



VisiConsult

X-RAY Technology



VisiConsult GmbH

X-ray Systems & Solutions

Pipe inspection systems

# Typical setup



# Specifications

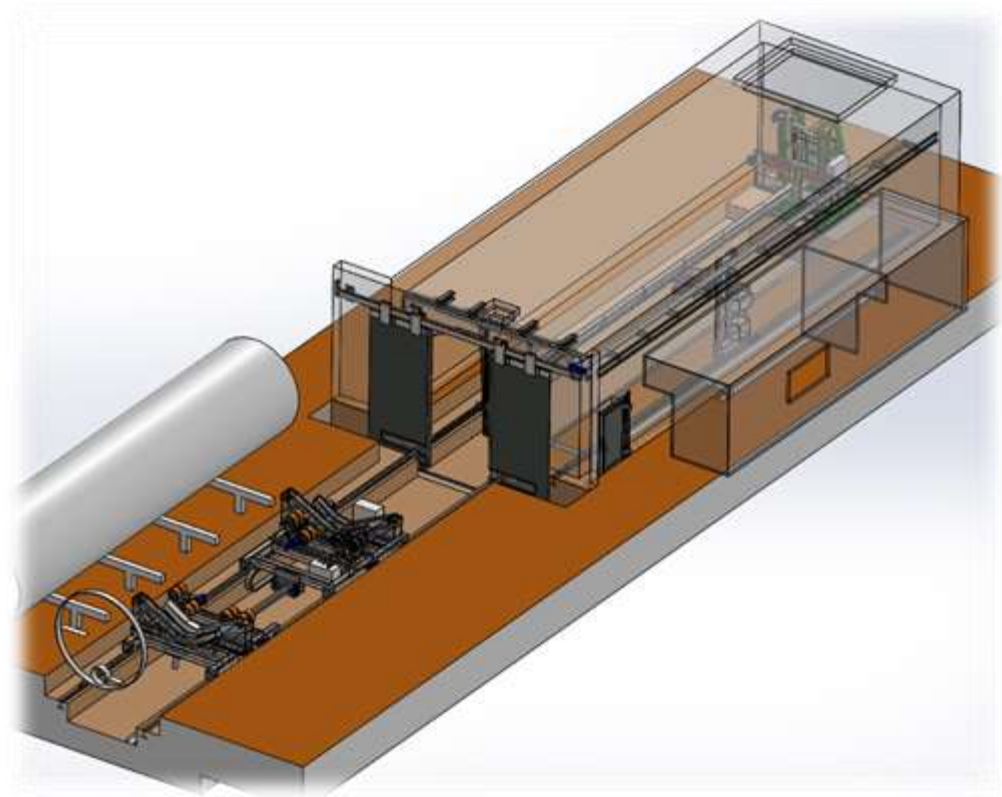


## Weld types

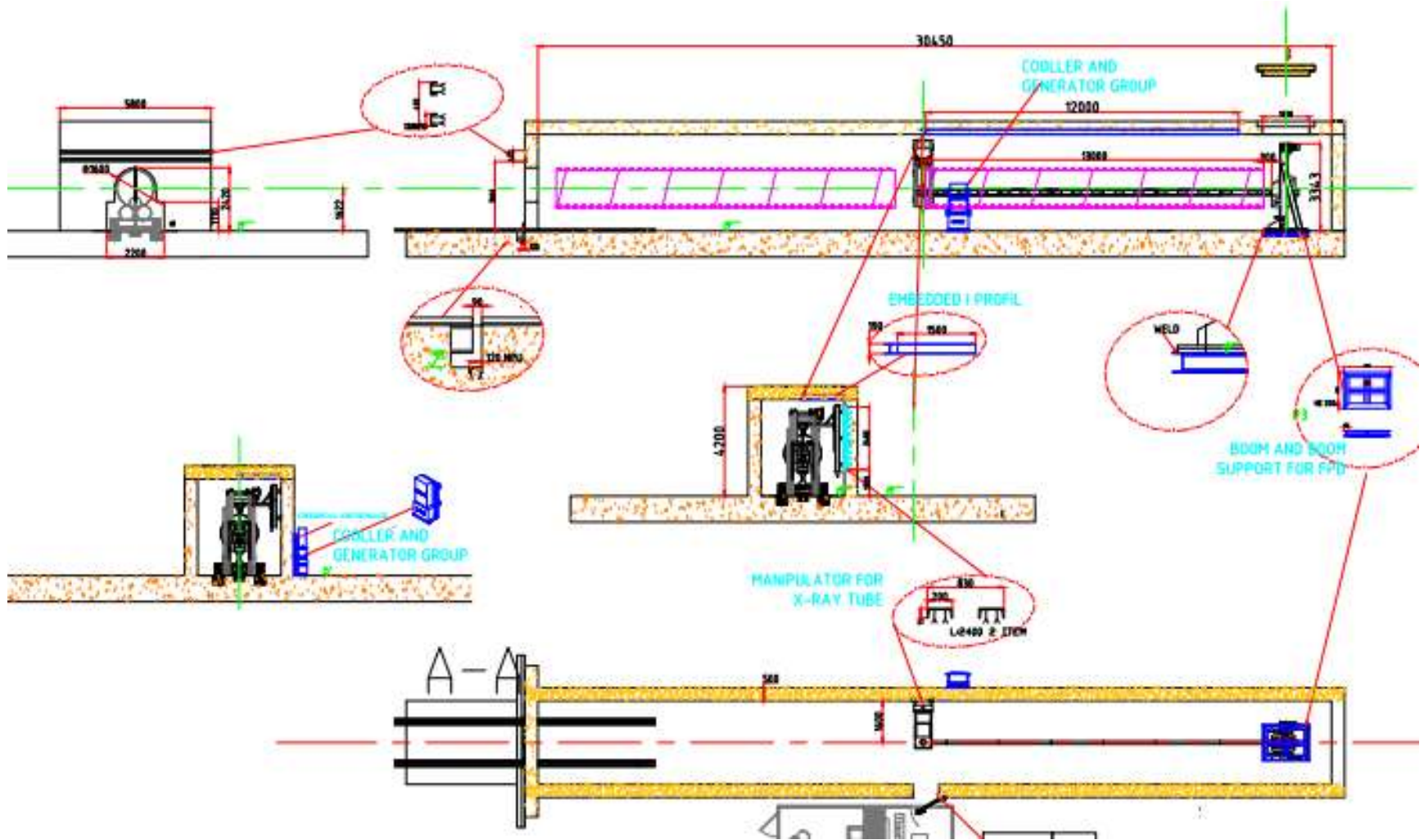
- ✓ Longitudinal welds
- ✓ Spiral welds
- ✓ Circumferential/planar welds

## Dimensions

Pipe length	: up to 20 m
Diameter	: 10" – 60"
Wall thickness	: 5mm-75 mm
Material	: (Stainless) steel



