

Diseño y producción de tubos de hormigón armado con elevados estándares de calidad utilizando el ejemplo del Proyecto TIBITOC



COMPETENCE

Gollwitzer GmbH & Co.KG

Pipe Factory since 1966

national

- Production of reinforced concrete pipes
- Jacking pipes from ID 300 - ID 3500
 - long seniority
- Delivery throughout Europe
- Pipe weight from 500kg up to 50tons
- between 150 - 200 projects per year

Gollwitzer GmbH

Pipes and Shaft Technology

since 2004

international

- Consulting, Engineering, Design & Construction, Supervising
 - Joint Venture
- Know-how transfer & technical assistance
 - Static calculation
- Sale of production equipment
 - Sale of consumables
 - Temporal-Field factory

Consulting

Designing

Engineering

Know-how and technology transfer

Technical specification

Joint Venture

Technical assistance with development, manufacturing and installation

Static calculation of the pipes

Employee training

Support in the start-up phase

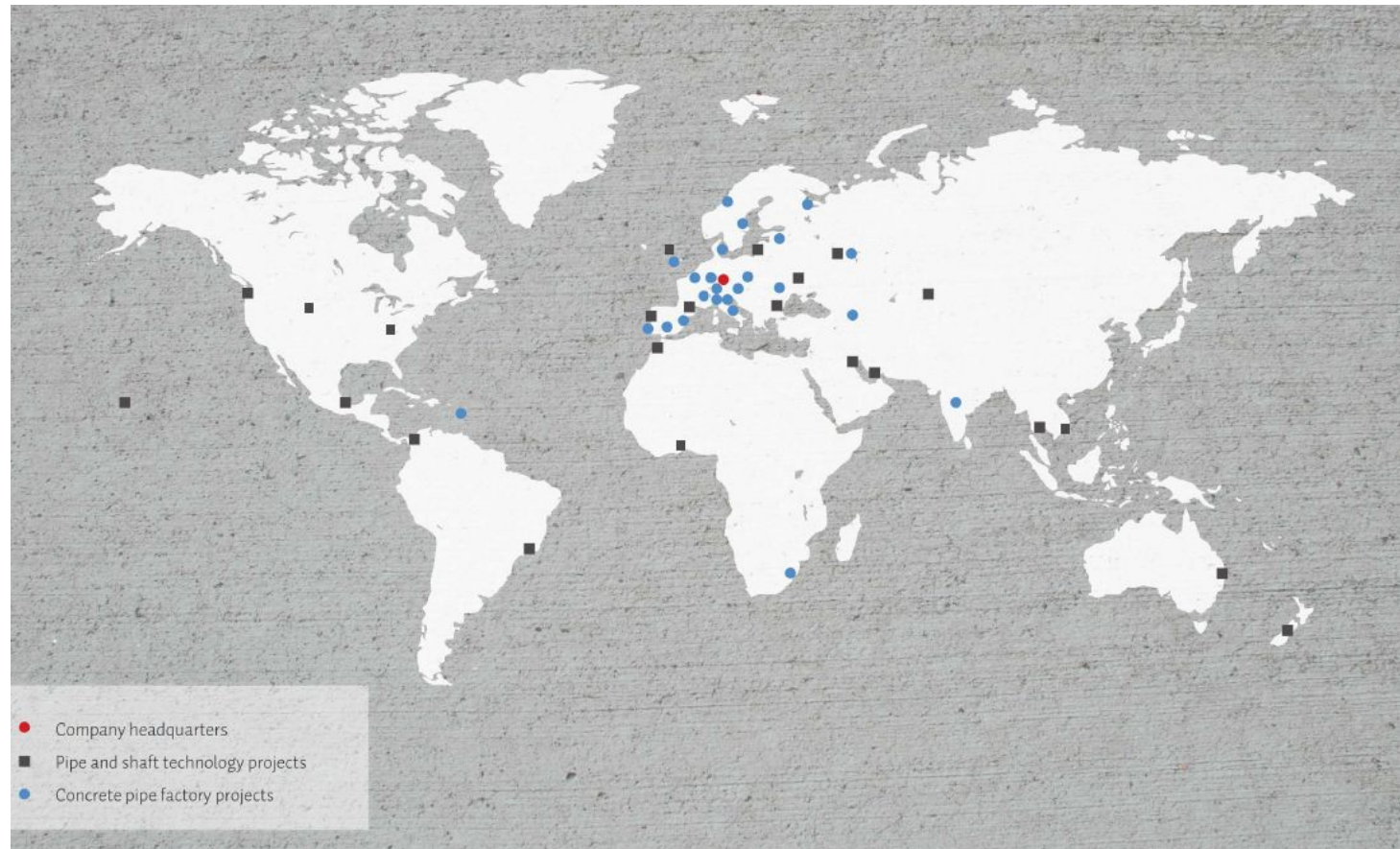
Supervising production

Quality control

Factory planning

Procurement of the means of production

Bavaria discovering the world



Requirements through standards and regulations

Requirements inside the EU - EN 1916

German requirements / standards

Standard

- DIN
1201
1610

Requirements of professional associations

DWA
- A 125
- A 161
- A 127

Other requirements

Builder
(ZTV)

Producer
(FBS)

National requirements other countries

app.
- BS 5911
- SIA 195

Requirements outside the EU

app.
- ASTM
C 76
C361
C497
- AWWA
C361
C302
ASCE 27-40

Requirements of planning

contruction conditions

e.g.

- topology
- Trassierung
- geology
- chemichal attack (outside)
- pressure (traffic)
- dimension (profile)
- etc.

usage conditions

e.g.

- chemical attack (inside)
- load (pressure inside)
- useful life
- etc.

DWA A125 - General requirements for pipes

requirements for jacking pipe:

