Development and large-scale model investigation of technical solutions for a complete decommissioning of offshore monopile foundation

The research project DeCoMP - DeCommissioning of MonoPiles at the Technische Universität Braunschweig

Nils Hinzmann, Patrick Lehn, Dr. Jörg Gattermann

Technische Universität Braunschweig, Institute for Geomechanics and Geotechnics

Decommissioning – met mast Amrumbank West 2016

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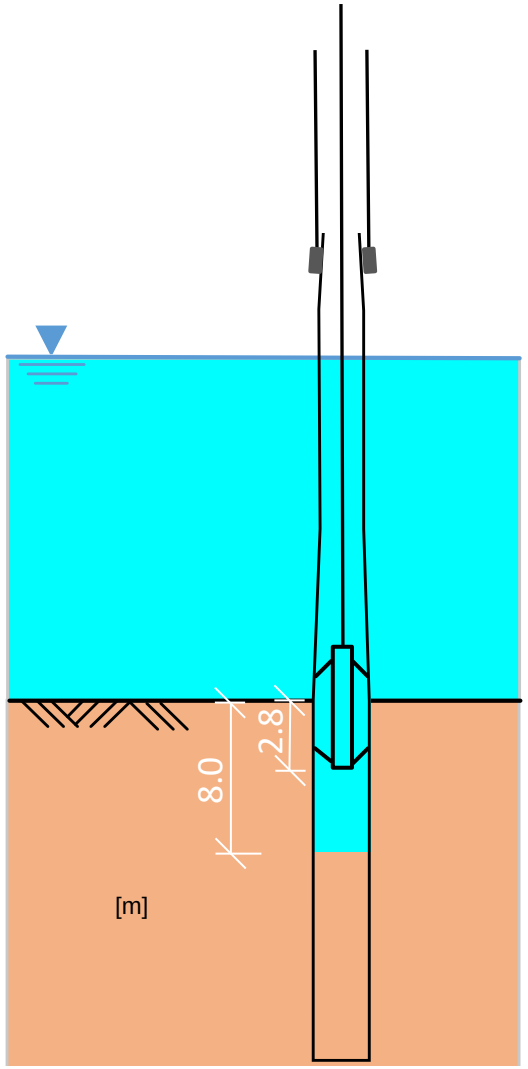
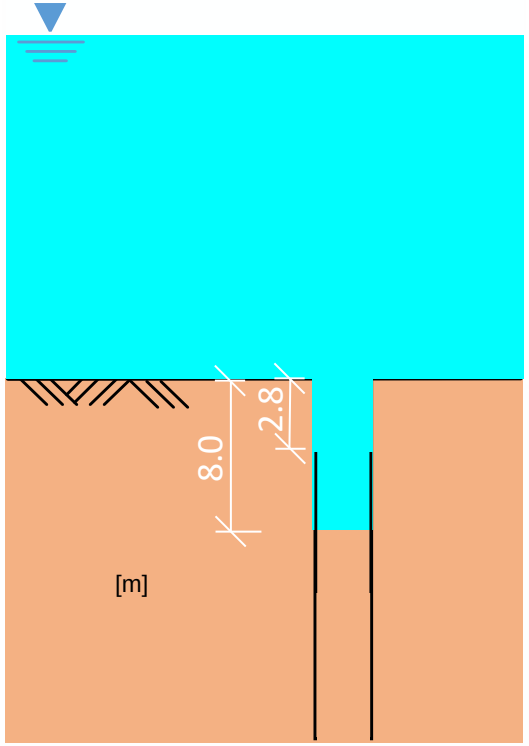


Challenges for offshore foundation decommissioning



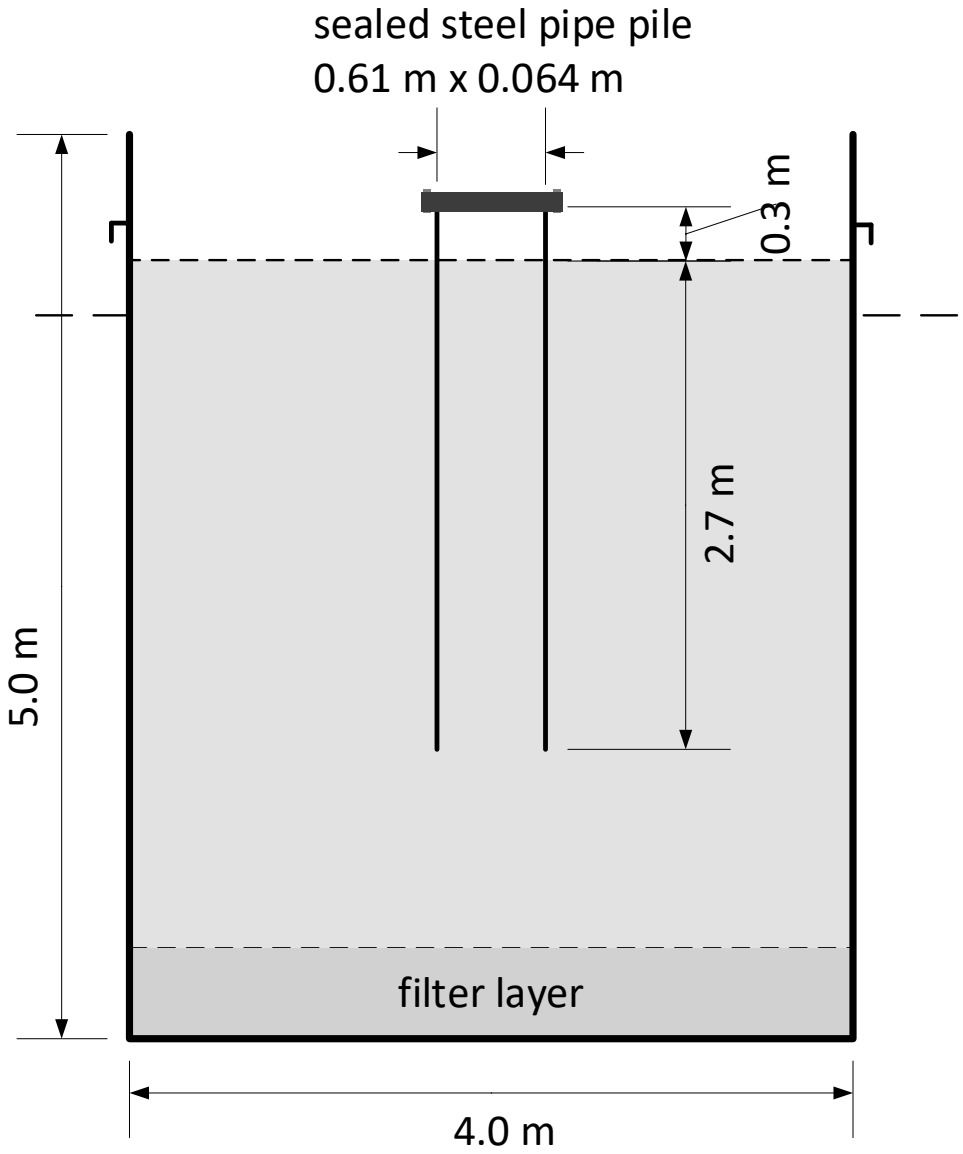
- legal regulation → BSH
- risk assessment
- recycling
- potential hazards
- duty of care
- foundation area
  - ➢grout protection
  - ➢sea-cable
- pile shaft resistance
  - ➢set up effect after 20-25 years
- decommissioning vessel (capacity)
  - ➢abrupt loads/reliefs