# Typical setup

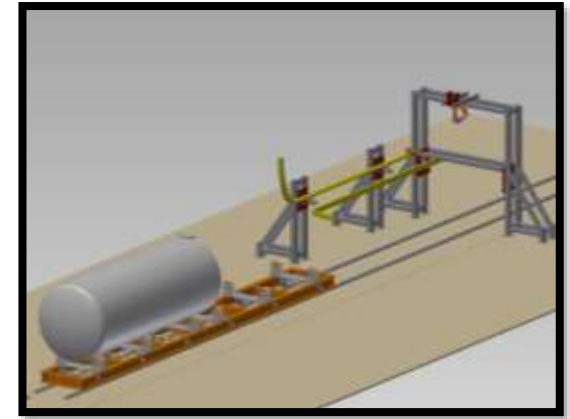
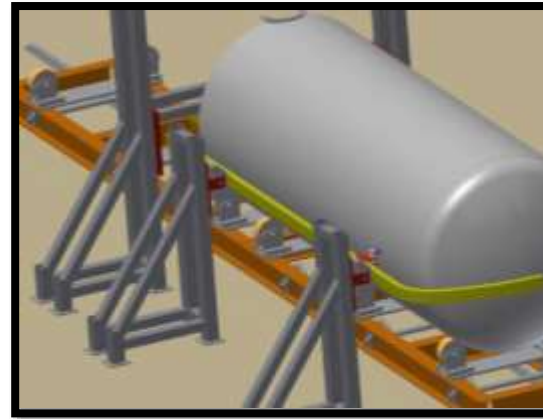
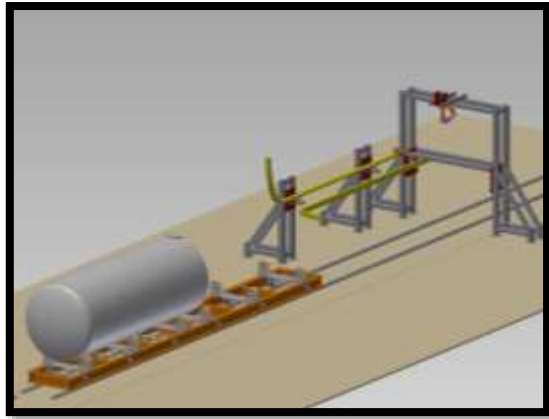




# Typical setup



# Standard Testcycle



## Start of testcycle

- ✓ Pipe moves in
- ✓ Parallel pipe length measurement
- ✓ Doors close automatically

## Test position reached

- ✓ Step-wise inspection of all welds
- ✓ Images stored for every position
- ✓ Optional: Faulty positions are marked on the tube

## End of Testcycle

- ✓ Doors open
- ✓ Pipe moves out

# Mechanical options



## **Moving Pipe carrier:**

- Detector and tube have a fixed position
- + Lower costs
- Longer bunker ( 2\* max tube length )

## **Fixed pipe position:**

- Detector and tube have a variable and synchronised position
- + Higher costs due o complex mechanics
- Short bunker ( 1\* max tube length )

→ Choice depending on space and budget considerations!

# Xplus<sup>Pipe</sup> Software



Version 1.18

AXES Process Xray Safety

Ref	Actual	Target	
0	0	0	Boom
0	0	0	Support
0	0	0	Detector
0	0	0	Tube Carrier
0	0	0	Tube Lift

Diff Boom - Support: 0

Start Position: 751,2

Diff Carrier Detector: 88,5

Operator:

Order No:

Pipe No:

Seq.Imageproc: F3

Number of Steps: 0

Actual Step: 0

Object Resolution um: 92

70 KV 2 mA

Manual

Ink 1 Shutter

Ink 2 filter

Quit

Program Stop

XRAY OFF

Collision Detektor

Up 0.0

Pipe Distance: 0

Down

0 mm

Pipe Sensor

Rotation

Panel

Tube

RotSpeed

0 50 100

Pipe LB

Light rack

Control Rack

System Rack



# Xplus<sup>Pipe</sup> Software



Axes Process Xray **Safety**

Ref	Actual	Target	
0	0	0	Boom
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Object Resolution um: 92

70 KV 2 mA

Seq.Imageproc: F3

0 Number of Steps

0 Actual Step

Manual

Quit

Ink 1 Shutter

Ink 2 Filter

Positioning control and safety indicators

Pipe meta data for automatic image overlay

# Xplus<sup>Pipe</sup> Software



A screenshot of the XplusPipe software interface. The interface is titled 'Version 1.18' in the top left. It features a central 3D visualization of a pipe system with various components labeled: 'Collision Detektor' (a green dot), 'Pipe Sensor' (a green dot), 'Pipe LB' (a green square), 'Boom' (a vertical grey bar), 'Panel' (a horizontal grey bar), and 'Tube' (a horizontal grey bar). The interface includes several control panels: a top panel with 'Up' and 'Down' buttons and a 'Pipe Distance' input field; a right panel with 'Up', 'Home', and 'Down' buttons; a bottom panel with 'Rotation' and 'RotSpeed' controls; and a left panel with 'mA' and 'KV' input fields. A 'Collision Detector' indicator is shown as a green dot with a red line pointing to it. A 'Pipe LB' indicator is shown as a green square with a red line pointing to it. A 'System status' indicator is shown as a yellow bar with a red line pointing to it. The interface also includes a 'XRAY OFF' indicator and a 'Collision Detektor' label.