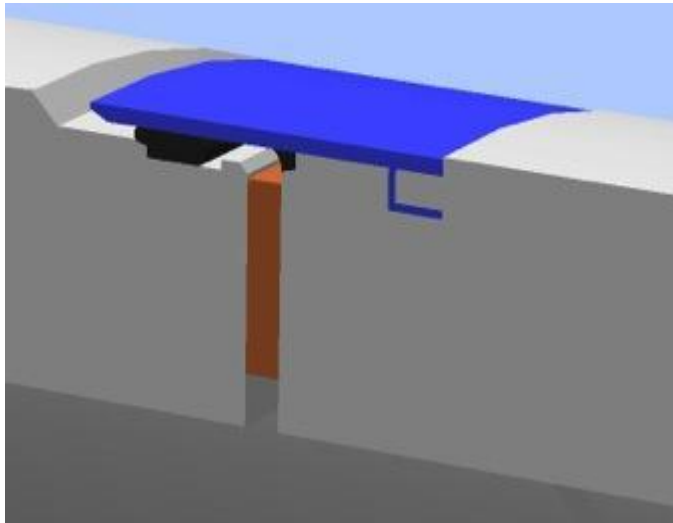
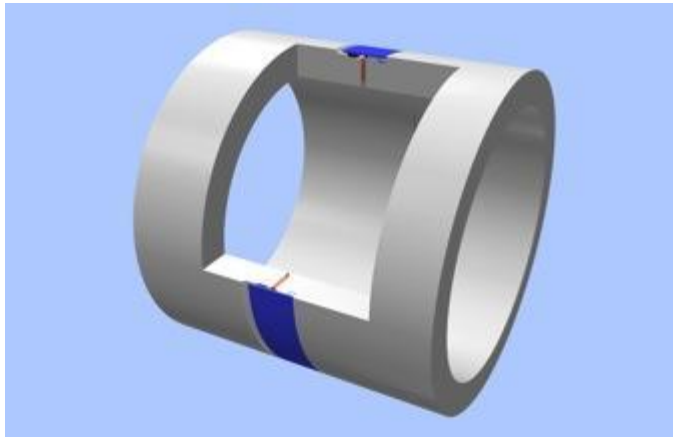
- measurement ID and OD, construction length, wall thickness
- rectangularity and parallelsim of the face
- deviation of the line
- equality of the bed form
- evenness of the surface (pore formation)

Requirements for pipe connections:

- Impermaeabilitiy of the connection
- bending
- transfer of longitudinal and shearing forces

Design and material selection of pipe connections:

- guide ring
- seal and pressure transfer
- anti-roll pin, joint sealing, tight-connection
- intermediate jacking station



5.1 Tolerances Outer diameter

Table 4: Permissible deviation from the maximum external pipe diameter in [mm]

DN	All materials ¹⁾ except for concrete, reinforced concrete, steel fibre concrete and vitrified clay	Concrete reinforced concrete steel fibre concrete	Vitrified clay
≤ 300	+ 0 - 10	+ 0 - 8	+ 0 - 10
400			+ 0 - 12
500			+ 0 - 15
600	+ 0 - 18		
700/ 800	+ 0 - 24		
900/ 1000	+ 0 - 30		
> 1000 ≤ 2800	+ 0 - 16	+ 0 - 14	+ 0 - 36
> 2800	+ 0 - 24	+ 0 - 20	—

NOTE:

1) For steel pipes, DIN 2460, DIN EN 10208-1, DIN EN 10208-2, DIN EN 10216-1, DIN EN 10217-1 and DIN EN 10224 apply in addition. The layer thickness of coatings and jacketings shall be observed in addition.

5.2 Acceptable tolerance in the deviation of rectangularity in

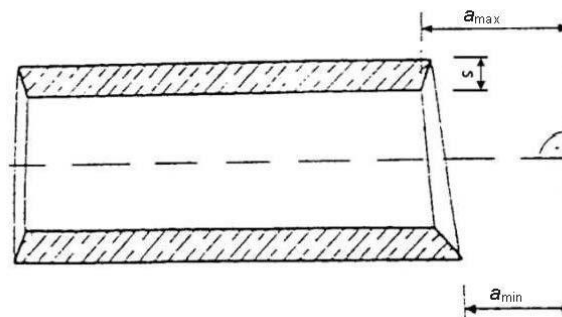


Table 2: Permissible deviation from squareness in [mm]

DN	Concrete, reinforced concrete, steel fibre - concrete	Vitrified clay	Steel	Cast iron (ductile)	GRP (UP-GF)	Polymer-concrete	PE, PP, PVC-U
≤ 300	4.0	1.0	1.6	1.0	1.0	1.0	1.0
> 300 ≤ 1000	6.0	1.0	1.6	2.0	1.0	1.5	2.0
> 1000 ≤ 2800	8.0	1.0	1.6	3.0	1.0	3.0	—
> 2800	10.0	—	—	—	—	—	—

5.4 Tolerance in Rectangularity

Socket and spigot joints shall be leaktight in accordance with Clause 5.3.3.1 under the maximum permissible deflection (max a) in accordance with Table 5, taking into account the permissible tolerances listed in Table 2.

Table 5: Deflection in [mm] per [m] pipe length

DN	max. deflection max a
≤ 200	25
> 200 to ≤ 0500	15
> 500 to ≤ 2000	10
> 2000 to < 2800	7
> 2800	5

The values in Table 5 should not be understood as information on permissible deviations for the jacking and steering process (see also Clause 5.3.4). The determination of the deflection a is shown in Figure 2.