Testing facility at the IGG-TUBS

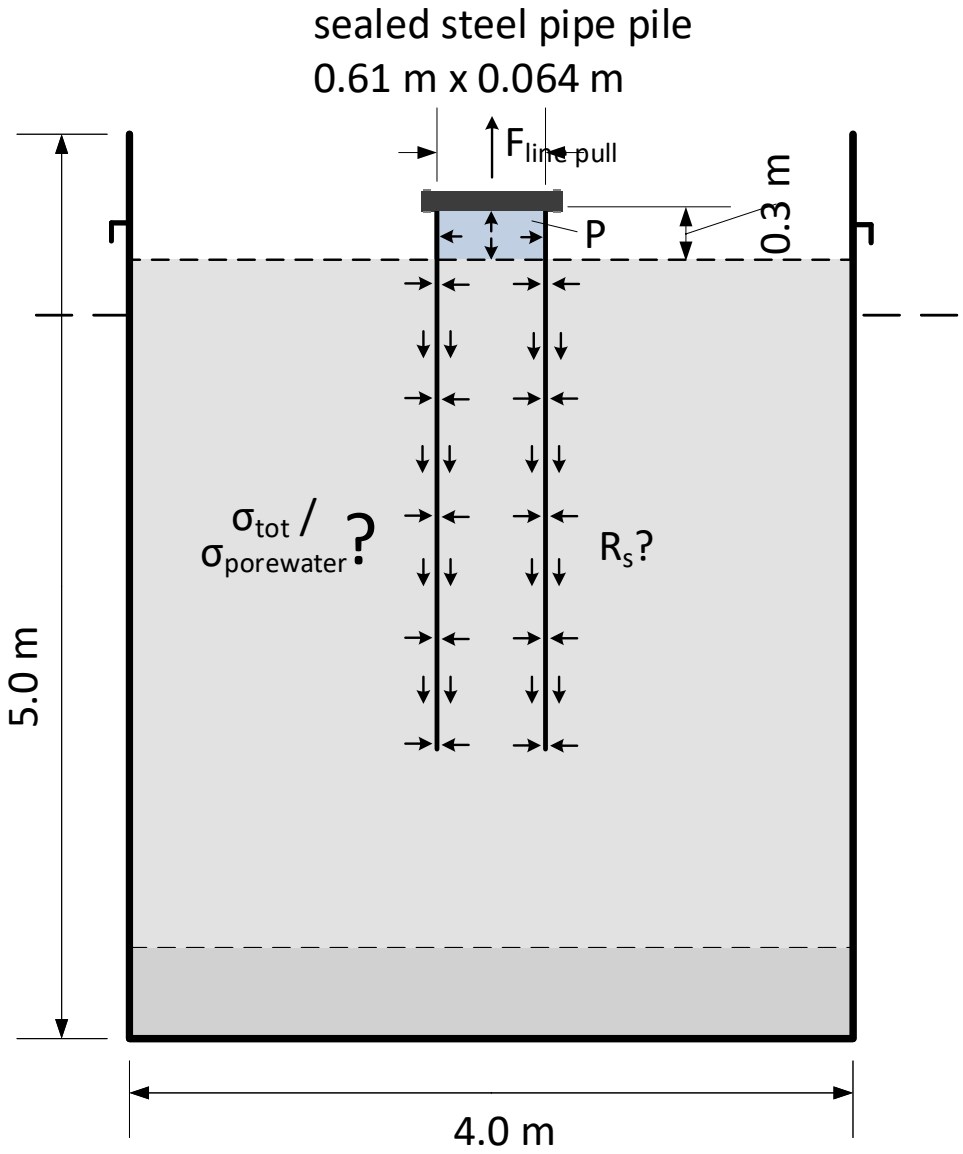
test setup:

