Additional sealing using Gel

Curtain injection / Masonri injection • Injection of movement joints • Element walls

Referent: Bernd Kress / DESOI GmbH

Structure

Preliminary remarks on the injection process

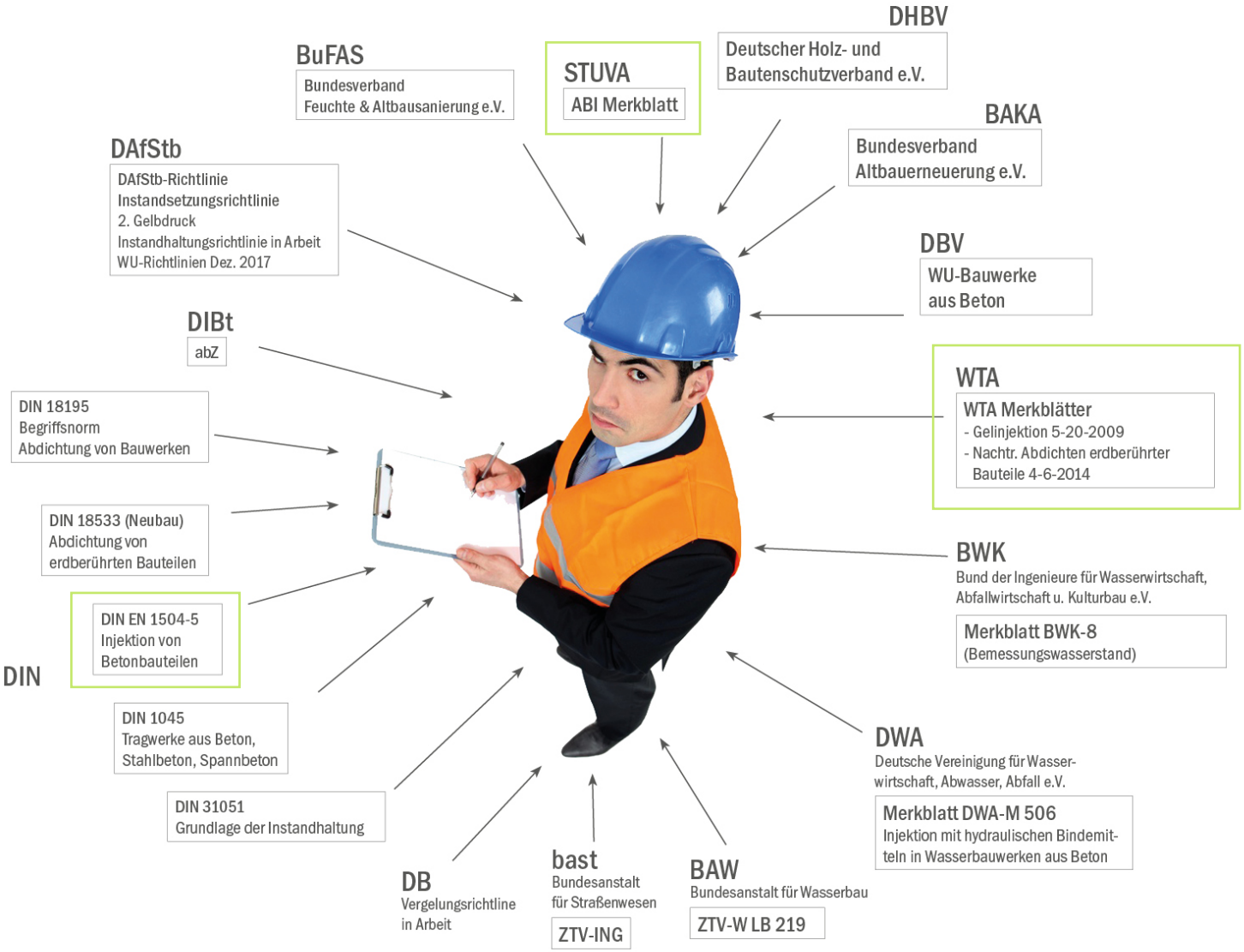
Technical advice
Norms, rules
Planning principles

Brief information on construction chemicals
Process for subsequent building waterproofing

Main features
Injection devices
Injection packer

Requirements injection success + documentation

Here are some German Regulations



Curtain injection/Surface injection

Preliminary remarks

- Subsequent sealing of structures from the inside
- Knowledge of the causes is a requirement for success
- Construction chemicals (gels) require a general building authority approval (AbZ) from DIBt.(German Institute for Construction engineering)

Planning principles

- Alternative sealing options must always be checked (e.g. exposure of the sealing layer and installation of bituminous materials)
- Professional gelling is not possible without an investigation of the subsoil
- Not everything that is called gel is suitable for gelling in the subsoil

Technical information

German Institute for Building Technology (DIBt)

- General building authority approval (abZ) for building materials

WTA leaflet gel injection 5-20

- Scientific-Technical Working Group for Building conservation and monument preservation e.V.

STUVA ABI leaflet

- Sealing of structures by injection,

  Annex III: Self-monitoring test plan - checklist

Technical information

The following must be documented by the person carrying out the work in accordance with WTA, DIBT and STUVA:

- Which material was used?
- How was it processed?
- What quantity was installed?
- Has the mixing ratio been adhered to?
- What pressure was used to inject?

Note

This documentation is part of the compensation.

The lower water authority requests this if necessary.

The documentation is used for your own quality control.

Recommendations for planning engineer

- Determination of leaks and their actions
- Investigation of causes
- Determination of water stress and Constructive boundery conditions

For preliminary examinations see also WTA leaflets

Planning of the subsequent sealing including the selection of possible repair methods and materials

