection of sustainable and environmentally friendly building materials reduces the energy required to produce and transport them.
10. Life cycle assessment: Consider the entire lifespan of the building to ensure long-term energy efficiency and sustainability.

Energy-efficient construction is an important strategy for reducing energy consumption, reducing CO2 emissions and helping to meet the challenges of climate change. It requires integrated planning, where architects, engineers, contractors and building occupiers work together to find optimal solutions for sustainable and energy-efficient building performance.



Compliance with environmental standards and regulations

Compliance with environmental standards and regulations is crucial to prevent environmental damage, protect the health of people and nature, and promote sustainable business practices. Here are some key aspects of complying with environmental standards and regulations:

1. **Laws and regulations:** Ensure that all applicable environmental laws, ordinances, and regulations are known and complied with at the national, regional, and local levels.
2. **Permits and certifications:** Obtain all necessary environmental permits and ensure that the necessary certifications and evidence are in place.
3. **Environmental Impact Assessment (EIA):** Conduct an EIA when it comes to major construction projects or projects with potentially significant environmental impacts to identify and minimize environmental impacts at an early stage.
4. **Environmental Management Systems:** Implement an environmental management system that ensures that environmental standards are continuously monitored and improved.
5. **Training and awareness:** Train all employees to raise awareness of environmental standards and regulations and ensure they follow appropriate procedures and practices.
6. **Waste management:** Ensure that waste is properly separated, stored, and disposed of to minimize environmental impact.
7. **Water management:** Implement measures to conserve and reduce water and prevent water pollution.
8. **Energy efficiency:** Promote energy-efficient practices and technologies to reduce energy consumption and greenhouse gas emissions.
9. **Emissions control:** Reduce emissions of pollutants and greenhouse gases to improve air quality and combat climate change.
10. **Sustainable procurement:** Consider environmental considerations when procuring materials and services and give preference to environmentally friendly and sustainable products.

Compliance with environmental standards and regulations is not only a legal obligation, but also an important contribution to environmental protection and sustainability. Companies and organizations that minimize their environmental impact and use natural resources responsibly can not only prevent environmental damage, but also increase the trust of their customers, partners and the public. Proactive environmental responsibility can strengthen competitiveness and ensure long-term success.



Concluding chapter:

Summary of key content

In this textbook on masonry, the following important contents were covered:

- Introduction to Masonry: A general introduction to masonry and its importance to the construction industry.
- Significance and history of masonry: The historical development of masonry and its role in building culture.
- Tasks and activities of a bricklayer: An overview of the various tasks and activities that a bricklayer performs on a construction site.
- Requirements for a bricklayer: The required skills, knowledge and characteristics that a bricklayer should have for his work.
- Career prospects in the masonry trade: A consideration of the career opportunities and development prospects for bricklayers.
- Presentation of the most important tools: A list and description of the most important tools used by bricklayers, such as trowels, trowels, grout boards and spirit levels.
- Areas of application of the individual tools: An explanation of where and how the various tools are used on the construction site.
- Care and maintenance of the tools: tips and instructions on how to properly care for and maintain the tools to extend their life.
- Building materials in masonry: An overview of various building materials used by bricklayers, such as brick, concrete and natural stone.
- Properties of building materials and their uses: A description of the properties of building materials and how they are used in practice.
- Storage and transport of building materials: Guidelines for the proper storage and safe transport of building materials on the construction site.
- Basics of blueprint reading: An introduction to the reading techniques of blueprints and construction drawings.
- Interpreting symbols and measurements on blueprints: An explanation of the most common symbols and measurements on blueprints and how to interpret them correctly.
- Creation of sketches and measurements: Instructions for creating sketches and measurements for work on the construction site.
- Basics of masonry construction: An introduction to the different types of masonry such as walls, ceilings and pillars.
- Masonry types: An overview of different types of masonry such as solid stone masonry and hollow block masonry.
- Types of mortar and how to process it: information about different types of mortar and how they are used in masonry work.
- Preparation of substrates: Instructions for preparing substrates before masonry construction.
- Selection and mixing of plaster mortar: tips for the selection and mixing of plaster mortar for plastering work.
- Plaster application and smoothing: Instructions for the correct application and smoothing of plaster on surfaces.
- Preparation of concrete mixtures: information on the preparation of concrete mixtures for use on the construction site.
- Formwork and reinforcement: Guidelines for formwork work and the use of reinforcement in concrete construction.
- Concreting and compacting: Instructions for concreting and compacting concrete mixes.