- pile scale 1:10
- high soil density $q_c \approx 20$ to 30 Mpa
- non cohesive fine/medium sand
- impact driven installation
- study occurring phenomena
- identify soil parameter
- implement test data into FE-Model
- scale FE-Model to in situ dimensions

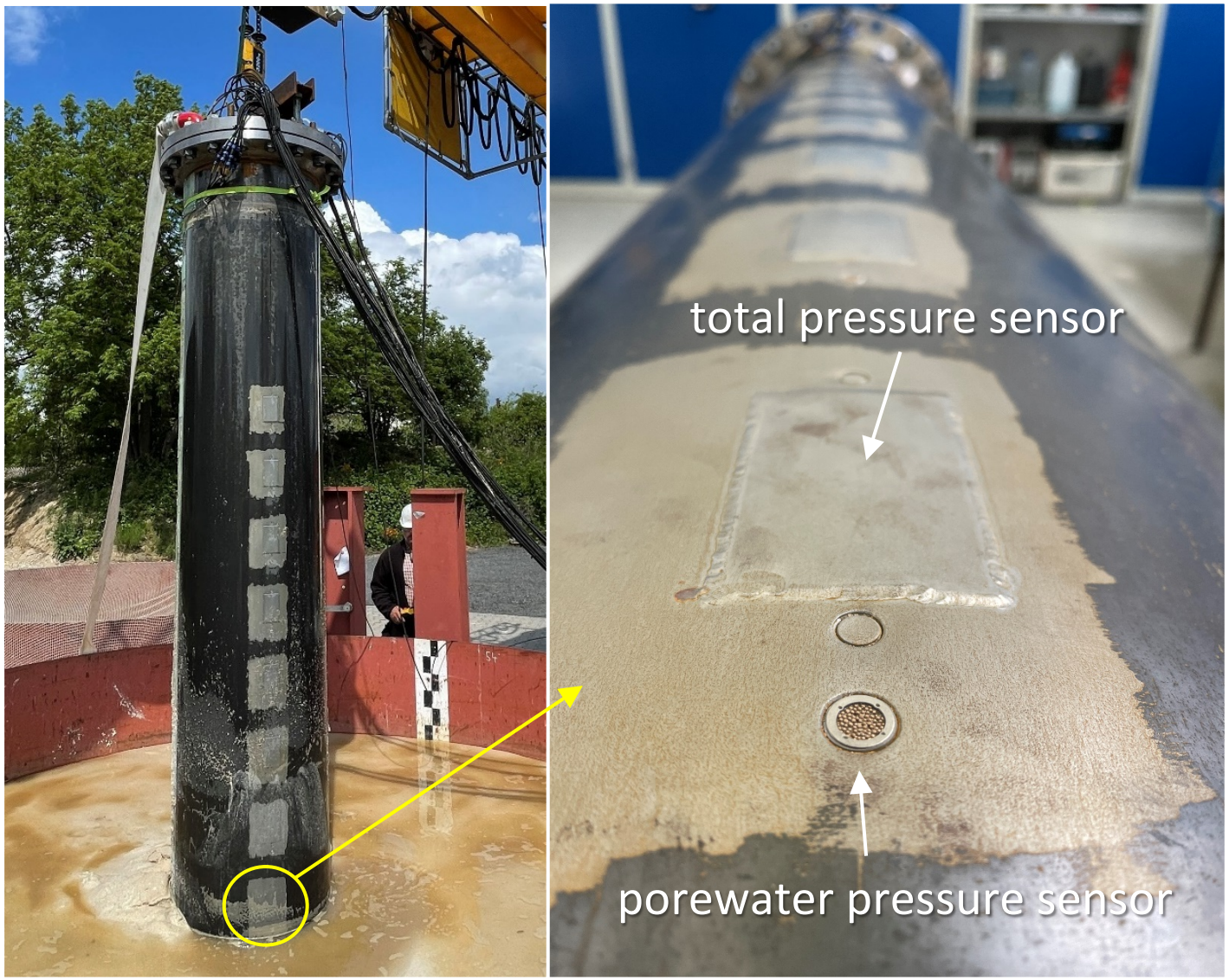
Testing facility at the IGG-TUBS



Testing facility at the IGG-TUBS



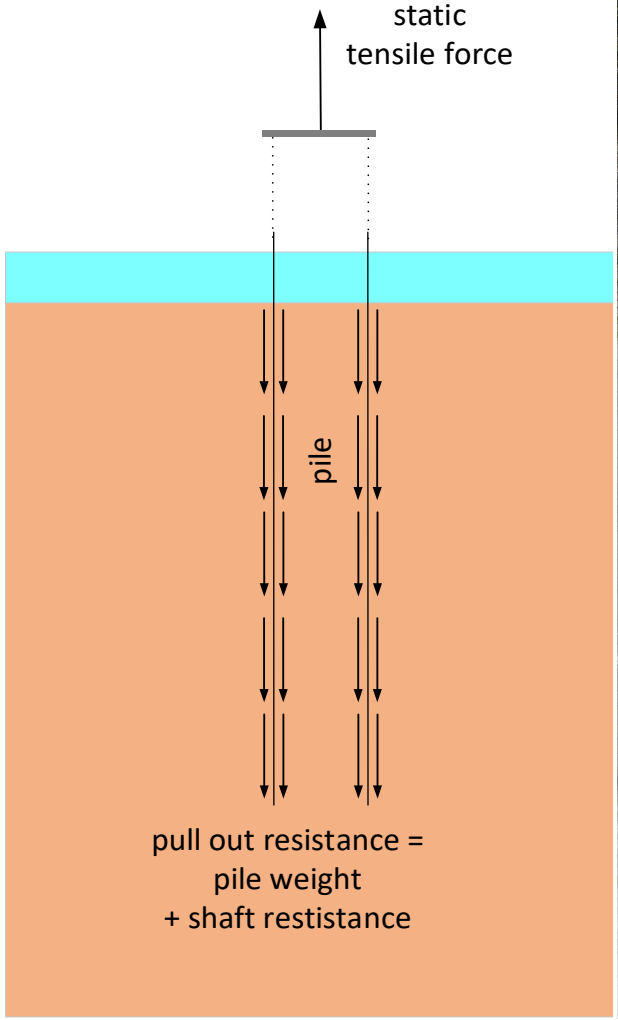
Sensor concept



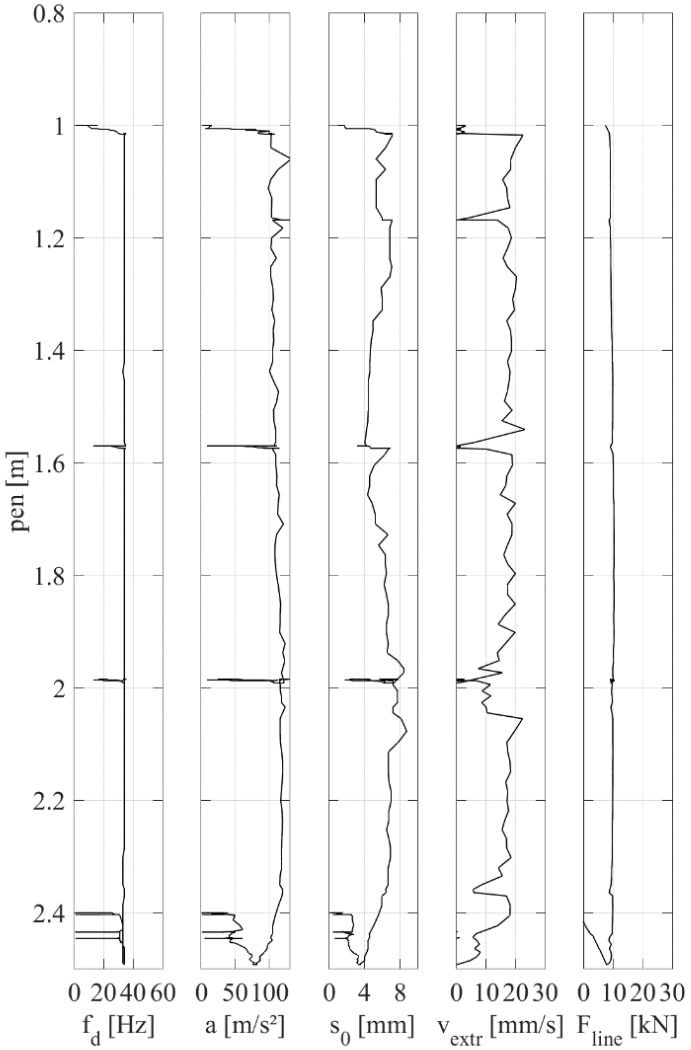
test setup:

- total pressure sensors (inside+outside+soil)