Determination of the design water level

Tendering and monitoring of subsequent sealing

Design water level

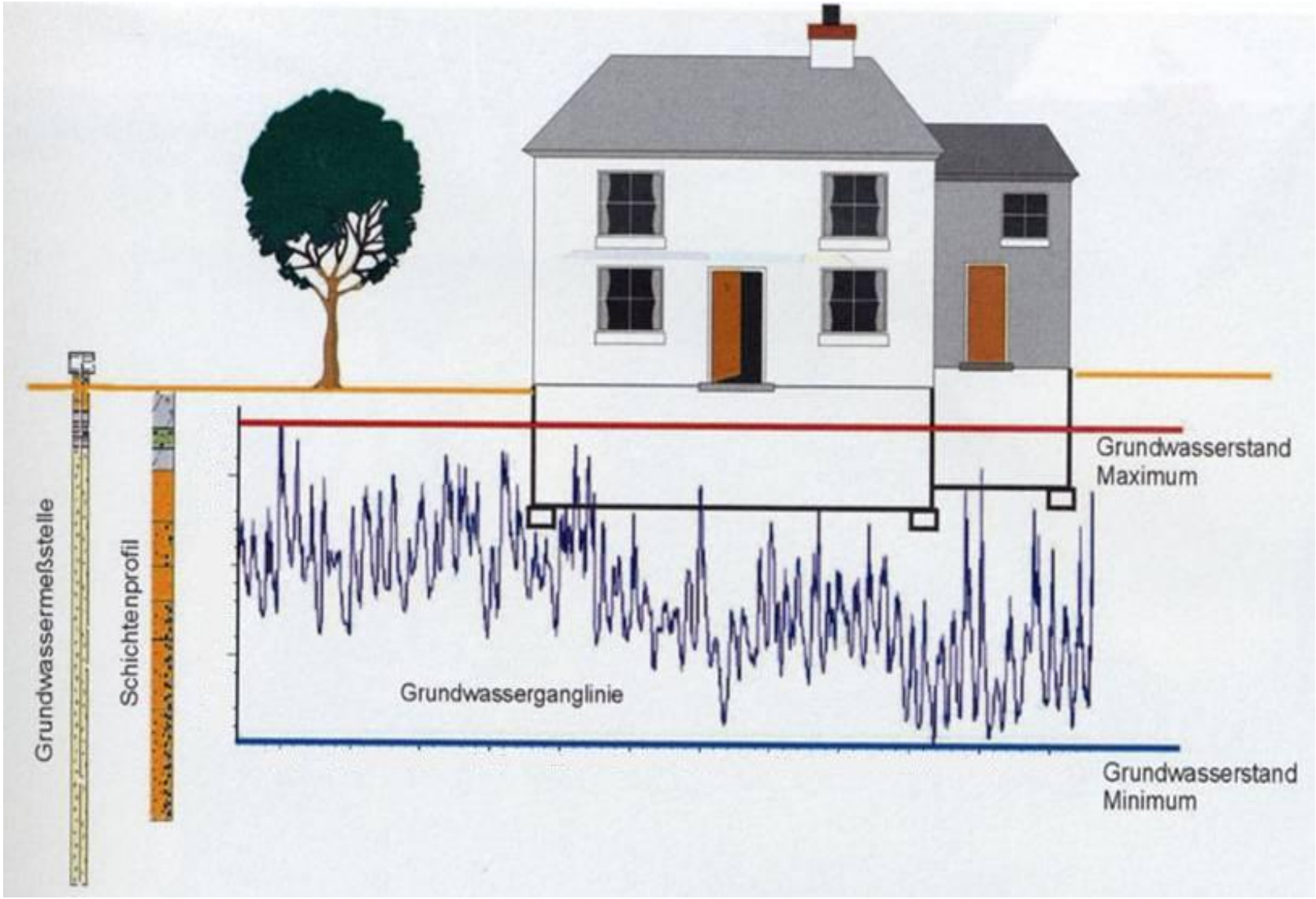
BWK (Association of Engineers for Water Management, Waste Management and Cultivation)

Leaflet M8 dated September 2009

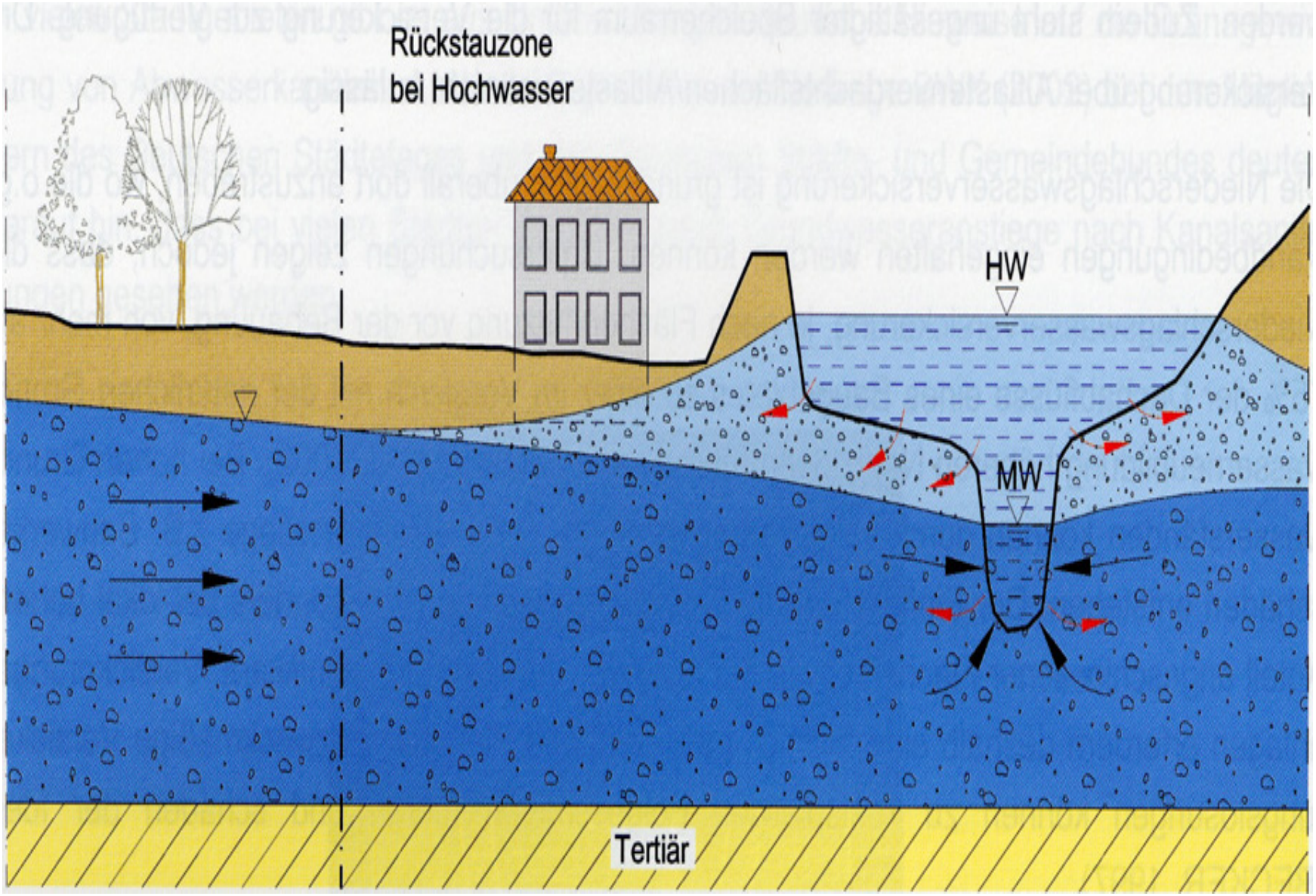
"Determination of the design groundwater level for building waterproofing"

"... the design water level is the groundwater level, which can set depending on the weather ..."

Design water level for building waterproofing



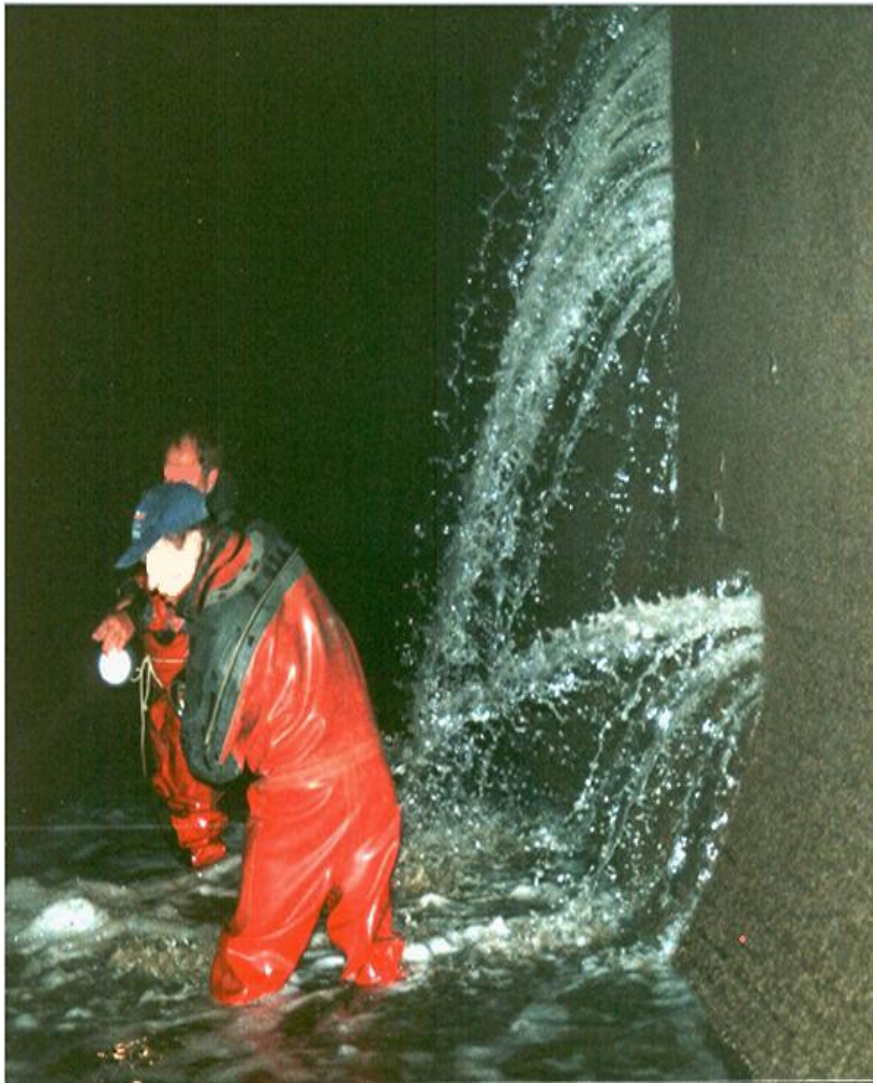
Design water level for building waterproofing