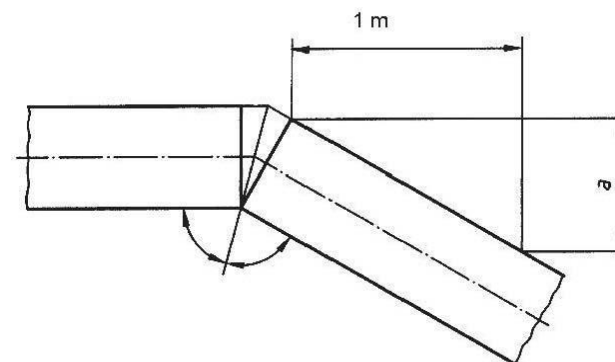
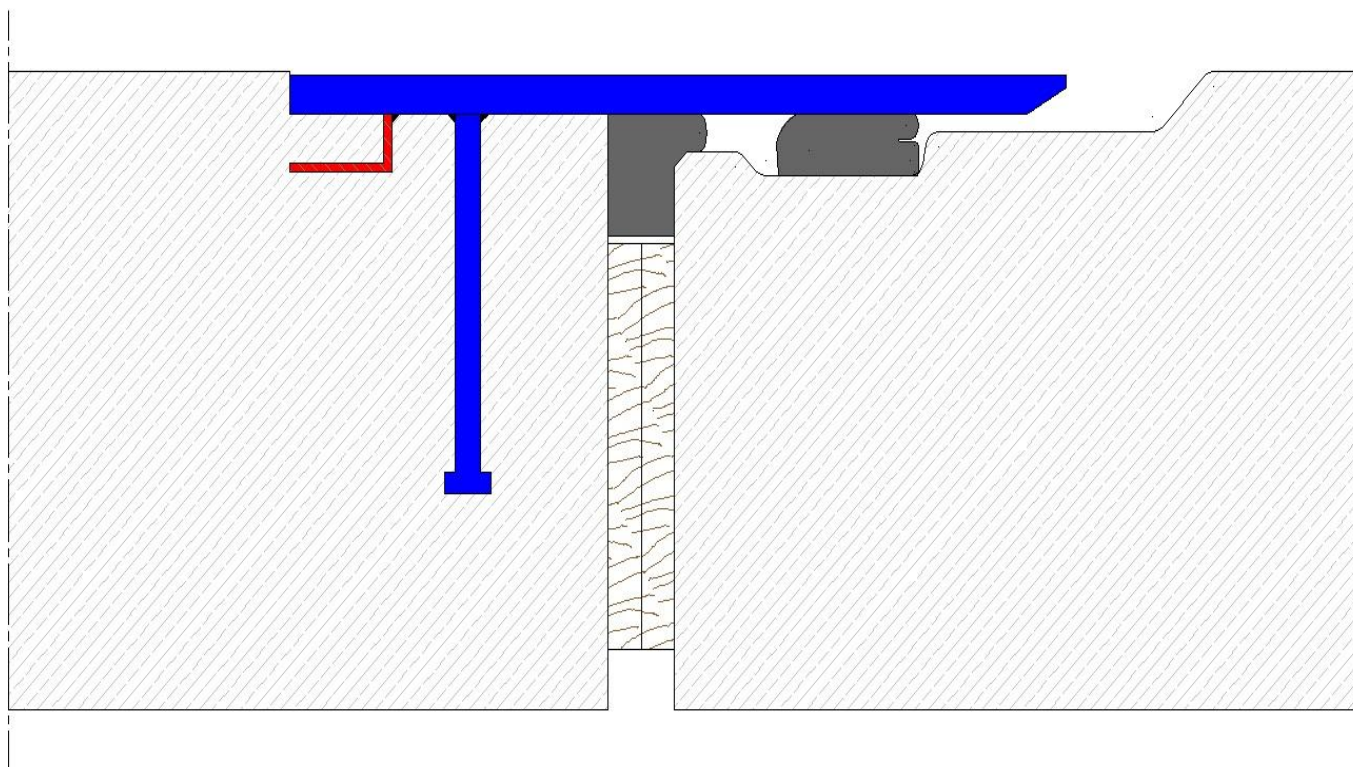
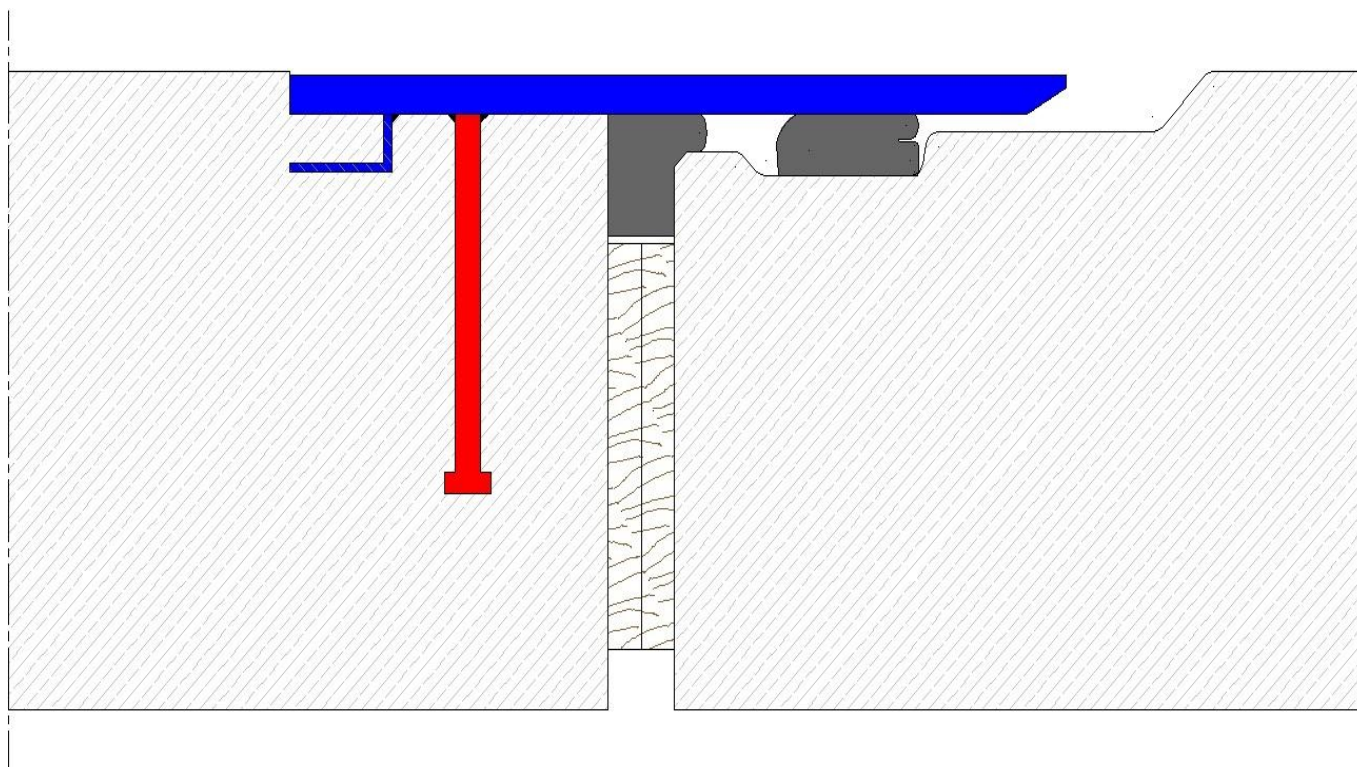