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- Selection and procurement of natural stones: Information on the selection and procurement of natural stones for use in the construction industry.
- Processing and laying of natural stones: instructions for processing and laying natural stones for construction and design work.
- Care and protection of natural stones: Tips for the care and protection of natural stones to maintain their beauty and longevity.
- Recognizing and assessing damage to historic buildings: Information on the identification and assessment of damage to historic buildings.
- Repair and restoration techniques: Techniques for the repair and restoration of historic buildings.
- Observe monument protection regulations: Instructions for compliance with monument protection regulations when working on historic buildings.
- Accident prevention and first aid: Measures for accident prevention and first aid on construction sites.
- Responsible handling of building materials and waste: Recommendations for an environmentally friendly and sustainable handling of building materials and waste.
- Energy-efficient construction: Concepts and measures for energy-efficient and sustainable construction.
- Compliance with environmental standards and regulations: The importance of adhering to environmental standards and regulations to minimize environmental impacts and promote sustainable construction practices.

This textbook provides a comprehensive overview of the masonry trade, from the basics to specific techniques and sustainability aspects. It serves as a guide for masons and construction professionals to improve their skills and promote responsible practices in the construction industry.



Outlook on future developments in the masonry trade

As an AI language model, I have no ability to predict future developments. Nevertheless, I can point out some potential trends and developments in the masonry trade based on previous developments and current technologies that could be relevant in the coming years:

1. **Digitization and BIM:** Digitization will also play an increasingly important role in the masonry trade. Building Information Modeling (BIM) enables holistic planning and collaboration between all parties involved in a construction project. By using BIM, possible problems can be identified and corrected at an early stage, which increases efficiency and saves costs.
2. **Automation and robotics:** The automation of construction processes can also affect the masonry trade. In the future, robots could be used in certain jobs, such as masonry brick layers, to increase productivity and reduce physical strain on workers.
3. **Sustainability and green building:** The trend towards sustainable construction will continue. Bricklayers will increasingly use environmentally friendly building materials and promote energy-efficient construction methods in order to meet the requirements of sustainable and green building.
4. **3D printing of building materials:** 3D printing of building materials such as concrete could play a bigger role in the future. This enables the production of complex structures and shapes that would be difficult or impossible to achieve with conventional techniques.
5. **Further development of building materials:** The development of new, innovative building materials could influence the masonry trade. Lighter and at the same time more robust materials could be used to optimize the construction process.
6. **Virtual reality and augmented reality:** VR and AR technologies could be increasingly used in the training of bricklayers to simulate practical exercises and training and to improve learning.
7. **Circular economy in the construction industry:** The circular economy approach, in which waste is reduced and resources are kept in circulation for as long as possible, will also gain in importance in the masonry trade.
8. **Focus on health and safety:** The safety and health of workers will continue to play a central role in the future. New technologies and safety measures could be developed to further minimize the risk of accidents.

It is important to emphasize that these potential trends and developments are merely speculation and could be influenced by various factors, such as political decisions, technological progress and societal developments. However, the masonry trade and the construction industry as a whole are constantly changing and will adapt to the demands of a changing world.



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Recommendations for further reading and training

There are various options for further literature and further training in the masonry trade, depending on which specific topics or skills are to be deepened. Here are some recommendations:

Further reading:

- "The Mason: Textbook for the Masonry Trade" by Frank Hädicke: A comprehensive textbook that covers all important aspects of the masonry trade.
- "The Big Book of Masonry" by Peter Regenfuss: A comprehensive introduction to masonry, including historical background and modern techniques.
- "Building Materials Science for Masons" by Winfried Nerdinger: A detailed presentation of the various building materials in the masonry trade and their properties.
- "Mason's arithmetic" by Rudolf Mühlbauer: A practical handbook for technical arithmetic in the masonry trade.
- "Plaster and stucco work: techniques, materials, design" by Bernhard Auinger: A book about plaster and stucco work, which presents various techniques and design possibilities.