Reasons for subsequent sealing

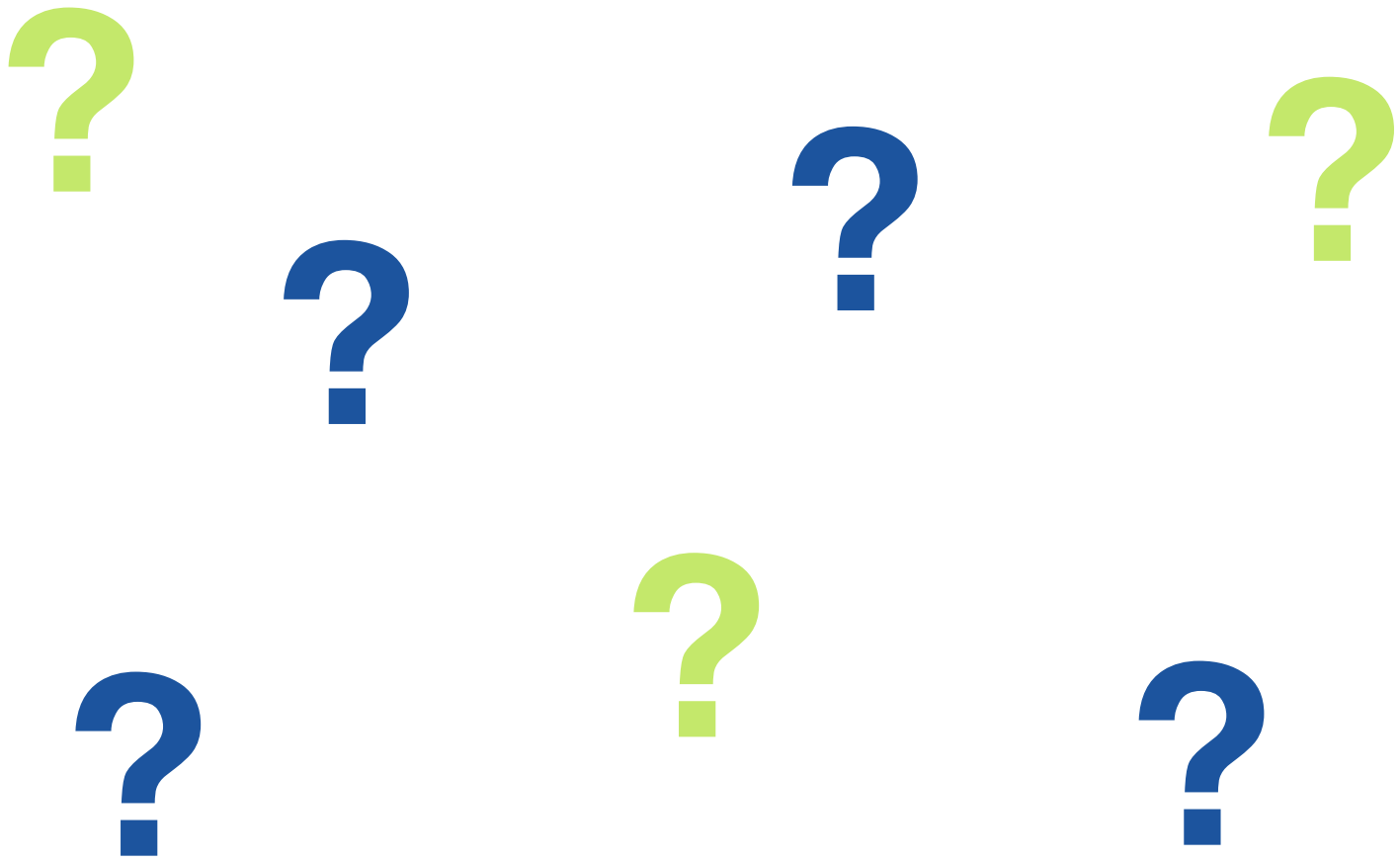
Leaks e.g. as a consequence of:

- Planning or execution errors
- Incorrect assumption of the design water level
- Savings for "cost reasons" e.g. soil appraisals