Figure 2: Angular deflection a of the pipe joint

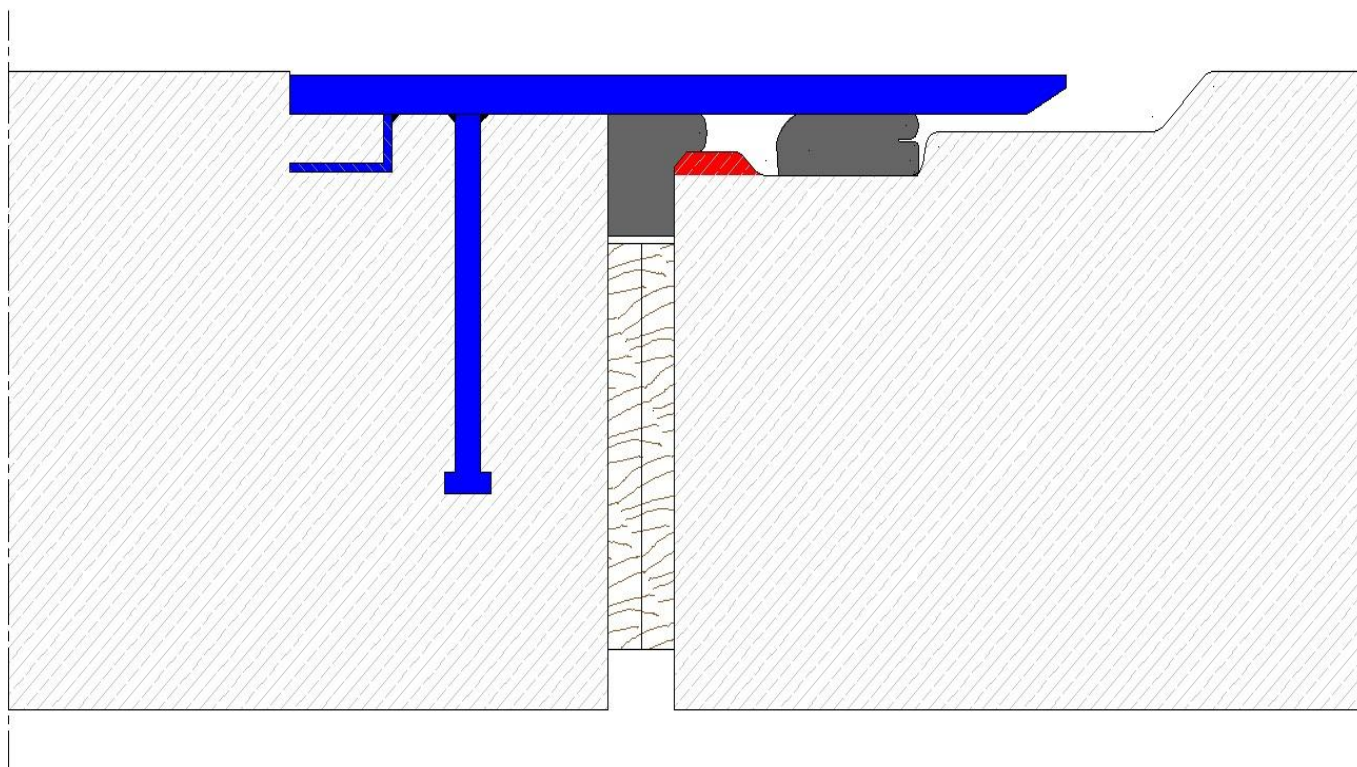
Pipes connecting – Detail 1



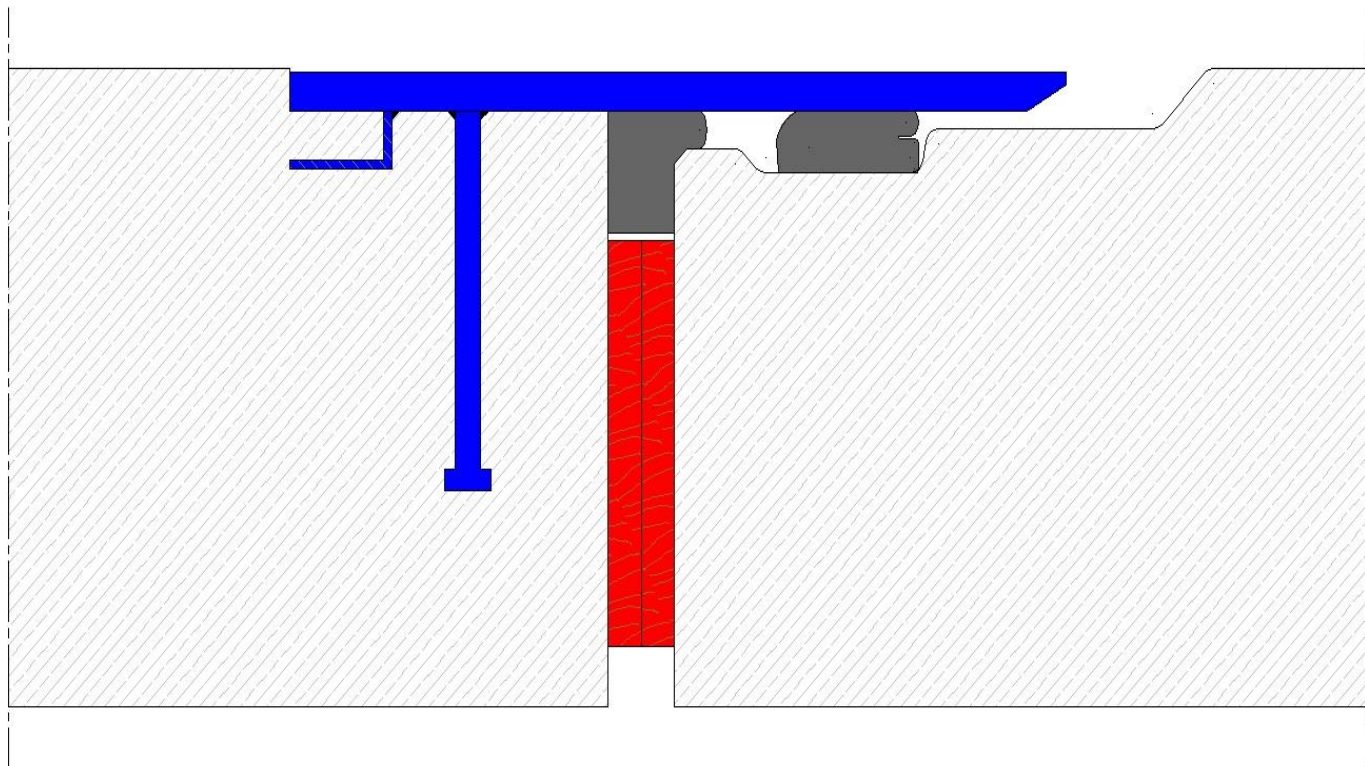
Pipes connecting – Detail 2



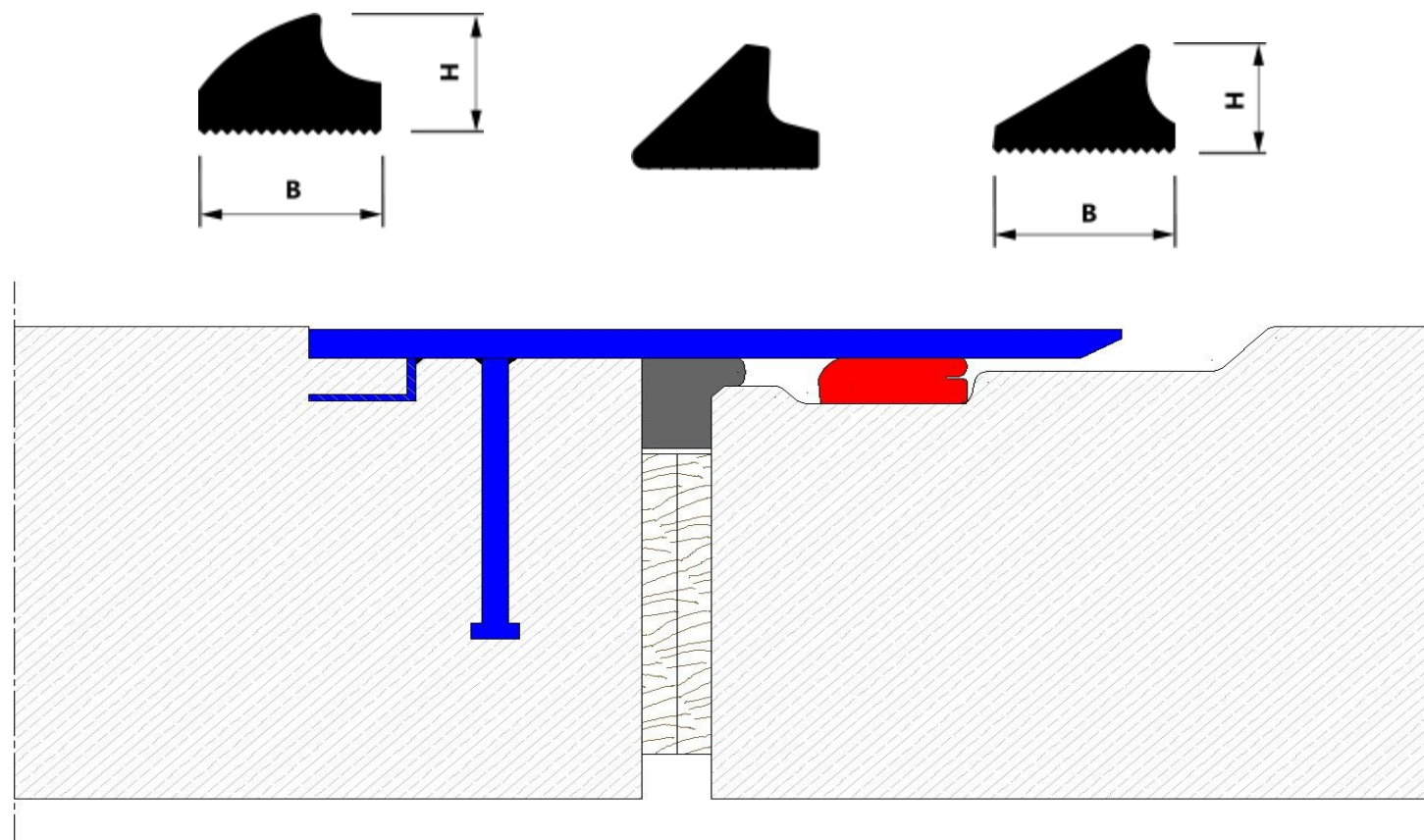
Pipes connecting – Detail 3



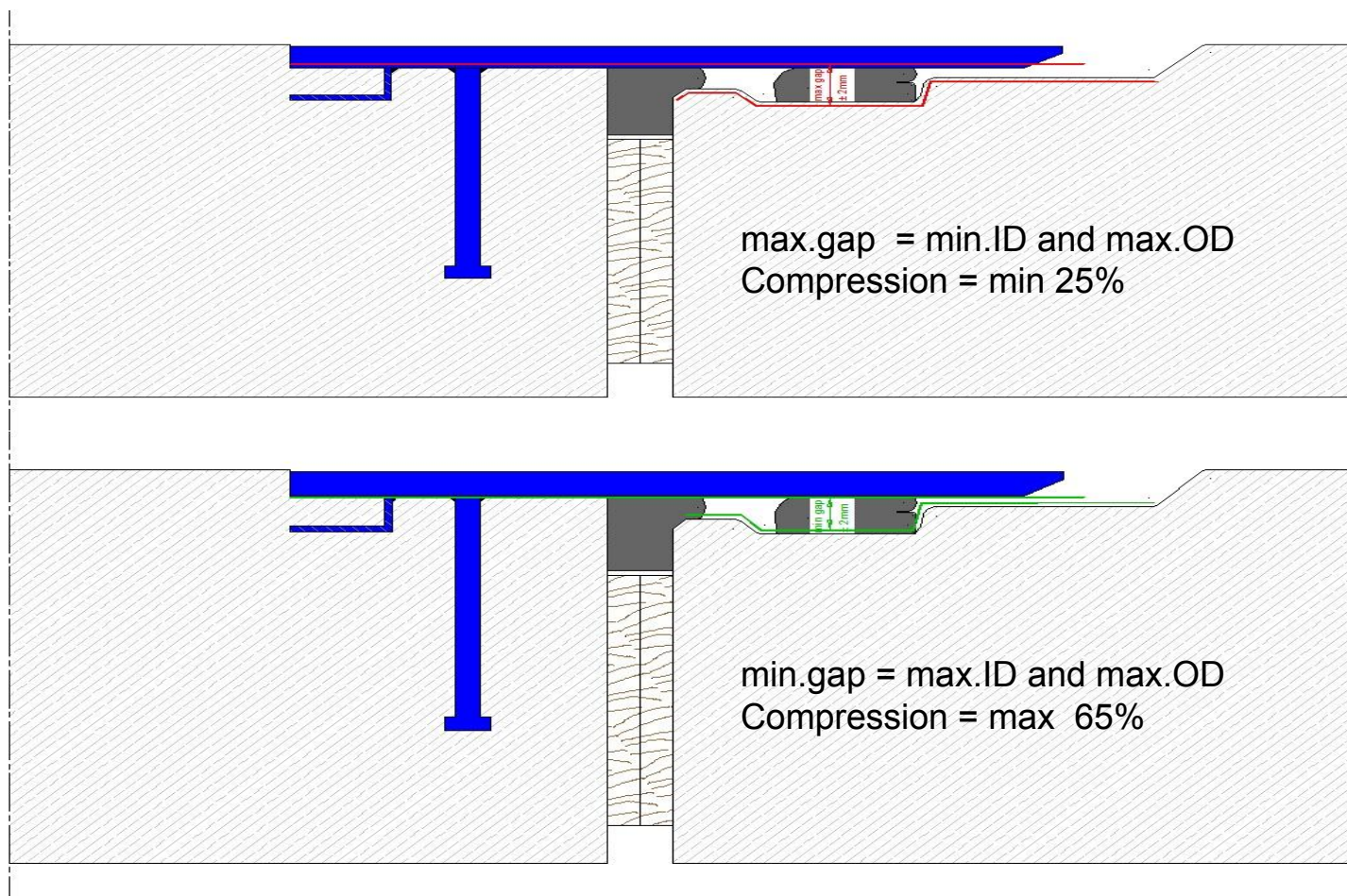