- porewater pressure sensors (inside+outside+soil)
- strain gages axial + tangential
- load cell for line pull
- acceleration sensors
- displacement sensor

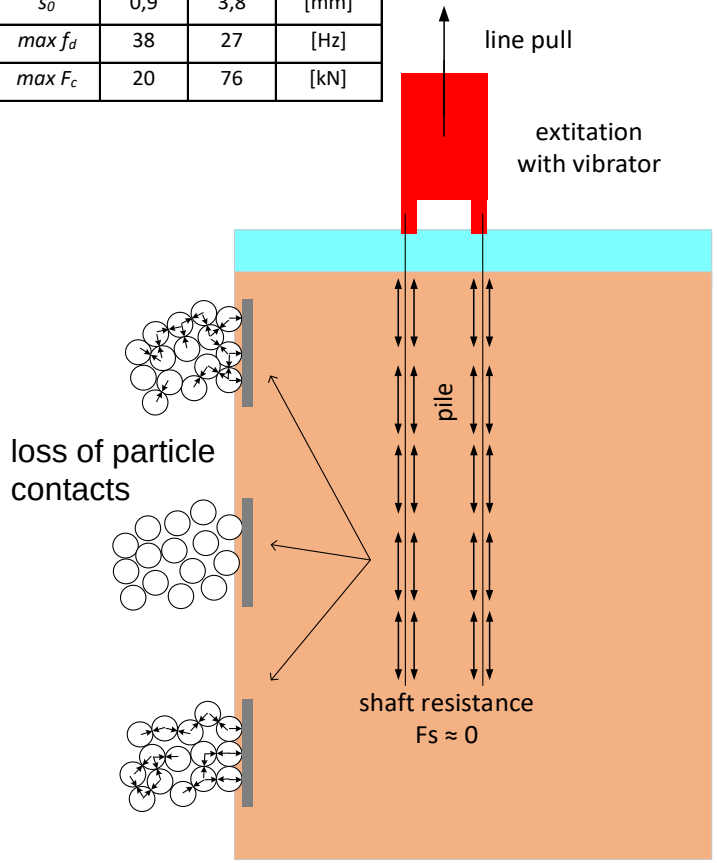
Static tensile test



Vibratory extraction



		APE Model 3	J&M Model 23	
eccentric moment	M_e	0,35	2,65	[kg·m]
dynamic mass*	$m_{dyn,1}$	273	557	[kg]
mass pile	$m_{dyn,2}$	132		[kg]
theor. displacement	s_0	0,9	3,8	[mm]
max. frequency	$max\ f_d$	38	27	[Hz]
max. centrifugal force	$max\ F_c$	20	76	[kN]