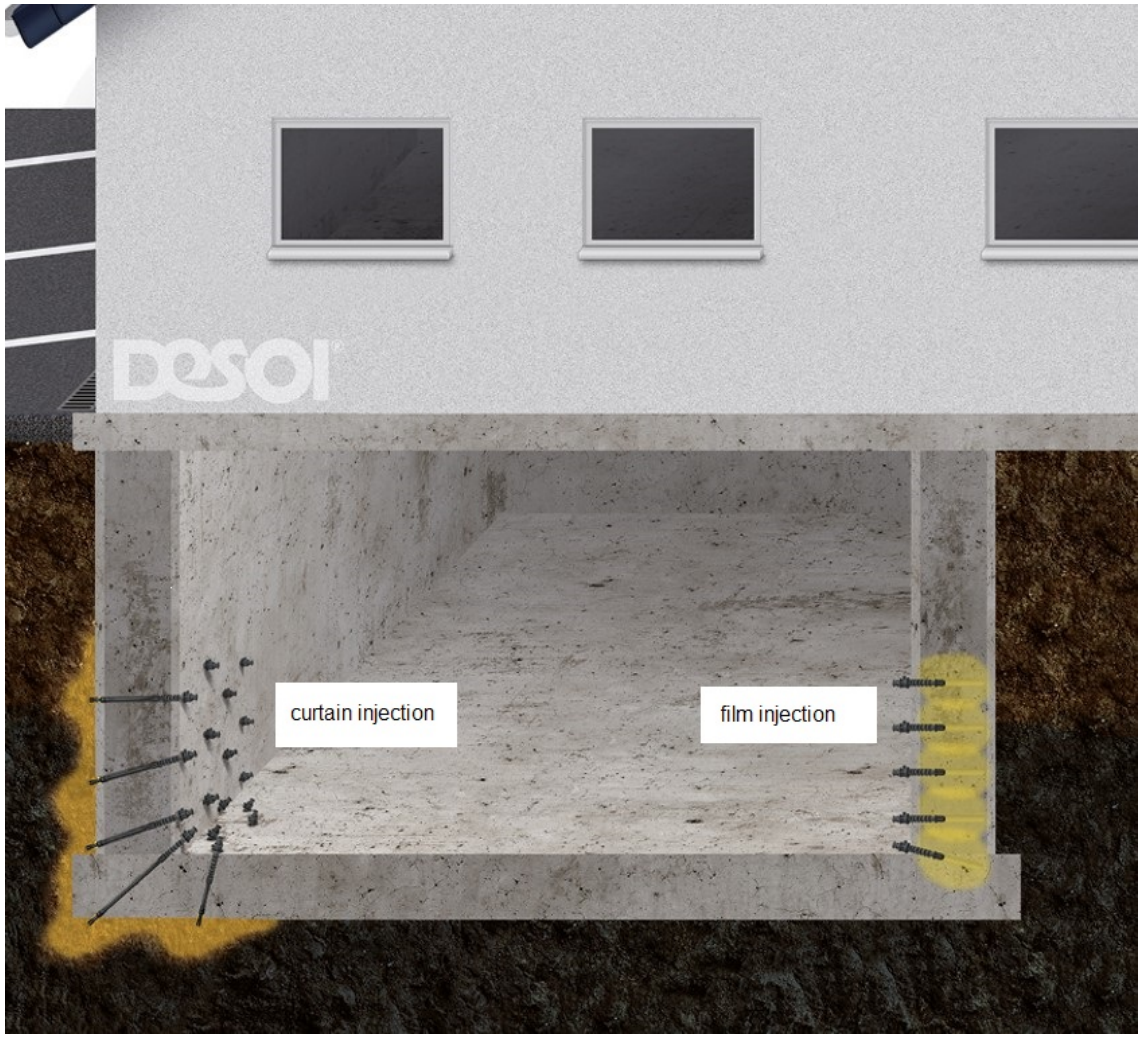


Answer fundamental questions

- Is a conventional seal e.g. .Black sealing possible?
- other alternatives
- Why does sealing using gelation technology tend to be more successful?
- What is the current situation?
- How is the goal defined?



Curtain and surface injection – residential construction



Curtain injection / Masonry injection
civil engineering

Curtain injection

Aims

- Creation of a continuous sealing layer in the component (masonry)
- Backfilling of water-accessible transport routes
  - Bed joints in the masonry
  - Cracks
  - Cavitie

Execution

- Flat vertical sealing
- Sealing of wall-sole connections

Injection material

acrylate gels

Injection target

Sealing of structures in contact with or covered in soil from the inside out by filling cavities, joints and capillary flow paths in the structure

Curtain injection

Application limits specified by the subsoil

Design water level (BWS) is always to be considered.

Sealing on the outside

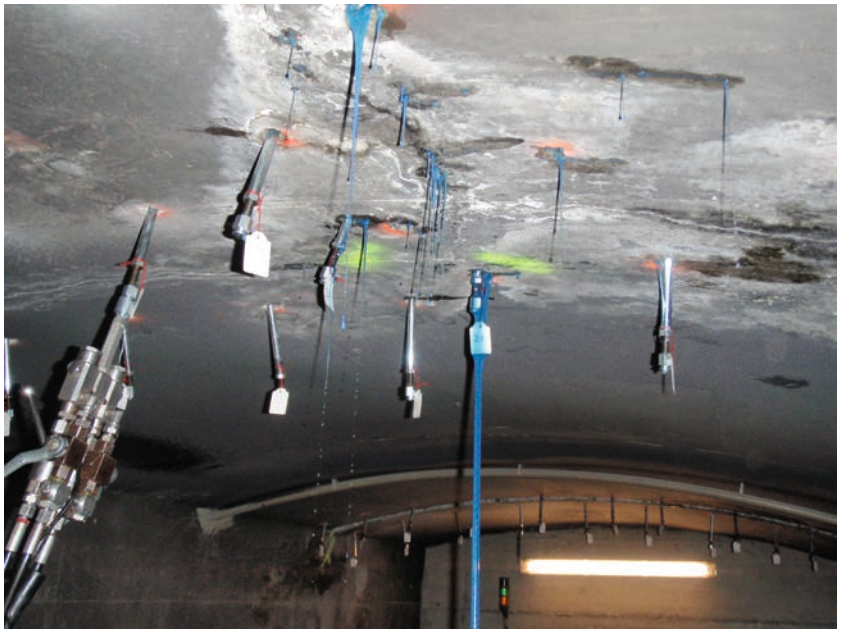
from the Building

Injection target

Concealment of the structure or parts of structures
by injection of acrylate gels