Training:

- Chambers of crafts and educational institutions often offer training courses for bricklayers, focusing on specific topics such as monument preservation, energy efficiency or modern building materials.
- Specialized training for the use of new technologies in the masonry trade, such as BIM or 3D printing.
- Courses and seminars on occupational safety and accident prevention.
- Training and certification for the use of certain building materials, such as natural stone processing or concrete construction.
- Further training in the field of construction planning and construction management to deepen the understanding of the planning and organization of construction projects.

It is advisable to inquire about current training opportunities at regional chambers of crafts, educational institutions or construction trade associations. In addition, online platforms and e-learning courses can be a practical way to continue your education flexibly and on your own. Through targeted training, bricklayers can expand their skills, stay up to date and improve their career opportunities.



Appendix:

Glossary of technical terms

Here is a glossary with some technical terms from the masonry trade:

- **Masonry:** A construction of stones or bricks joined by mortar to form walls, ceilings, or pillars.
- **Mortar:** A mixture of sand, cement, and water used to join stones or bricks in masonry.
- **Plaster:** A thin layer of mortar that is applied to walls or ceilings to create a smooth surface.
- **Joint board:** A tool used to smooth and shape the plaster or mortar on the surface.
- **Level:** A tool used to measure the horizontal orientation of surfaces or lines.
- **Construction plan:** A drawing or sketch that depicts the details of a construction project, including dimensions and placement of structural elements.
- **BIM (Building Information Modeling):** A digital method for planning, executing and managing construction projects that integrates all relevant information into a 3D model.
- **Hollow block masonry:** Masonry that uses hollow blocks with air chambers to reduce weight and allow for better insulation.
- **Natural stone:** A building material that is extracted directly from nature and can be used in various forms such as quarry stone, boulder or polygonal slab.
- **Reinforcement:** The reinforcement of concrete with steel rods to increase the load-bearing capacity and resistance of the concrete.
- **Energy efficiency:** The efficient use of energy to reduce energy consumption and minimize a building's energy needs.
- **Formwork:** A temporary mold that is poured around concrete to give it the desired shape as it hardens.
- **Monument protection:** Measures for the preservation and care of historic buildings and monuments.
- **Circular Economy:** An approach in which resources are kept in circulation for as long as possible in order to reduce waste and promote sustainable management.
- **Building protection:** Measures and techniques to protect buildings from weather, moisture or pollutants.

This is just a small selection of technical terms from the masonry trade. There are many other specific terms and terms used in construction and construction planning. A comprehensive technical dictionary or specialized textbooks can provide additional information and definitions for other technical terms.



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Illustrations and diagrams for illustration

Unfortunately, as a text-based AI model, I can't display any illustrations or diagrams. My format is limited to text responses. If you need visual illustrations, I recommend that you look at appropriate textbooks, online resources, or visuals to supplement and visualize the information. You can also specifically search for illustrations and graphics that depict the different aspects of masonry to deepen understanding and facilitate the application of the concepts in practice.

Exercises to deepen what has been learned

1. Calculation of material requirements: Calculate the material requirements for masonry of a wall with dimensions of 4 m in length, 2.5 m in height and 0.25 m in thickness. Use standard dimensions for bricks (length: 20 cm, height: 10 cm, thickness: 5 cm) and assume a joint width of 1 cm.
2. Reading blueprints: Interpret a blueprint and identify the different symbols for masonry, windows, doors, and stairs.
3. Preparation of the substrate: Make a sketch and describe the steps to prepare the substrate before masonry, including the need for foundations and the application of sealants.
4. Mixing plaster mortar: Make a plaster mortar mixture that is suitable for indoor use and specify the correct ratios for cement, sand and water.
5. Working with natural stones: Create instructions for processing and laying natural stones for a decorative stone wall.
6. Safety measures on the construction site: Describe the personal protective equipment (PPE) required for masonry work and name five safety rules on a construction site.
7. Energy-efficient construction: List five measures to improve energy efficiency on a construction site, for example through thermal insulation or the use of renewable energy.
8. Building materials and their properties: Explain the differences between bricks and hollow blocks in terms of their properties and use in masonry.
9. Concrete mix: Prepare a concrete mix suitable for building a foundation, specifying the correct ratios of cement, sand, gravel and water.
10. Monument protection regulations: Name three monument protection regulations that must be taken into account when renovating a historic building and explain their importance for the preservation of the building.

These exercises can help you consolidate what you have learned in masonry and understand practical applications of the various concepts. If you need the solutions or want more specific exercises, feel free to ask!



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