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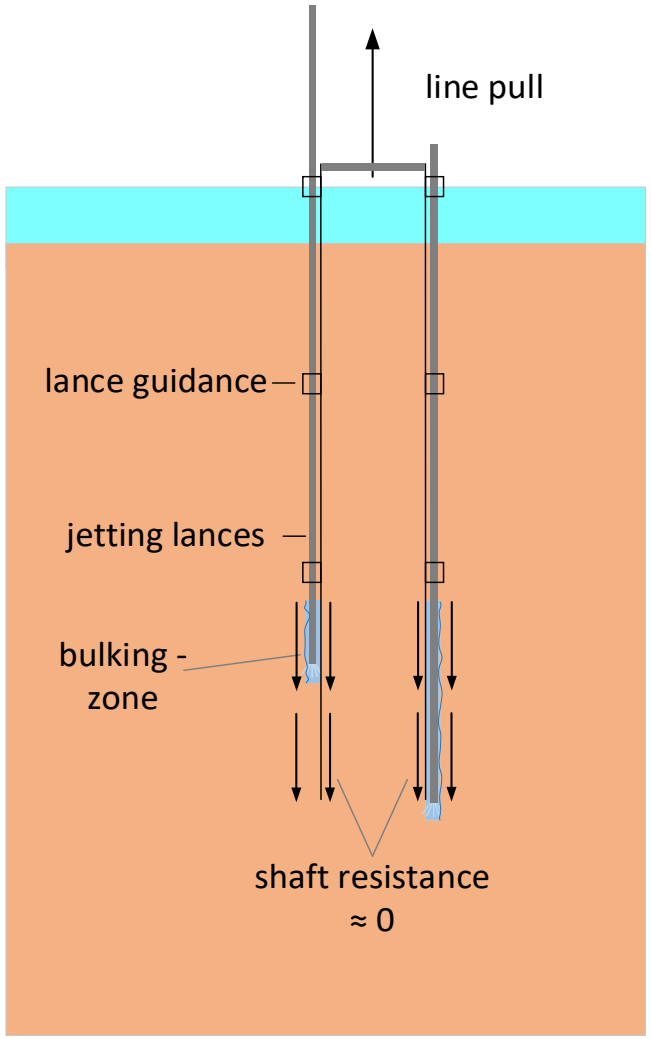