Curtain injection in tunnel

Melide Tunnel, Tessin, Swiss

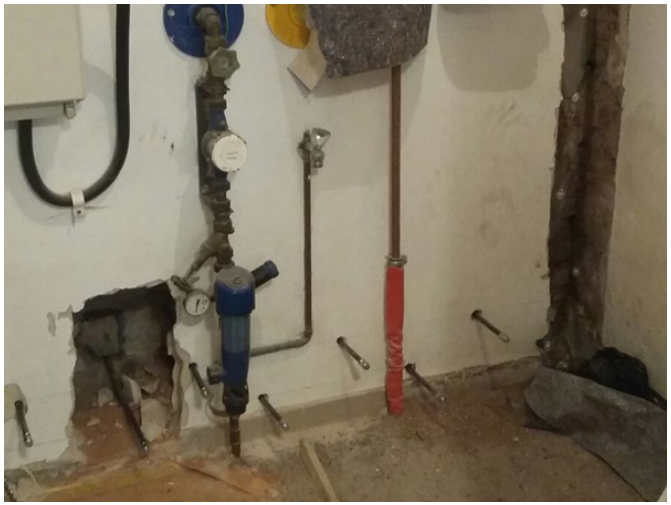


Object example -
Curtain injection historical masonry

Bad Homburg - Billiard Coffee

Quelle: KÖSTER BAUCHEMIE AG

Bremen - residential building



Quelle: KÖSTER BAUCHEMIE AG

Hessian State Museum Kassel

Curtain injection in the area in contact with the ground

Basement waterproofing in existing building

Curtain injection / Basement waterproofing

Curtain injection / Basement waterproofing

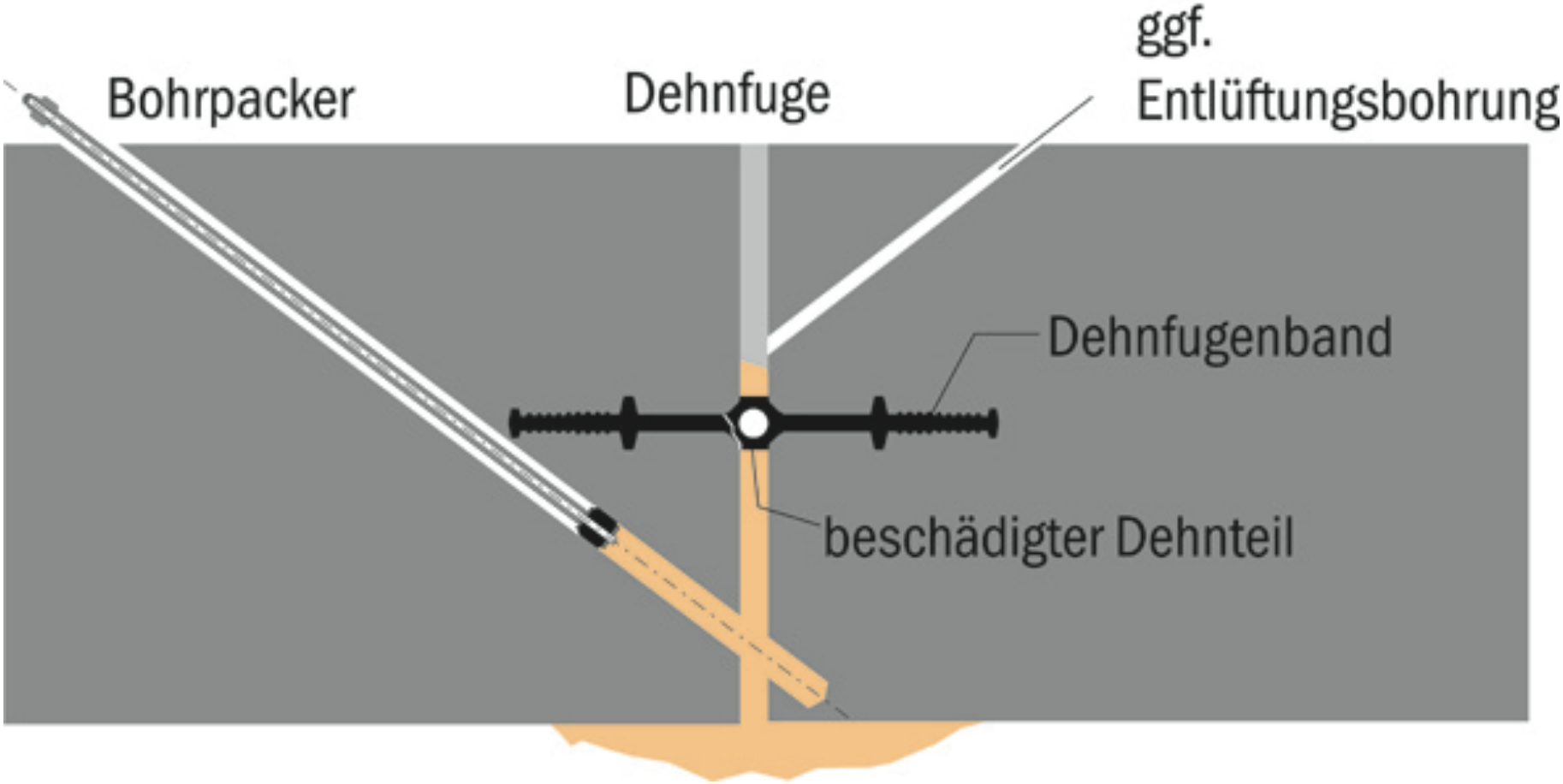
Object examples

Object examples

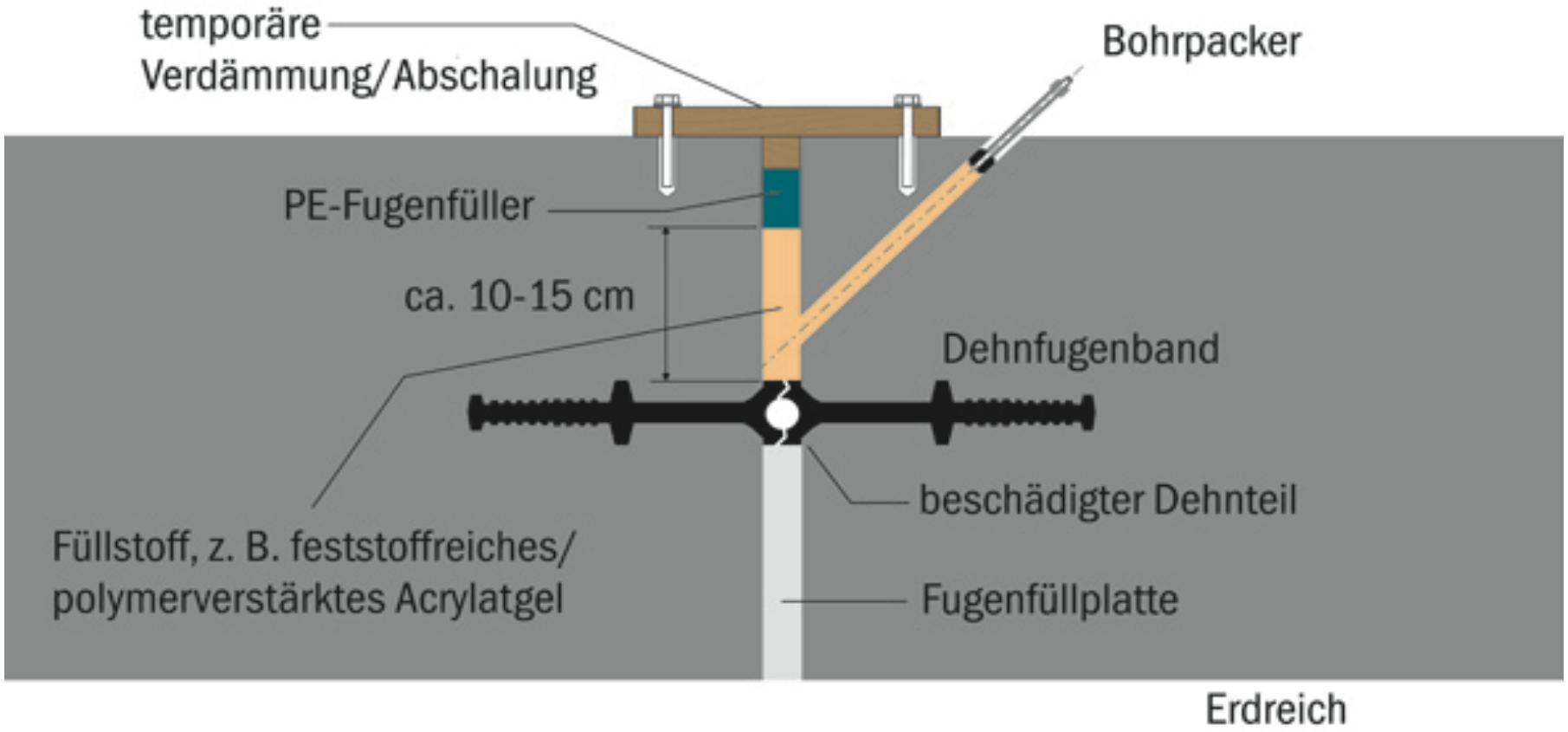
Video

You can find the video on our website at **www.desoi.de/catalog/de/service/mediathek/videos/**