X-ray control

Collision detection

System status

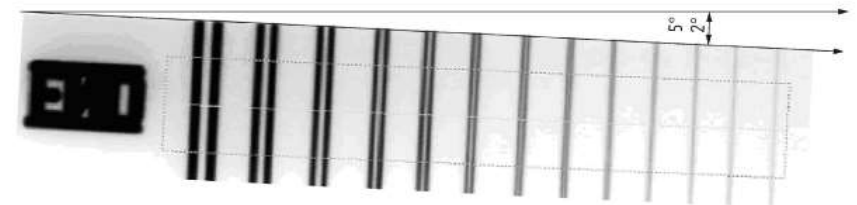
# Inspection Standards



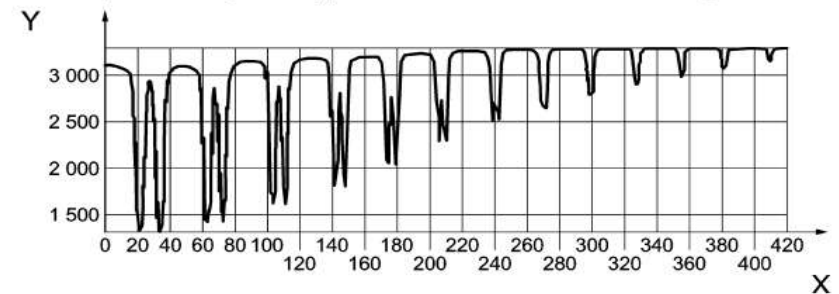
- ✓ Meets international standards (EN/ISO 17636-2-2013, ASTM etc.)
- ✓ Class B is fulfilled (proof trough IQI)

Tabelle B.14 — Maximale Bildunschärfe für alle Techniken der Klasse B

Bildgüteklasse B, Doppel-Draht-BPK nach ISO 19232-5		
Durchstrahlte Dicke $w^a$ mm	Mindest-BPK-Wert und maximale Unschärfe (ISO 19232-5) <sup>b</sup> mm	Maximale Basis-Ortsauflösung in mm (äquivalent zur Drahtstärke und zum Drahtabstand) <sup>b</sup>
$w \leq 1,5$	D 13+ 0,08	0,04
$1,5 < w \leq 4$	D 13 0,10	0,050
$4 < w \leq 8$	D 12 0,125	0,063
$8 < w \leq 12$	D 11 0,16	0,08
$12 < w \leq 40$	D 10 0,20	0,10
$40 < w \leq 120$	D 9 0,26	0,13
$120 < w \leq 200$	D 8 0,32	0,16
$w > 200$	D 7 0,40	0,20



