SINTEF Community
Postal address:
Postboks 124 Blindern
0314 Oslo, Norway
Switchboard: +47 40005100
info@sintef.no

Enterprise /VAT No:
NO 919 303 808 MVA

Test report

Testing of clamps for pipe in tube systems from August Kleven ApS

SINTEF Test Method no. 2

SANITARY LABORATORY	**DATE** 2022-01-07
AUTHOR Dag Fredrik Nedberg	**VERSION** 1
CLIENT August Kleven ApS, Fynsvej 59, 5500 Middelfart, Denmark	**CLIENT'S REFERENCE** Steen Kjølby
PROJECT NO. 102025630-2	**NUMBER OF PAGES:** 12

SUMMARY
SINTEF Community has on behalf of August Kleven ApS conducted testing of clamps for protection tubes in pipe-in-tube systems. The clamps were tested in combination with corrugated protection tubes from different suppliers, see Table 3.1.

The tests were conducted in accordance with SINTEF Test Method no. 2 "*Pipe in tube systems*", Clause 6.27 "*Clamps and protection tube - Resistance to pull-out*".
See Table 4.1 for conducted tests.

Result: **Passed**

PREPARED BY Dag Fredrik Nedberg	SIGNATURE Dag Fredrik Nedberg
CHECKED BY Bjørn-Roar Krog	SIGNATURE Bjørn-Roar Krog
APPROVED BY Lars-Erik Fiskum	SIGNATURE Lars-Erik Fiskum

REPORT NO 2021:01485	**CLASSIFICATION** Restricted	**CLASSIFICATION THIS PAGE** Restricted

Table of contents

APPENDICES

- - - No appendices - - -

1 INTRODUCTION

SINTEF Community has on behalf of August Kleven ApS conducted testing of clamps for corrugated protection tubes in pipe in tube systems. The purpose of the clamps in pipe in tube systems is to fix the protection tubes in place (typically to walls or studs), so that the inner PEX pipe can be easily replaced without interventions to the building structure.

The clamps' ability to securely fix a tube is affected by the tube's physical properties: for example, the tubes' ability to withstand deformation, the ductility of the tube material, the depth and width of the corrugations, and so on. Test results are therefore only applicable to the specific combination of clamp and protection tube model that has been tested. If the clamps are to be used in combination with different models of protection tubes, each combination of clamp-tube must be tested.

SINTEF Community has conducted testing of clamps from August Kleven ApS in combination with protection tube models from different suppliers. See Table 3.1 and 4.1.

The tests according to SINTEF Test Method no. 2 were conducted by Dag Fredrik Nedberg (M.Sc.). The tests were performed in the Sanitary lab. (U47) between 2021-12-14 and 2021-12-22.

Evaluations of impartiality have been performed in all steps of the testing process, and impartiality has been found to be in accordance with SINTEF's quality management system and the current standard for the activity.

2 TEST METHOD

The tests were conducted in accordance with SINTEF Test Method no. 2 "*Pipe in tube systems*", Clause 6.27 "*Clamps and protection tube - Resistance to pull-out*".

See Table 4.1 for conducted tests.

3 TEST OBJECTS

The tested clamps and protection tubes are listed in Table 3.1 and shown in Figure 3.1-3.11. The test objects were delivered to SINTEF Community on 2022-12-13 and on 2021-12-17. They were selected by the customer and in good condition on arrival.

Table 3.1: Test objects

Sample no.	Designation	Article number	Quantity	Figure	Dimension
1	August Kleven clamp for corrugated protection tubes, Ø25 mm	5113528	15	3.1	25 mm
2	August Kleven clamp for corrugated protection tubes, Ø28 mm	5113529	15	3.2	28 mm
3	JRG Sanipex pipe in pipe coil	5111515	50 m	3.3	25 mm
4	Roth MultiPex RiR 15/25 mm	5083703	60 m	3.4	25 mm
5	LK PE-X Universal pipe PiP, X16 x 2,0	8364883	50 m	3.5	25 mm
6	Uponor Aqua Pipe PEX 15 x 2,5 mm	5110129	3 m	3.6	25 mm
7	Høiax rør i rør 12x2,0/25	5125048	50 m	3.7	25 mm

Sample no.	Designation	Article number	Quantity	Figure	Dimension
8	JRG Sanipex varerør 29 mm f. 20 mm pex	5111586	3 m	3.8	29 mm
9	Roth MultiPex RiR, 18/28 mm	5083705	60 m	3.9	28 mm
10	Uponor Aqua Pipe PEX 18 x 2,5 mm	5110132	3 m	3.10	28 mm
11	Høiax varerør 28 mm	5125062	50 m	3.11	28 mm