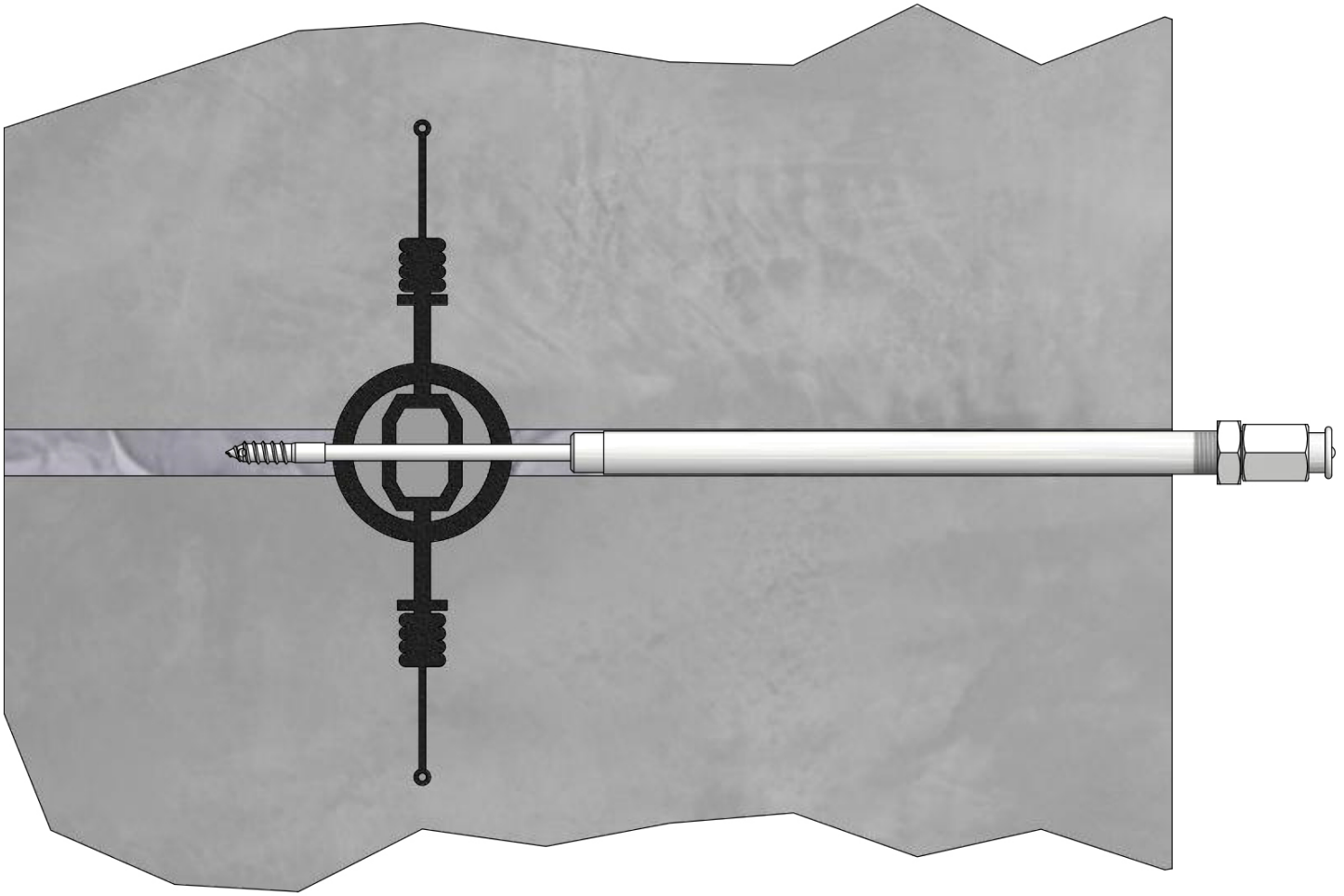
Joint sealing



Joint sealing



Joint sealing

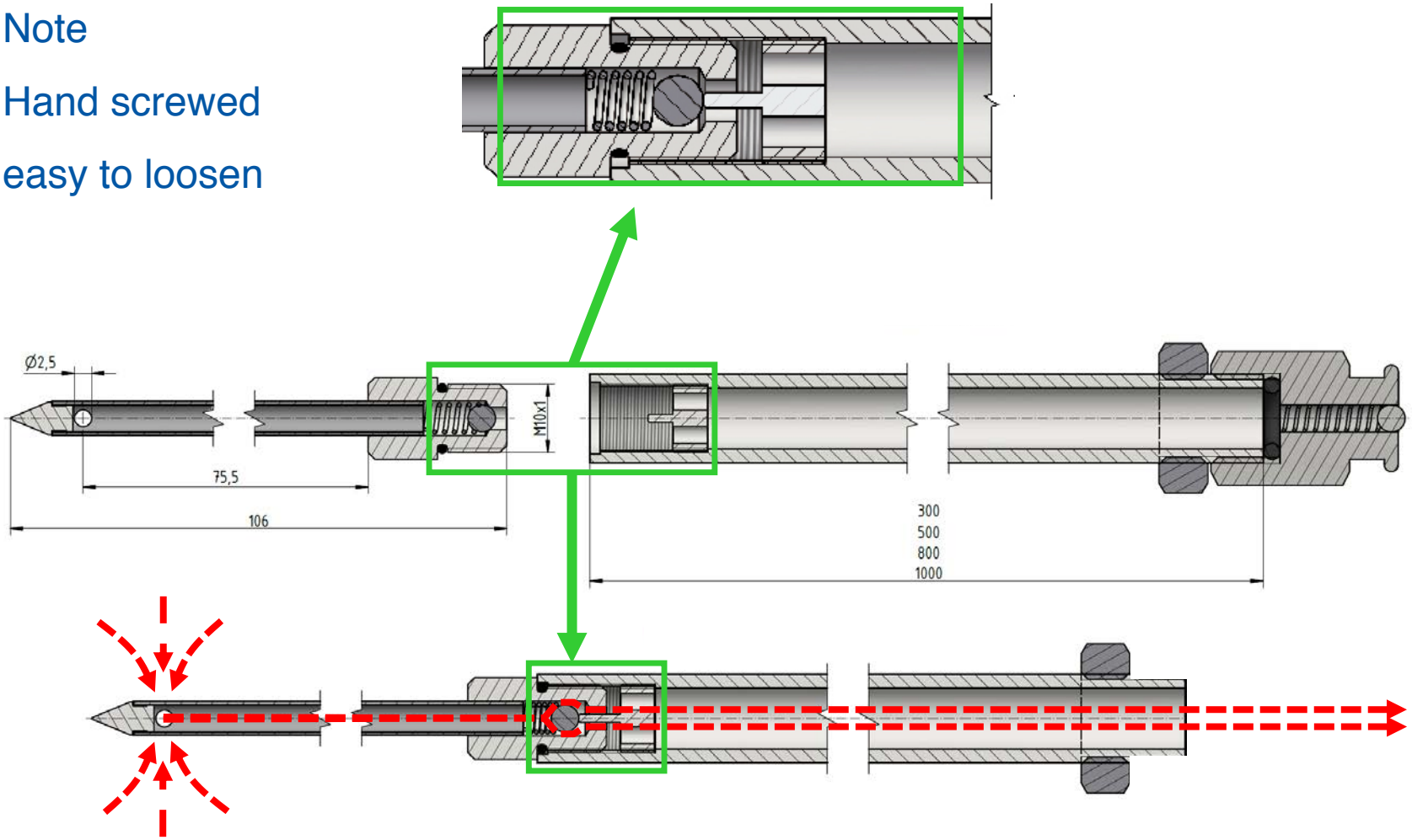


Joint sealing

Note

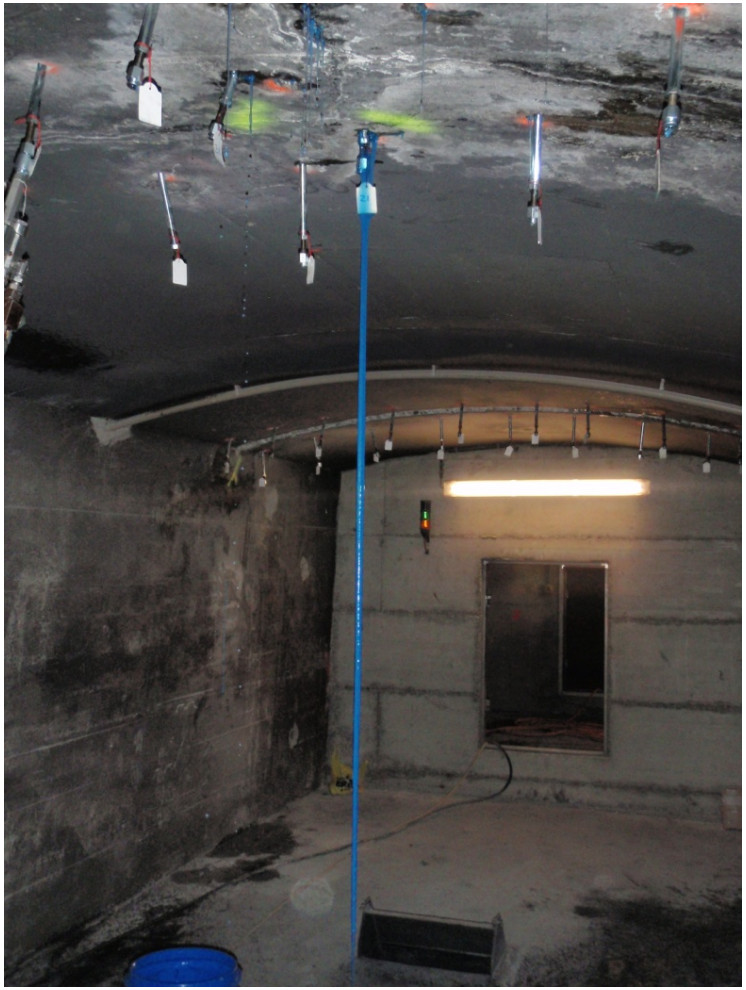
Hand screwed

easy to loosen



Object example - injection drill needle