Pipes connecting – Detail 4



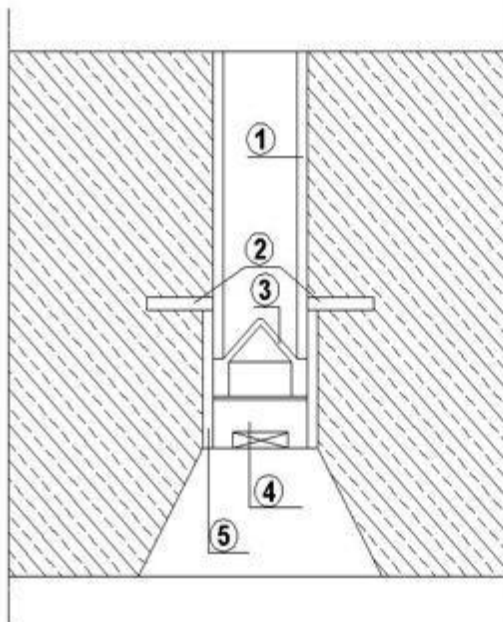
Watertightness of the pipe connection



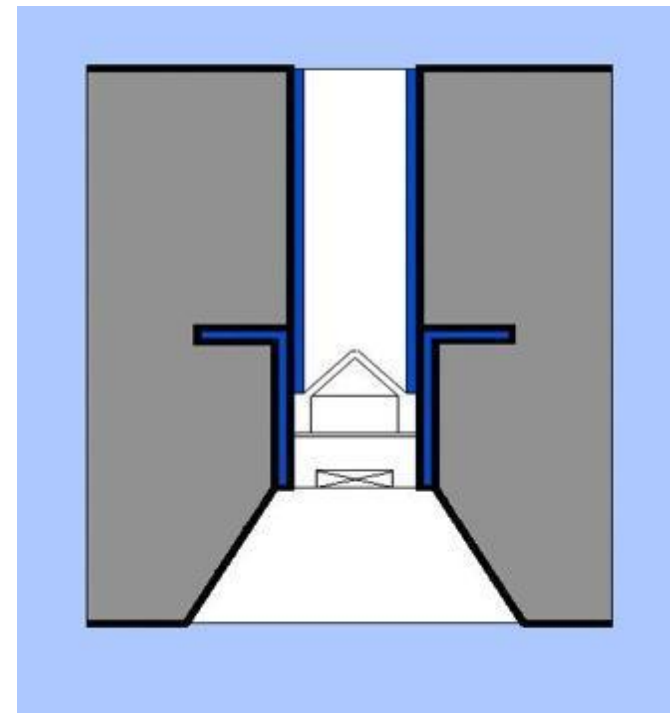
Watertightness of the pipe connection



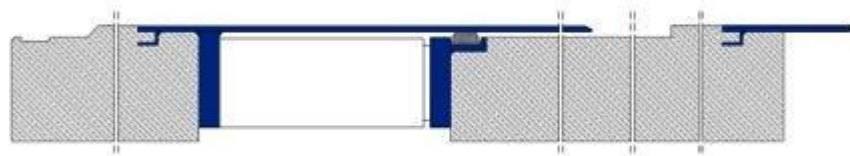
Injection openings



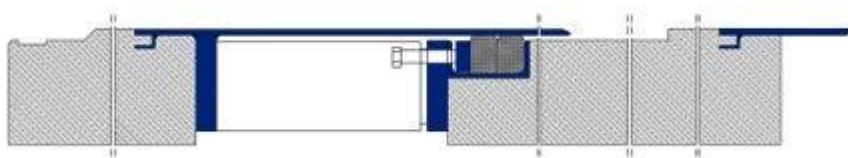