a) Abbildung des Doppeldraht-BPK in einem Durchstrahlungsbild

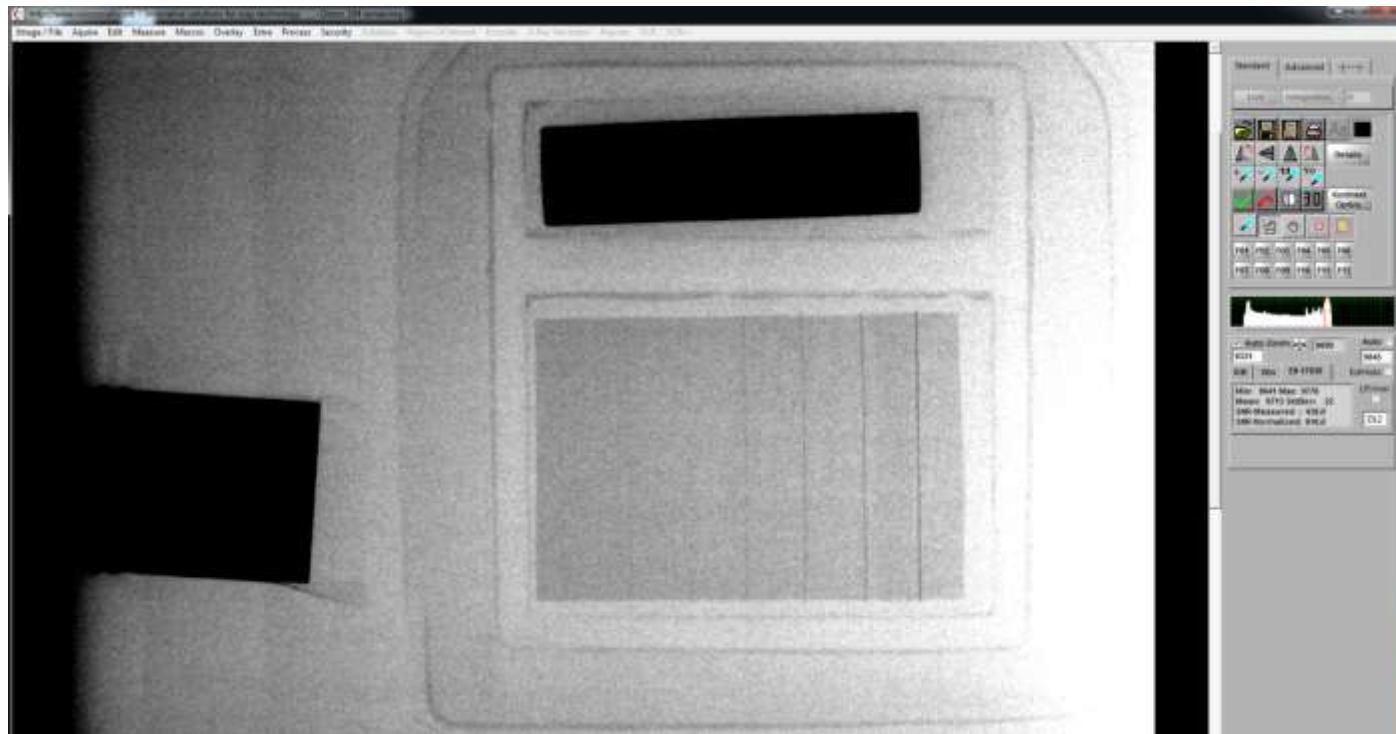


b) Aus mindestens 21 Zeilen gemittelttes Profil des Doppeldraht-BPK

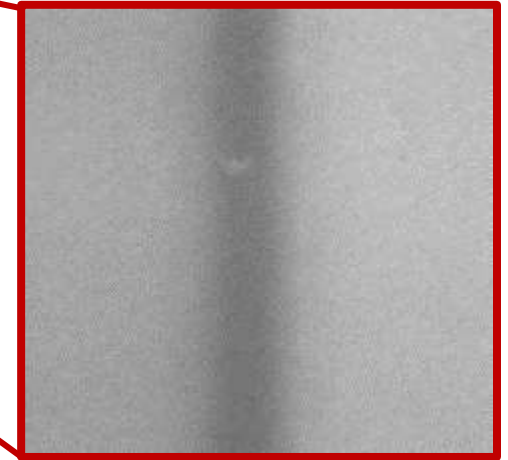
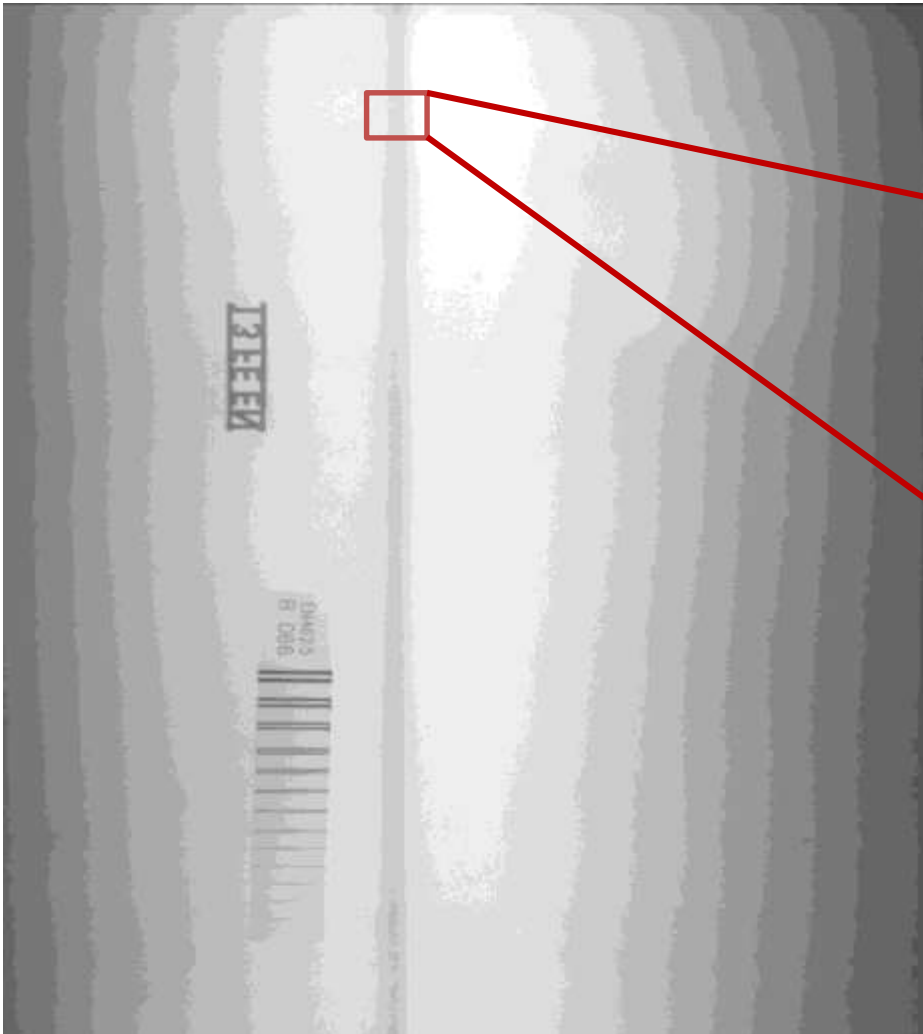
# Inspection Standards



- ✓ Meets international standards (EN/ISO 17636-2-2013, ASTM etc.)
- ✓ Class B is fulfilled (proof trough IQI)



# X-ray images





# The X-ray setup



The wall thickness range is influencing the choice of the detector and the X-ray setup:

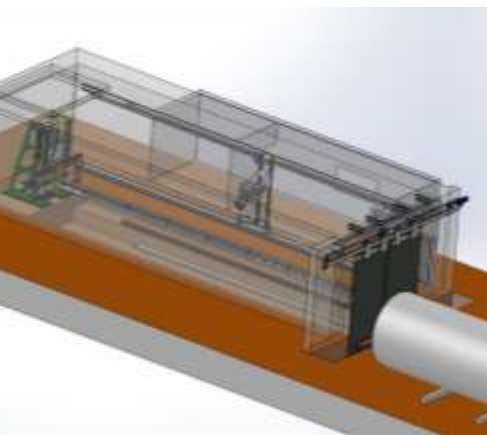
Max. Wall thickness	→	Energy (Max. kV)
Min. Wall thickness	→	Detector resolution (pixel size)
Min diameter of pipe	→	Fitting of the detector for single wall



# References



Company	Country	Material
Sosta	Germany	Stainless Steel
Butting	Germany	Stainless Steel
Corinth Pipe Works	Greece	Steel
SMS Meer	Germany, South Korea, Malaysia, Saudi Arabia	Steel
PFW	Germany	Titanium





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Thanks for your attention!