General information

If the medium being insulated is warmer than the surroundings, we talk about thermal insulation.
If the medium being insulated is colder than the surroundings, we talk about cold insulation.

The tasks of insulation

* Reducing heat loss, and therefore energy consumption.
* Protecting the flow medium from undesirable temperature fluctuations.
* Preventing the formation of condensation and external corrosion.
* Reducing the growth of Legionella bacteria.

Insulation materials

Different materials can be used to achieve the desired insulating effect. Nowadays insulation materials predominantly consist of the following basic materials:
* Mineral fibres, e.g. mineral wool or glasswool
* Soft or hard plastic foams, e.g. PVC, PU, PE, PS

The installer insulates lines using:
* pipes with thermal insulation applied in the factory.
* closed-pored, flexible insulation hoses.
* pipe shells made from the above materials.

Regulations on protecting piping against heat transfer

Thermal insulation is stipulated for hot water and heating lines in the German Energy Conservation Ordinance (EnEV), which relates to the Energy Conservation Act (EnEG). Hot water and heating lines primarily must be protected against heat loss, as hot, uninsulated lines lose a great deal of heat. The larger the pipe circumference, the larger the magnitude of the heat loss.

Cold water lines must also be encased with insulation according to DIN 1988-200. Failure to do so poses a risk that the moisture contained in warm air will condense when it comes into contact with the cold pipe. Thus in summer temperatures, even in low-humidity conditions, condensation can form and drip off. This moisture carries with it a risk of corrosion and mould growth.

Recommended max. spacing between brackets for copper pipes:

External diameter	Spacing
(mm)	(m)
15 to 22, soft	2
22 to < 54, semi-hard	3
54 to 67, semi-hard	4

In addition to observing the spacing between pipe brackets, it is also important to avoid the transfer of excessive vibrations. Particular care must be taken to ensure that noises or vibrations are not transmitted from the piping into walls and buildings, by choosing the right support structures.

Measures to prevent pipes from freezing

A layer of thermal insulation cannot permanently prevent lines from freezing. Therefore, to guard against frost:
* Room which are susceptible to frost must be heated with appropriate equipment.
* Do not route water lines though external walls.
* Route lines in the ground at depths not susceptible to frost.

WHY SOUND INSULATION?

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General information

Sound insulation is a measure to reduce transmission of sound from a sound source.

Our ears need a break

The human ear is a high-performance sensory organ, which can discern sounds in a frequency range of approx. 16-18,000 Hz. It cannot shut out sound waves.

Facts and figures

* Over a third of German citizens feel disturbed by traffic noise.
* 6.5% of German citizens complain about noisy neighbours.
* Many suffer from the effects of aircraft noise, and noise at sporting events and in industrial facilities.
* Noise has become a constant problem in our modern society.

Types of sound

Airborne sound

* Sound is transmitted through the air.
* The sound spreads throughout the area and is transferred to walls, ceilings, and floors.
* Only airborne sound is discernible by the ear.

Structure-borne

* ound: *Structure-borne sound is transmitted through solid objects (piping, walls, ceilings).
* The sound spreads throughout the area and is transferred to walls, ceilings, and floors.

Why does sound insulation play a role in fastening technology?

Noise from ventilation, cooling, and heating equipment is primarily generated by structure-borne sound transmission. Structure-borne sound cannot be easily remedied, most damage is irreparable. It can cause lasting physical and psychological damage.

Continuous noise pollution represents a problem which is not to be underestimated.

Why does sound insulation play a role in fastening technology?

Sound sources in a building

* Insulation. Using sound-insulating fastening technology, you can ensure that all potential sound sources are insulated from the building structure.
* For piping under high pressure (> 5 bar), install a pressure regulator.
* Dimension drainage lines properly with ventilation to avoid gurgling noises.
* Avoid 90°bends in downpipes.
* Line shafts with mineral wool (min. 30 mm)and seal installation shafts without joints.
* Use low-noise fittings (noise class I).

WHAT IS **ELECTROPLATING?**

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General information

Electroplating is a corrosion protection process for parts made predominantly of steel. The objects to be finished are coated with metal (zinc)in an electrolytic bath.

Facts and figures

* Germany has around 1500 galvanic installations.
* The person who discovered galvanic electricity was physicist Luigi Galvani.
* The largest zinc baths in Germany have a length of approx. 20 m.

The process

The workpieces are zinc plated by electricity in an electrolytic bath. This involves suspending the workpiece in the electrolyte as a cathode (-). The zinc is the anode (+), which dissolves away and is thereby applied to the cathode.

In suspension systems, the products are suspended from specially adapted frames. Immersing the product in the electrolytic bath distributes the zinc over the product uniformly.

For small steel parts, the bulk goods are loaded into metal drums and fully immersed in the bath. By rotating the metal basket, the parts are centrifuged. This is particularly important for parts with a thread.

There'smore to galvanising than meets the eye!

The various galvanising processes differ in terms of the thickness of the zinc layer and their corrosion protection-properties:

Sendzimir galvanising:

* Sendzimir galvanising (strip galvanising) is used in the area of punching & forming processes.
* The thickness of the zinc layer is in this case generally around roughly 7 - 25 µm.