- ① Rohr 1"
- ② Wassersperre
- ③ Rückschlagventil
- ④ Muffenstopfen
- ⑤ Schweißmuffe



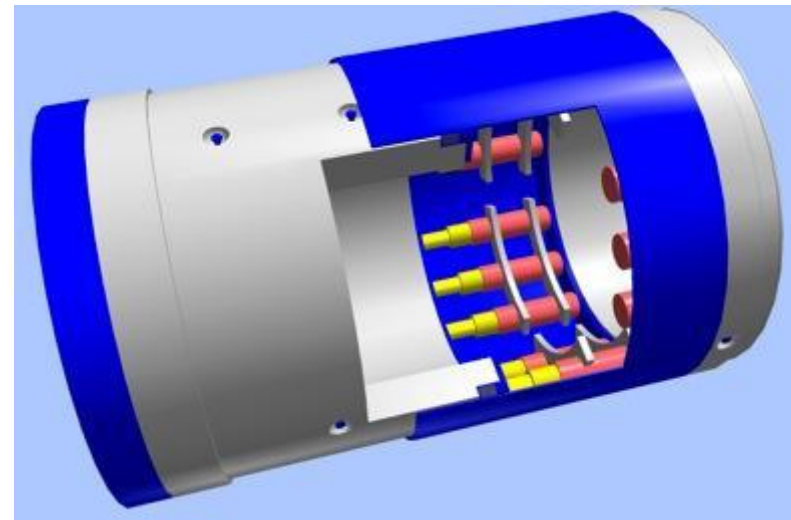
System intermediate jacking station (IJS)



with dirt whipper



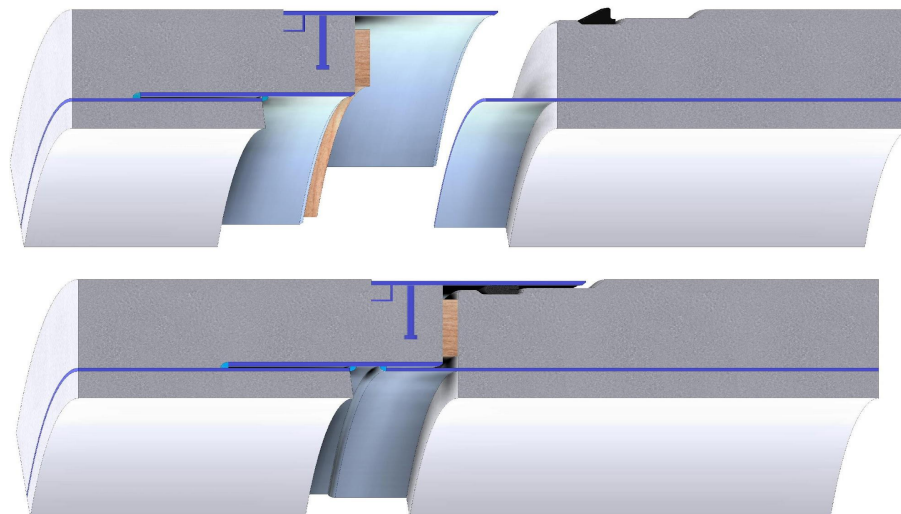
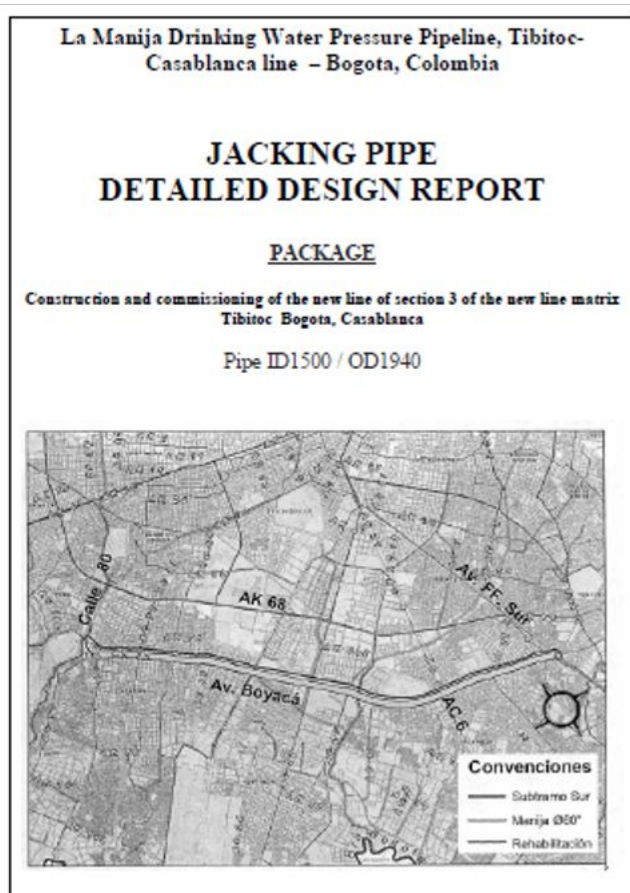
with adjustable seal