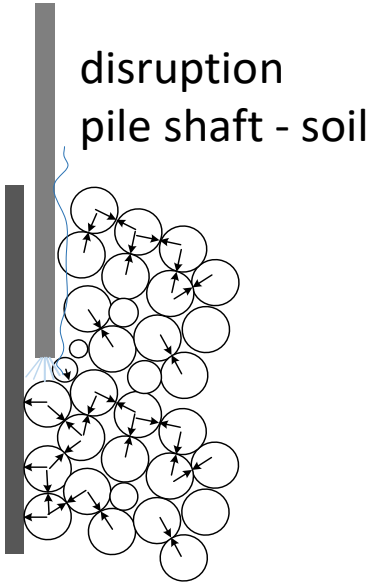

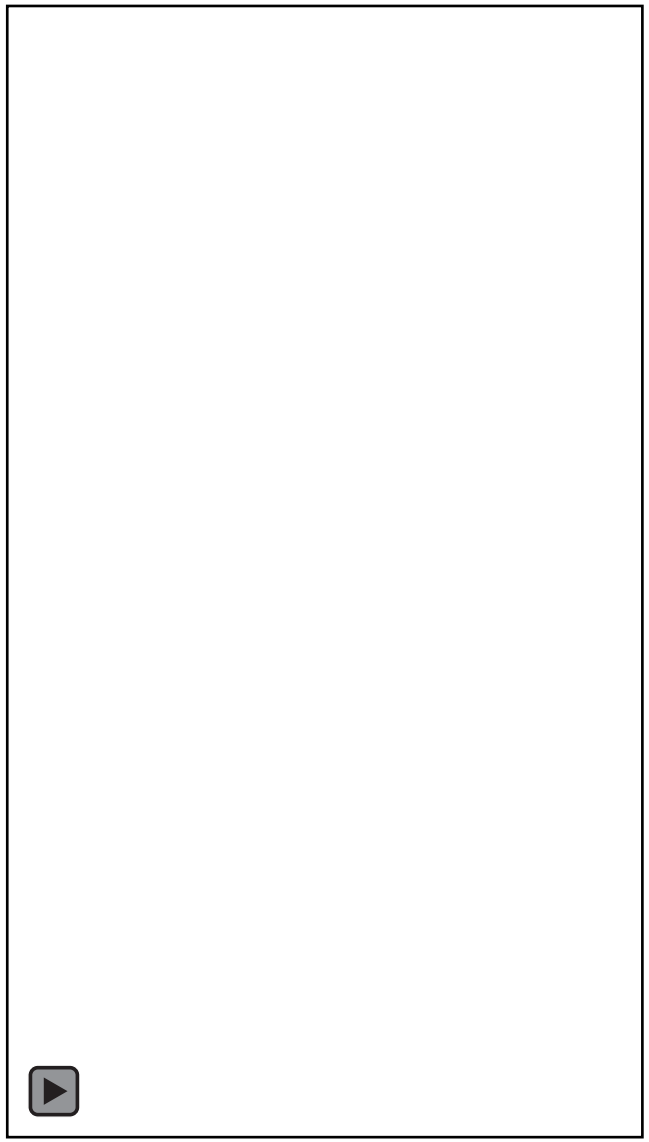

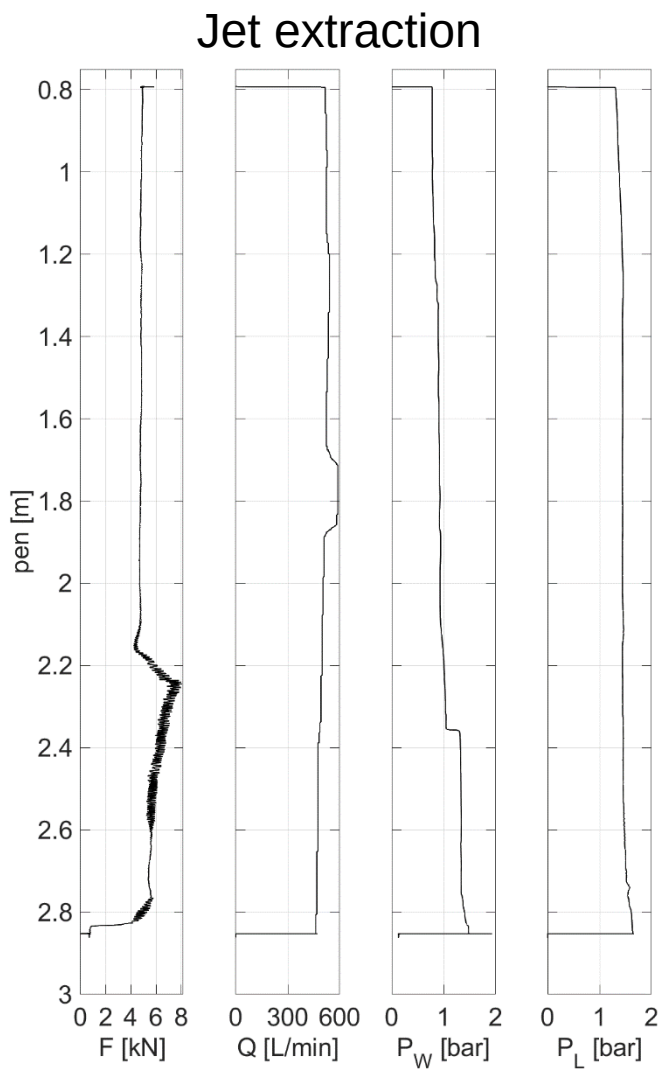

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