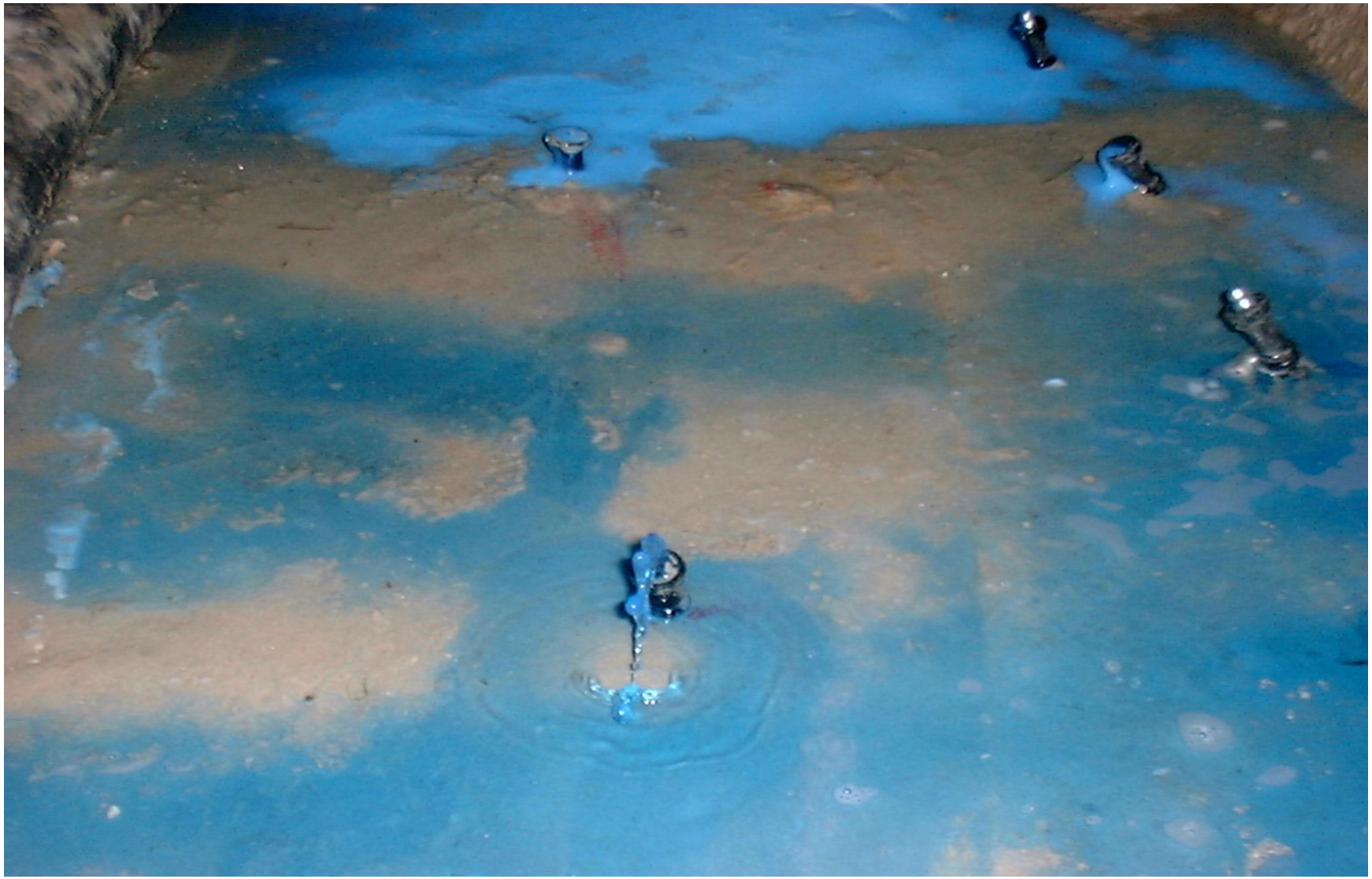
Object example



Packer installed

Curtain ijnection

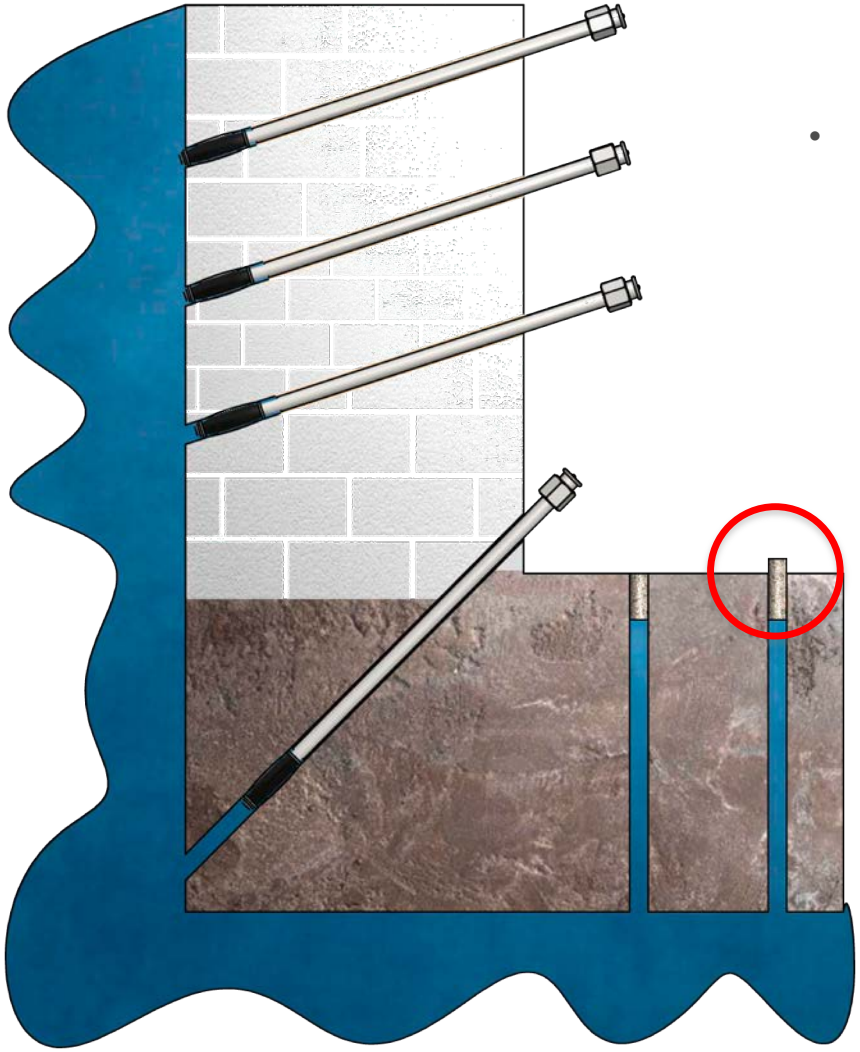
“Packer contact”



Practical tips

Quelle: V-Tech Münster

Closing drilling channels ...