Impression of big Microtunneling Pipes ID 30000 / OD 3800 x 4,00 m

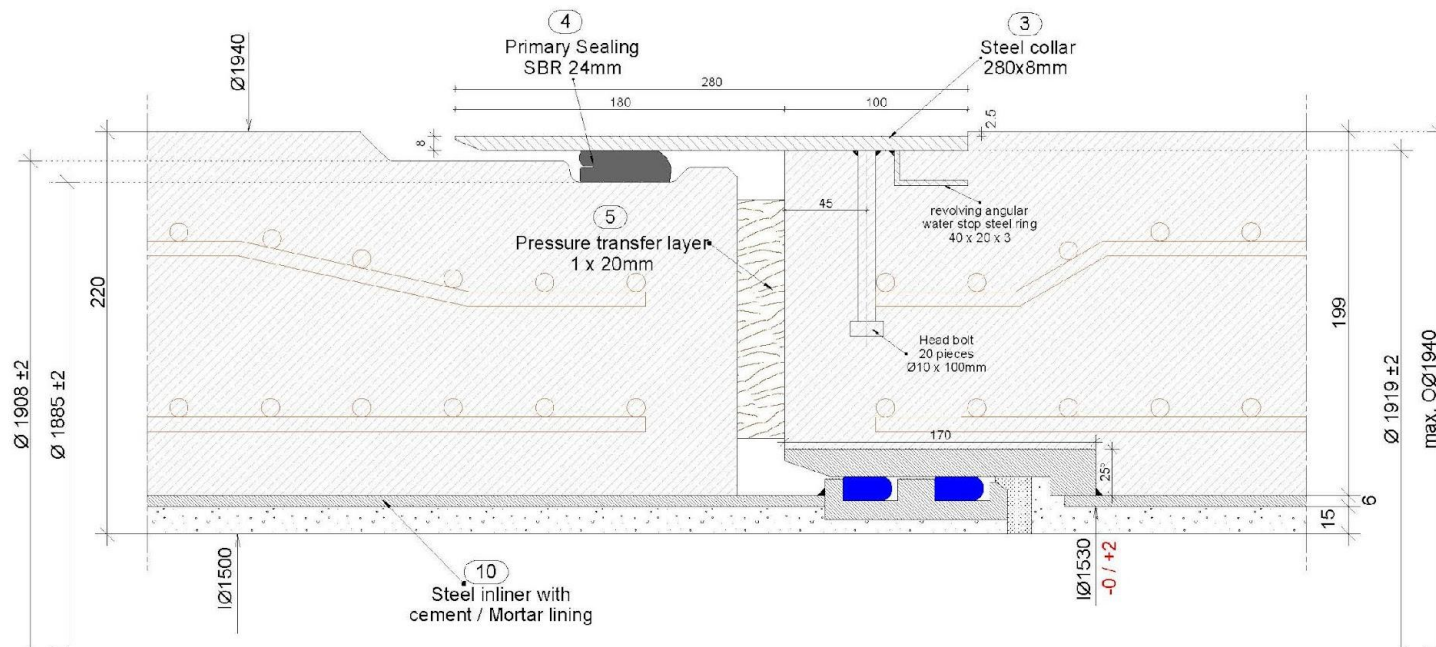


Special Design Specifications – Project TIBITOC



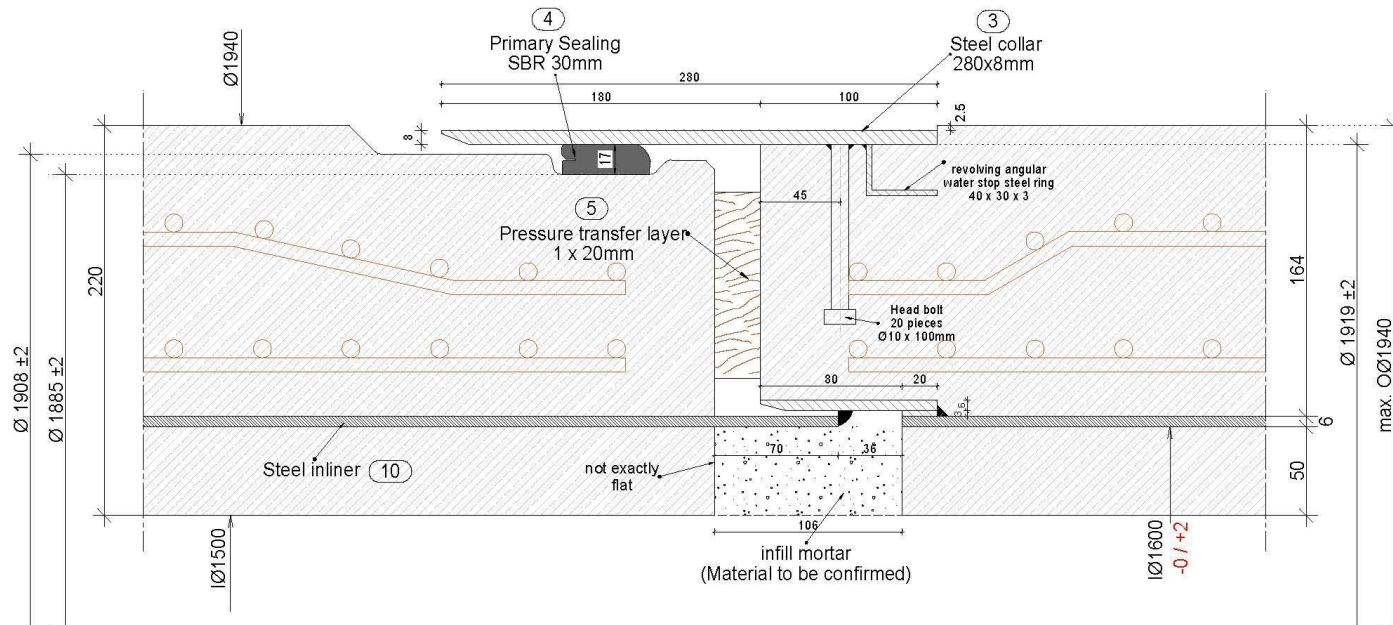
Design Version 2

Flexible Joint



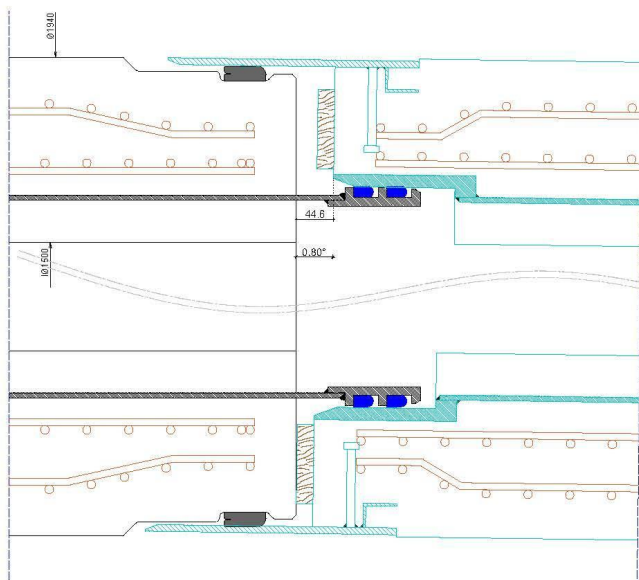
Design Version 3

Single Welding Joint

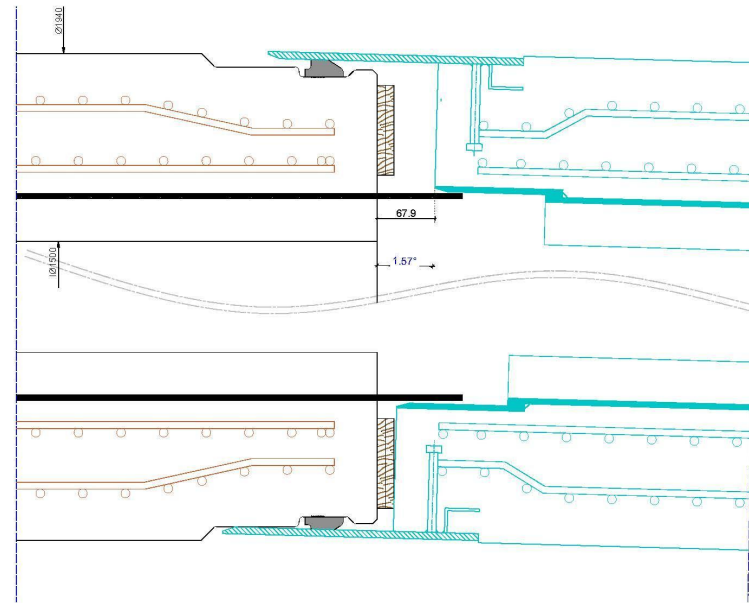


Comparison of the pipe joints