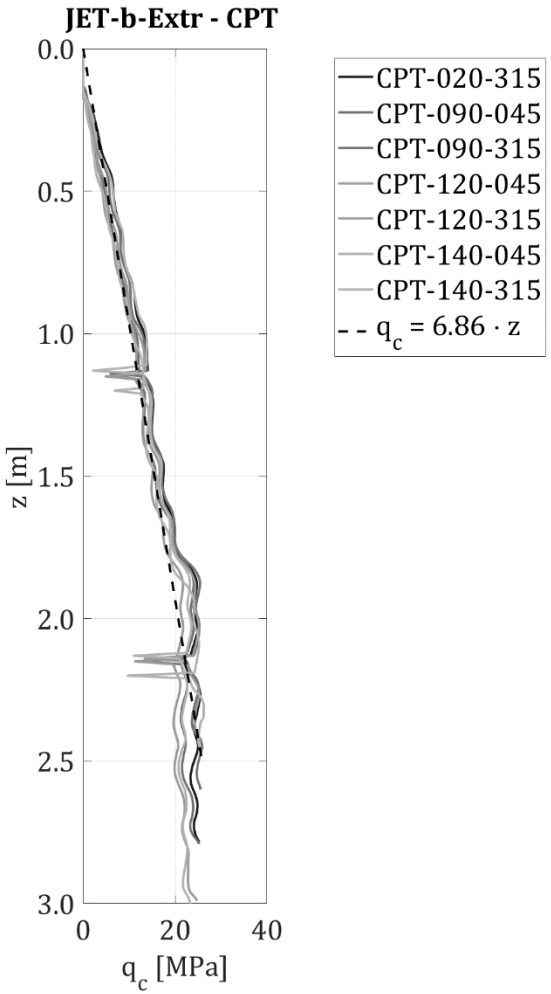
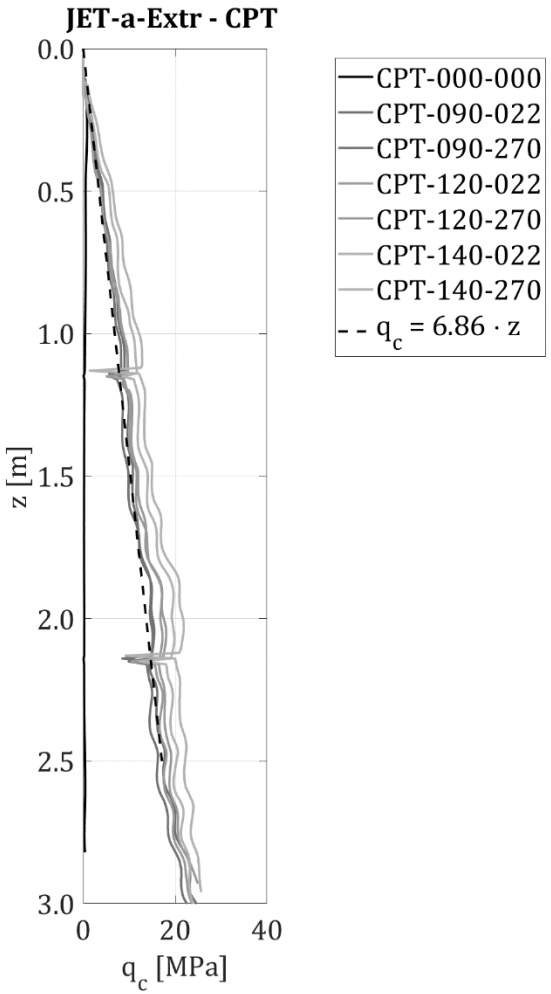
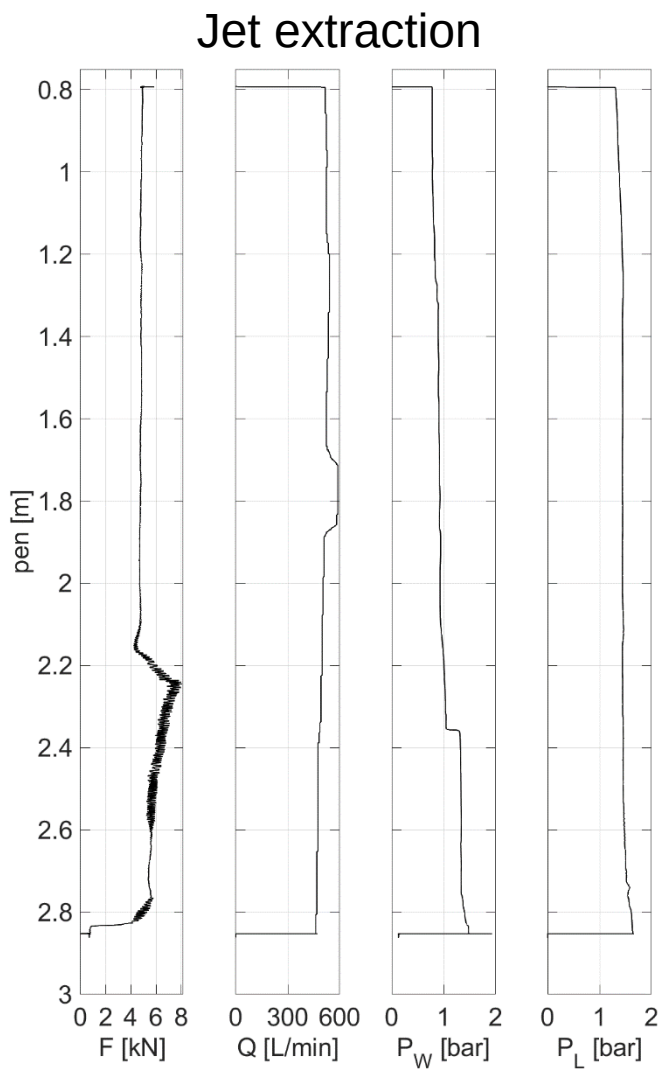
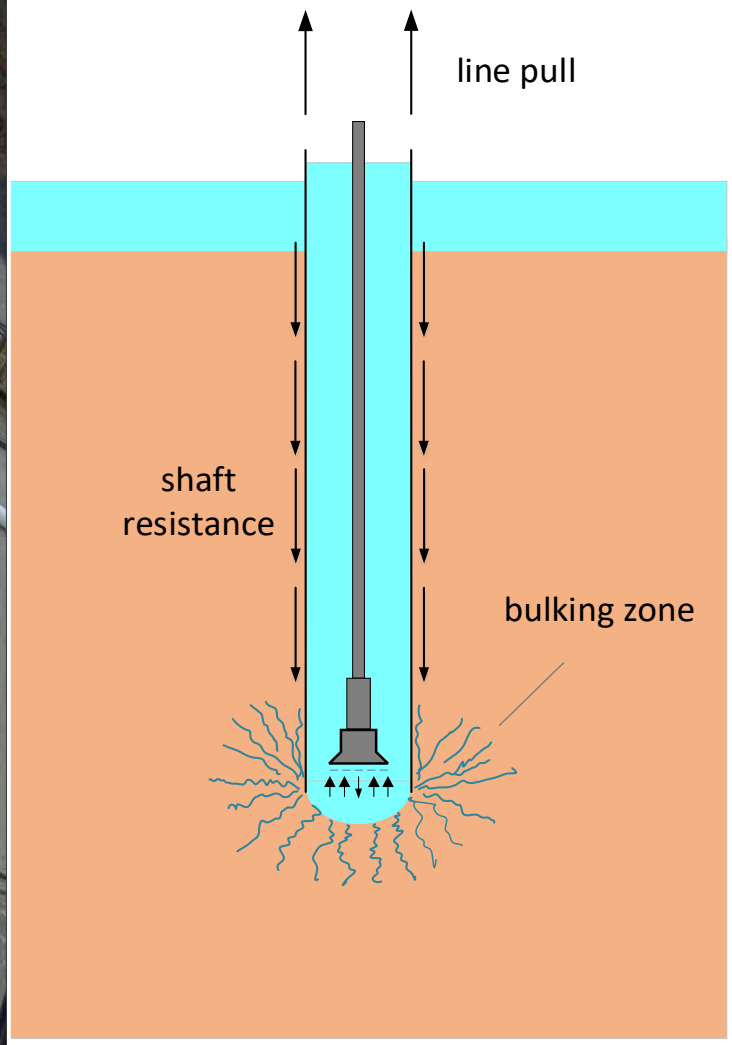