- The mineral material can squeeze out when the gel swells.

Testing of the area injection system

Injection control tests (filling)

Determination of:

- Completeness
- Liquid tightness
- Force fit
- the filling

Note based on ZTV-ING:

The completeness of the filling is proven,

if drill cores with a filling level of at least

80% are filled - (ZTV-ING part 3 page 7)

Video

You can find the video on our website at **www.desoi.de/catalog/de/service/mediathek/videos/**

Subsequent basement waterproofing: Does the lightning rod still work?

- What is a foundation earth electrode?
- The electrical protection system works as long as the outer walls are in direct contact with the ground
- As well as sufficient "earth moisture" is available

Blitz planner

According to DIN 18014: 2014-3, foundation earth electrodes are located under waterproof basements under the building floor in the ground - up to 80 centimeters in buildings with no basement.

Recommendation: **www.dehn.de**

Injection Packer

- General requirements
- Compatibility of the materials with the fillers used
- Reliable fastening in the component with the process-related injection pressures
- Corrosion resistance of parts remaining in the component
- Cross-section adapted to the delivery rate and flow properties of the product

Packer to inject gel

Steel Packer Gel

End piece with 4 holes ø 5 mm

Plastic Packer

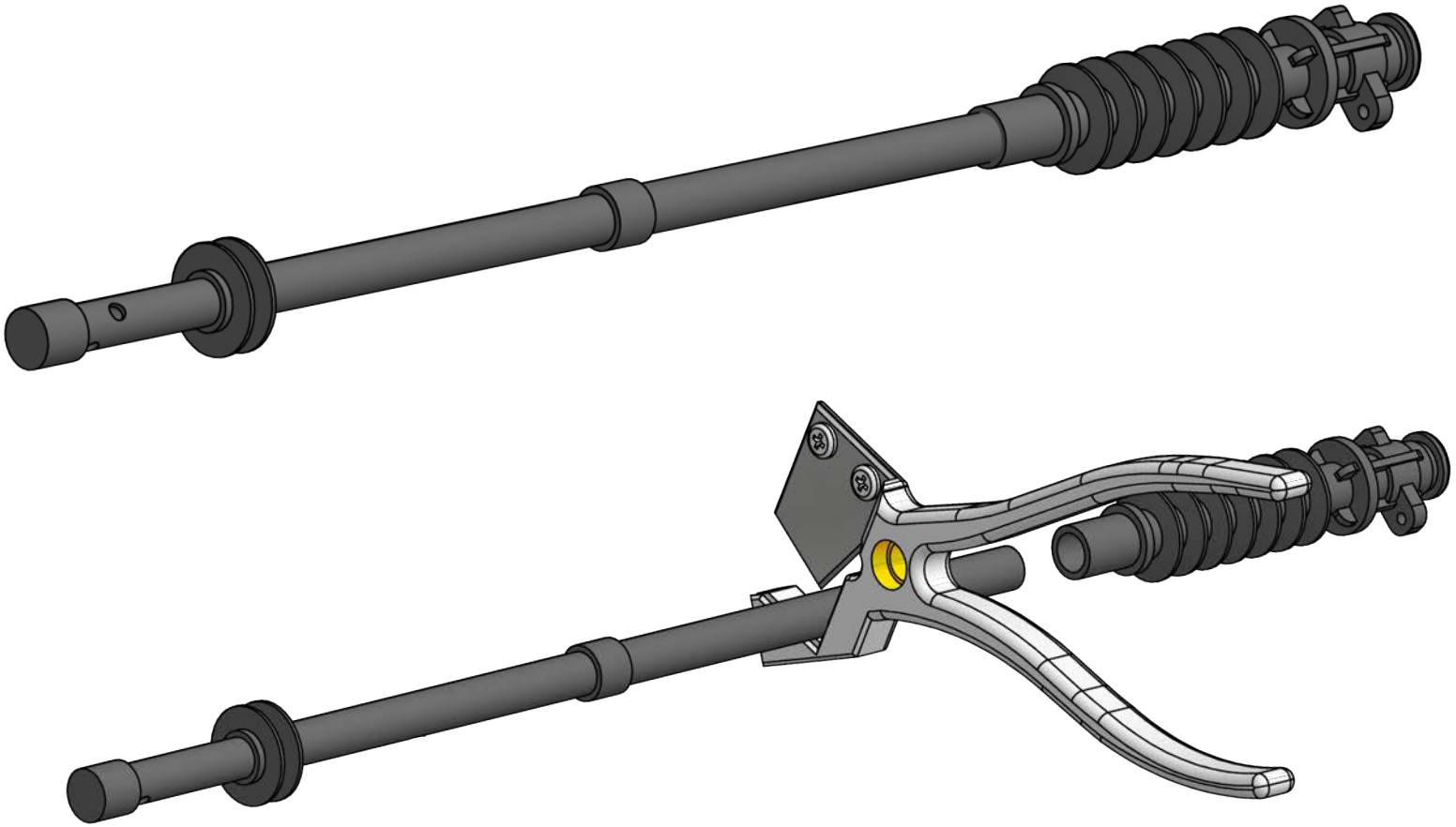
Lamella drive in Packer Ø18

End piece

Extention

Lamella drive in Packer Set

Variable extension -
from construction experience



Steel Packer with quick acting tommy nut and shut off piece

Steel packer with nut and shut-off piece

Locking tappet with shut-off slide

Quick snap

Injection Devices - Main Features

- Easy to use, easy to check functionality
- High immunity against wrong handling
- Adjustable or limited pressure, depending on the product
- Easy cleaning and maintenance
- High dosing accuracy
- Low susceptibility to incorrect operation
- Control technology with warning or shutdown in the event of mixed errors (DESOI w.i.l.m.a.)

Injection machine – Two component

2C-machine with cleaning pump

DESOI AirPower S25-3C

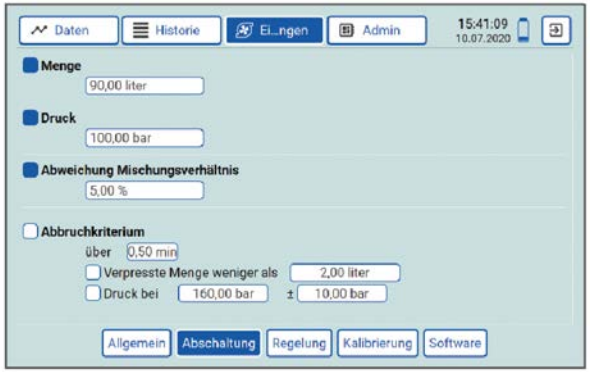
Injection device – Mixing head

Mixing head – Stainless steel

Injection machine – control device

DESOI w.i.l.m.a. - AY

DESOI w.i.l.m.a. - Tablet



DESOI w.i.l.m.a. - Tablet

Injection success

- Adhere to planning principles
- Define material parameters
- Select injection method
- Select machines and packers
- Monitoring of the given parameters
- Final control and documentation

Good Luck!