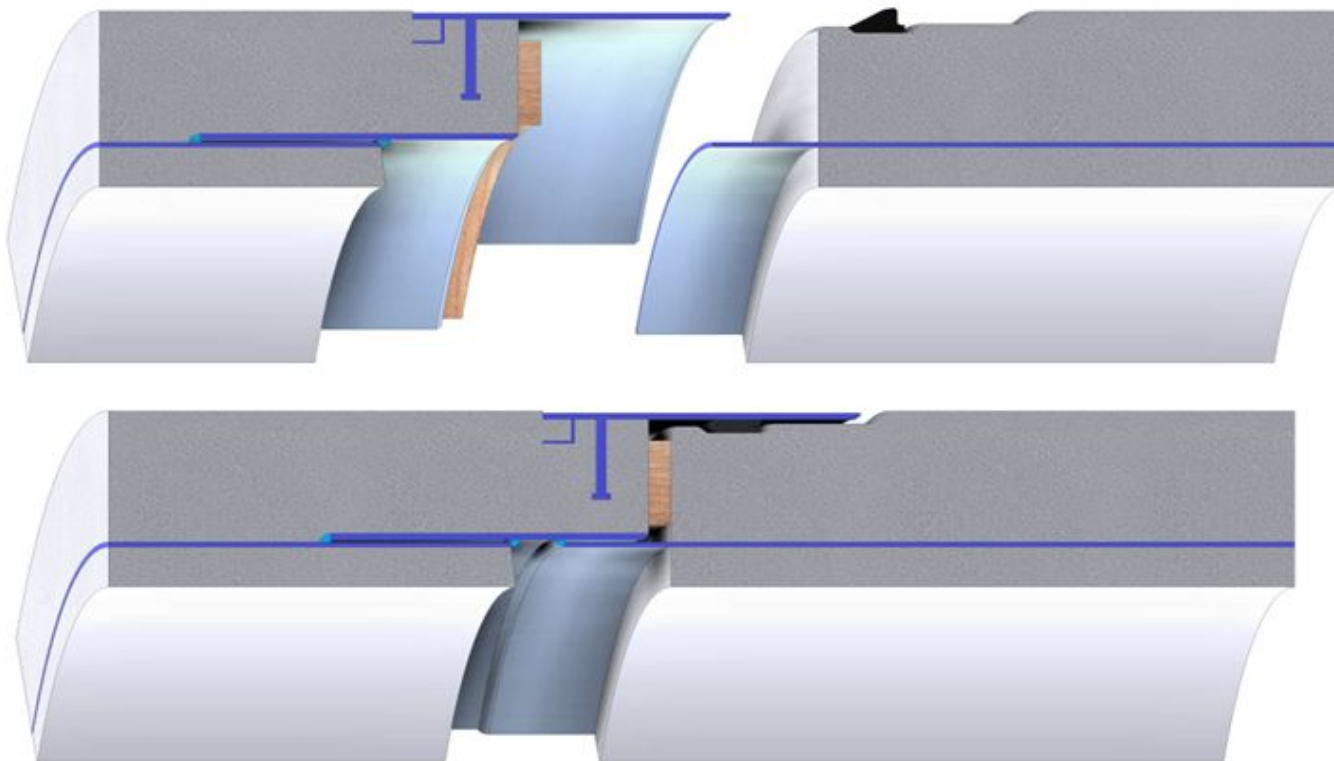
deflection in °	offset center line	joint gap
0,80°	42,3mm	44,6mm



deflection in °	offset center line	joint gap
1,57°	82,3mm	67,9mm



Final Solution – Single Welding Joint



Production in Partnership with TITAN





Many thanks for the constructive cooperation

- EAAB
- C. Alianza 744
- TITAN





Thank you for your attention!