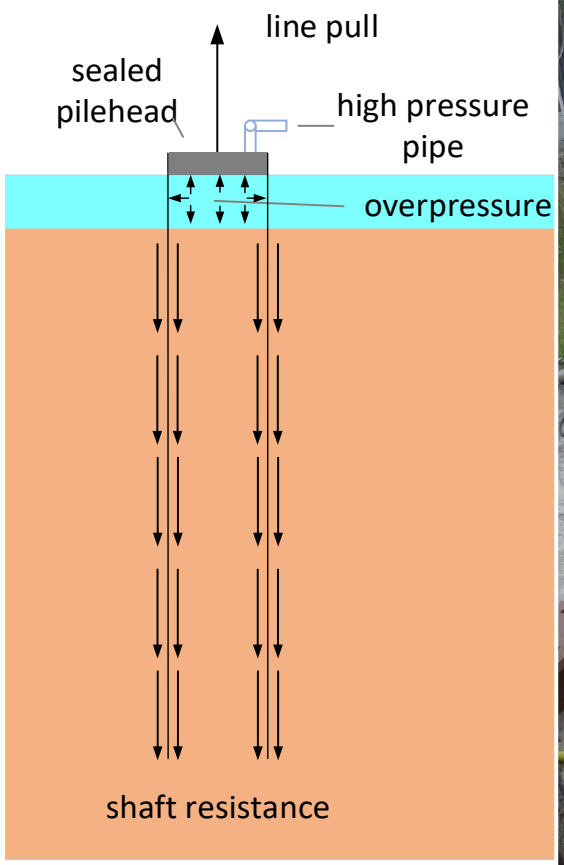


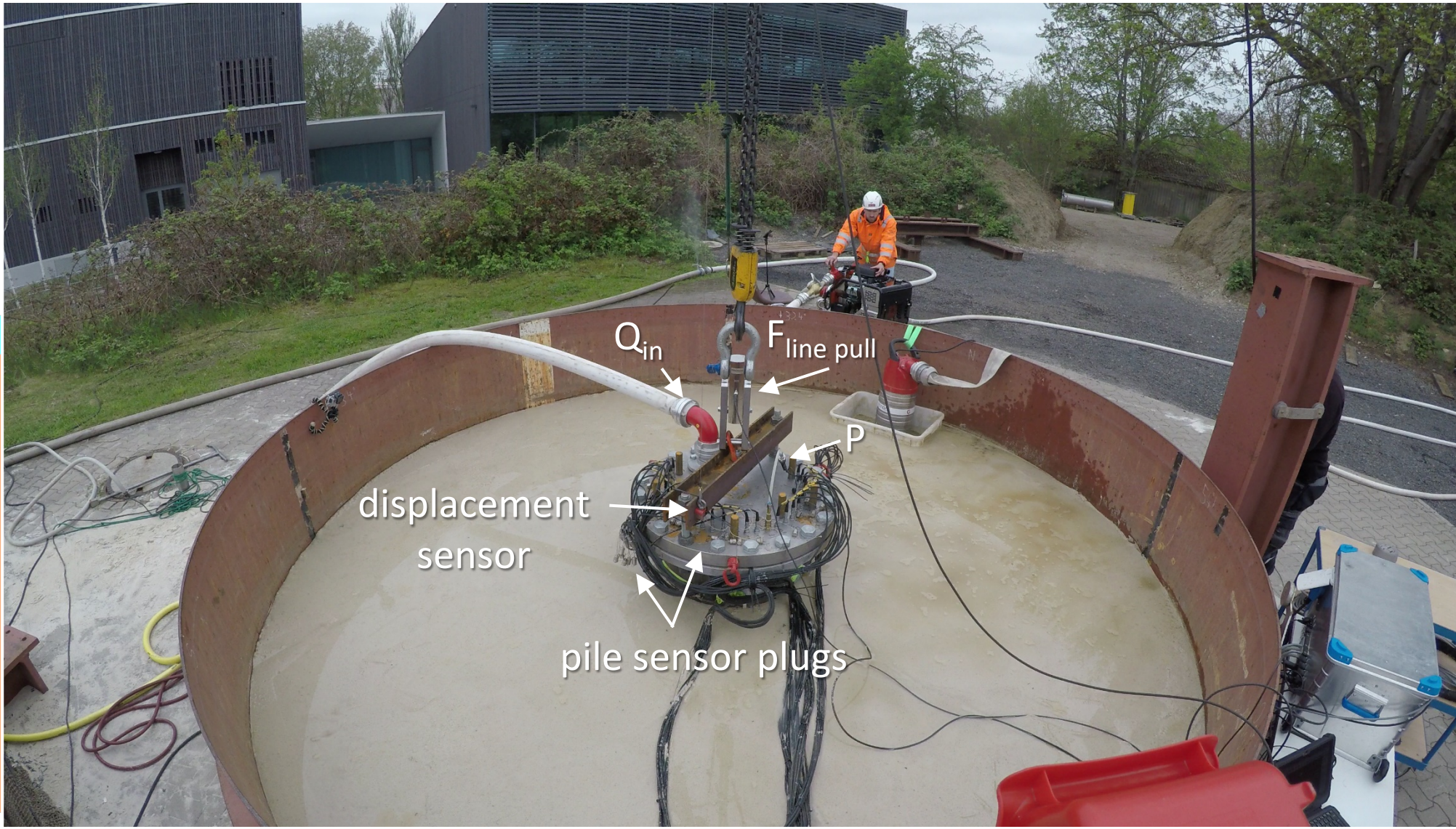
Internal dredging



Overpressure extraction

- $P_{max} \approx 13$ bar (370 kN)
- $Q_{in\ (Pmax)} = 220$ L/min
- $F_{line\ pull} = 0$ kN





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Contact info

Lead author (correspondence author)

Nils Hinzmann, M.Sc.	**n.hinzmann@tu-braunschweig.de**	**0531-391-62018**
Patrick Lehn, M.Sc.	p.lehn@tu-braunschweig.de	0531-391-62016
Dr.-Ing. Jörg Gattermann	j.gattermann@tu-braunschweig.de	0531-391-62002

Institute for Geomechanics and Geotechnics
Technische Universität Braunschweig
Beethovenstraße 51b
38106 Braunschweig
Germany

www.tu-braunschweig.de/igb/forschung/decomp

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