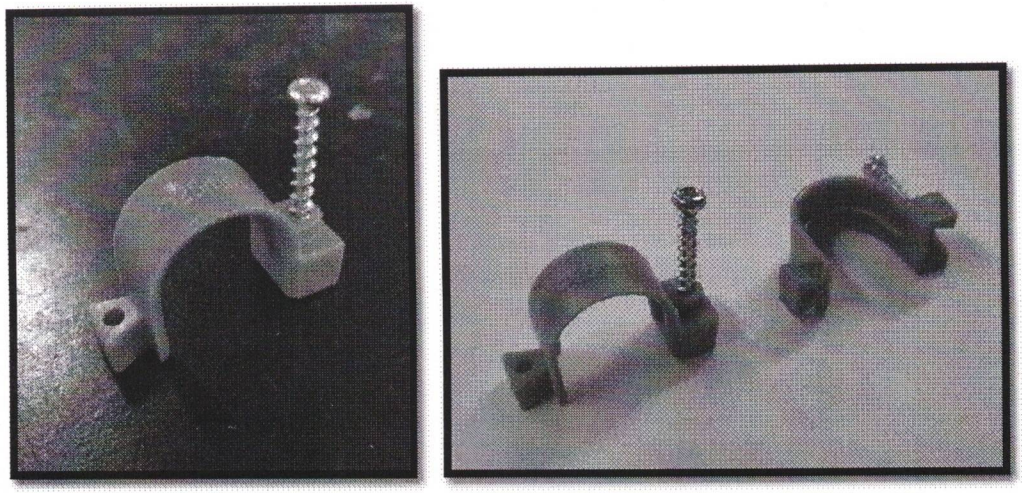

Figure 3.1: August Kleven clamp Ø25 mm – Art. no. 5113528

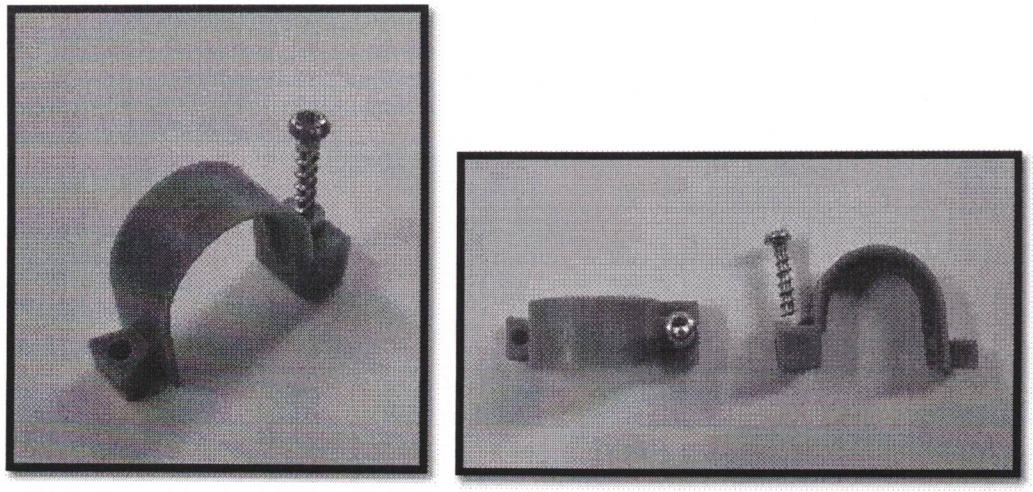

Figure 3.2: August Kleven clamp Ø28 mm – Art. no. 5113529

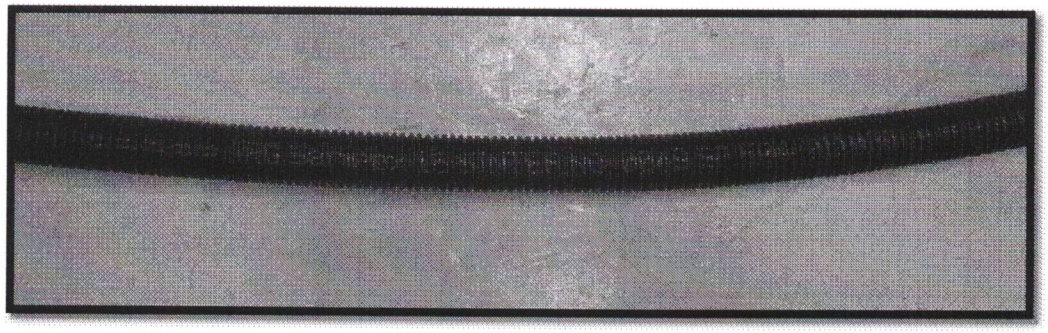

Figure 3.3: JRG Sanipex pipe in pipe coil – Art. no. 5111515

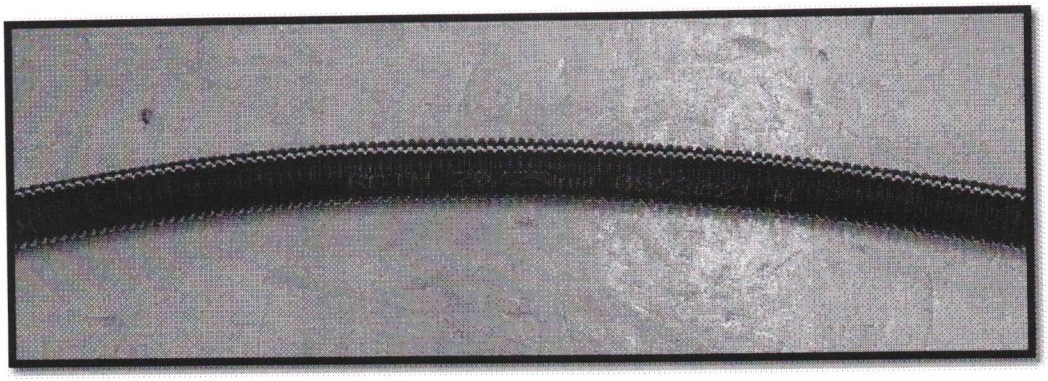