Electroplating:

* Electroplating is primarily used for small parts.
* The thickness of the zinc layer is in this case generally around roughly 5 - 25 µm.

Hot-dip galvanising:

* Hot-dip galvanising is primarily used for outdoor applications.
* The thickness of the zinc layer is in this case generally around roughly 50 - 100 µm.

Special galvanising:

* There are also other galvanising processes, for example zinc spraying or zinc flake coating.

Environment

Galvanising contributes to the avoidance of corrosion damage, and consequently extends the durability of the products.

The most important task of a well-managed electroplating shop is to handle raw materials, water, and energy in such a way that resources are conserved, waste minimised, and risks to the environment avoided.

Our in-house electroplating shop is a pioneer in this area.

WHAT IS **CORROSION?**

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General information

The term corrosion means the destruction of metals by the reaction of a material with its surroundings.

Facts and figures

* Each year in Germany, damage in the value of some €100B is caused by corrosion.
* A rust film can be deposited on untreated steel within hours.

How is rust produced?

Rust occurs primarily on iron or steel surfaces by oxidation with oxygen in the presence of electrolytes (e.g. water). The formation of rust is also accelerated by the presence of salts, as they increase the conductivity of the water.

Slight traces of rust can be washed off with diluted phosphoric acid (for example). Heavily rusted materials can be cleaned of rust by methods including brushing,grinding, or sandblasting.

Types of corrosion

Corrosion can occur in different forms:

Erosive corrosion: The surface is attacked and removed uniformly.

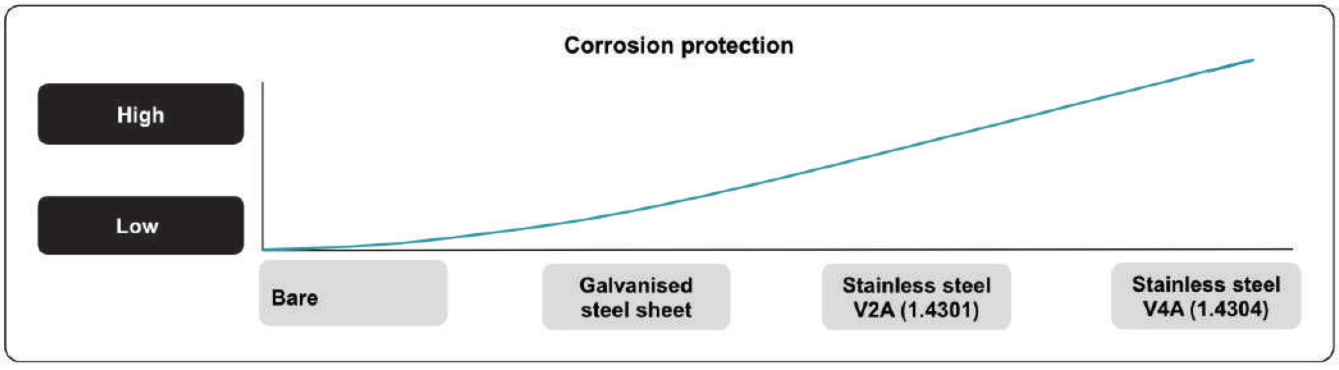
Pitting corrosion: The passive layer on the surface is destroyed selectively. Due to the progressive removal of material, holes appear in the base material.

Stress corrosion: Stress cracks in the material grow as a result of the accumulation of aggressive media in the crack.

Contact corrosion: Occurs due to direct contact between noble and base metals in conjunction with an electrolyte (moisture). If steel (for example)– a base metal – comes into direct contact with stainless steel – a noble metal – the steel is corroded more quickly in combination with moisture.

Corrosion protection

Corrosion protection describes all measures to protect materials and components from corrosion. Absolute corrosion resistance of steel cannot be achieved. In this case, the objective is to reduce the speed of corrosive attack sufficiently to avoid damage to the component during its service life.



Units and conversion factors

1. SI units

In accordance with the German units of measurement law (EinhZeitG), only SI units (système international) may be used for official and commercial purposes.

There follows a list of the most common SI units prescribed by law.

Basic units		
Basic parameter	Base unit	Symbol
Length	Metre	m
Mass	Kilogram	kg
Time	Second	s
Temperature	Kelvin	K
Current	Ampere	A

Derived units	
Physical variables	Designation
Force	N (newton)
Energy, work	J (joule)
Pressure	Pa (pascal)
Area	m^2
Volume	m^3

2. Conversion factors

Lengths				
Units	m	dm	cm	mm
Metre [m]	1	10	100	1.000
Mass				
Units	t	kg	g	mg
Kilogram [kg]	0,001	1	1.000	1.000.000
Force				
Units	1 N*	10 N	100 N	1,000 N
Metre [m]	0,1	1	10	100

*1 N = 9.81 kg

3. Symbols and their meaning

Symbol	**Meaning**
ΔT	Temperature difference between jet and jet path
ΔL	Linear expansion
dm	Decimetre
cm	Centimetre
mm	Millimetre
t	Tonne
g	Gram
mg	Milligram
N	Newton