Figure 3.4: Roth MultiPex RiR 15/25 mm – Art. no. 5083703

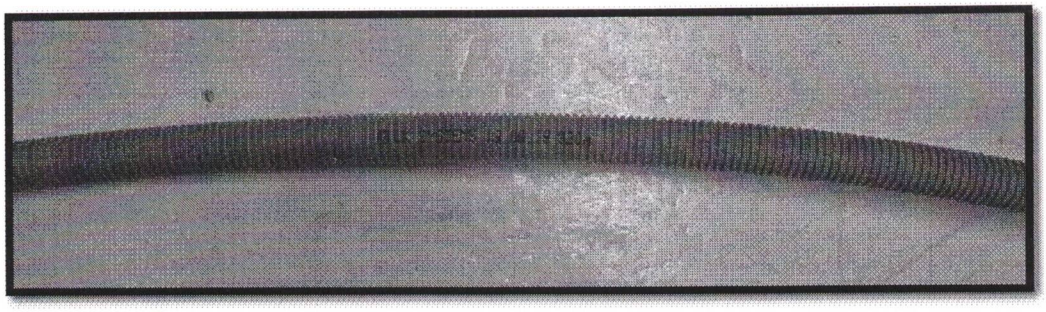

Figure 3.5: LK PE-X Universal pipe PiP, X16 x 2,0 – Art. no. 8364883

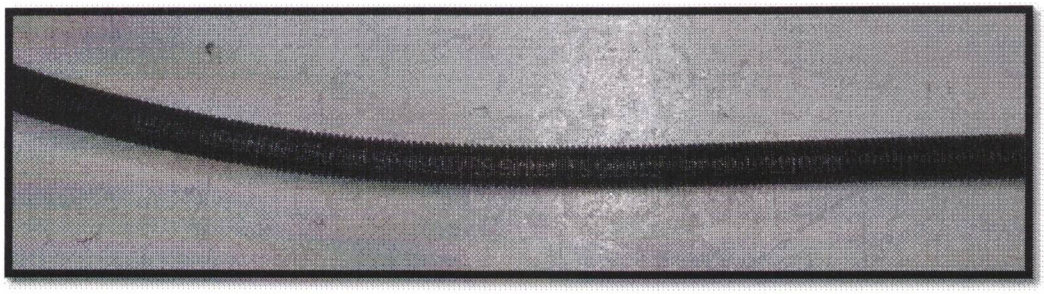

Figure 3.6: Uponor Aqua Pipe PEX 15 x 2,5 mm – Art. no. 5110129

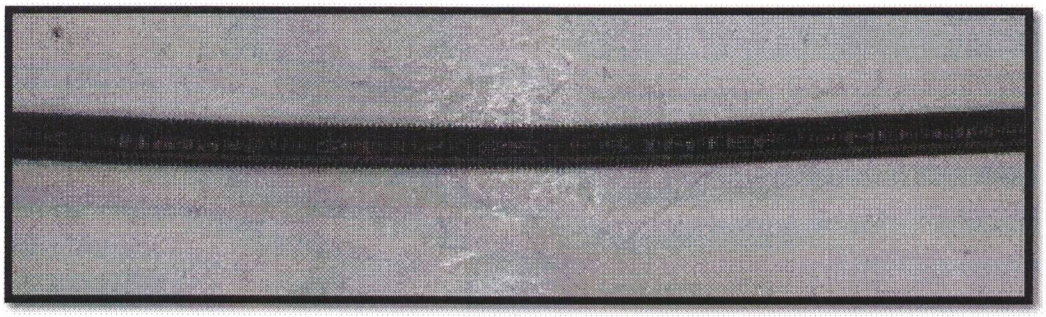

Figure 3.7: Høiax rør i rør 12x2,0/25 – Art. no. 5125048

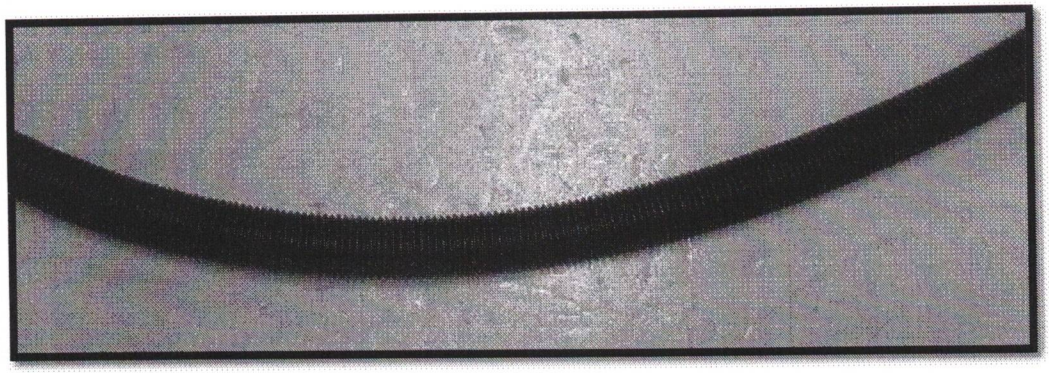

Figure 3.8: JRG Sanipex varerør 29 mm f. 20 mm pex – Art. no. 5111586

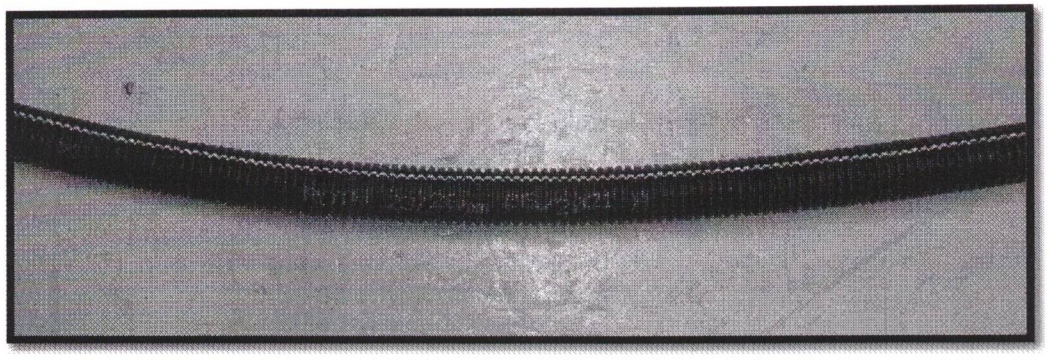

Figure 3.9: Roth MultiPex RiR, 18/28 mm – Art. no. 5083705

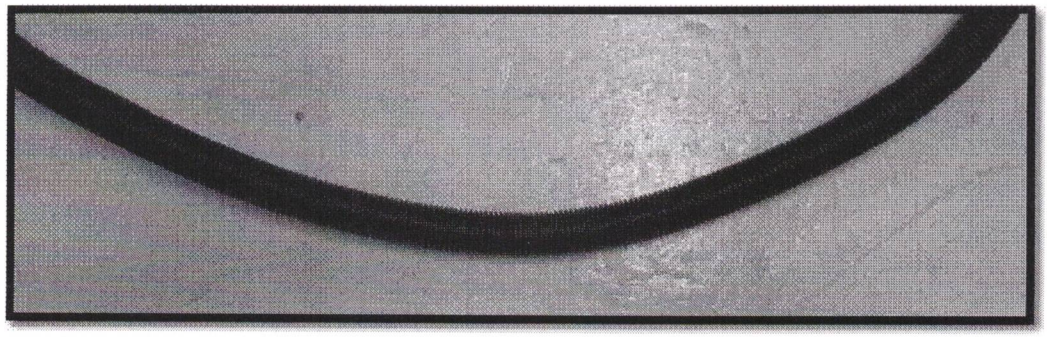

Figure 3.10: Uponor Aqua Pipe PEX 18 x 2,5 mm – Art. no. 5110132

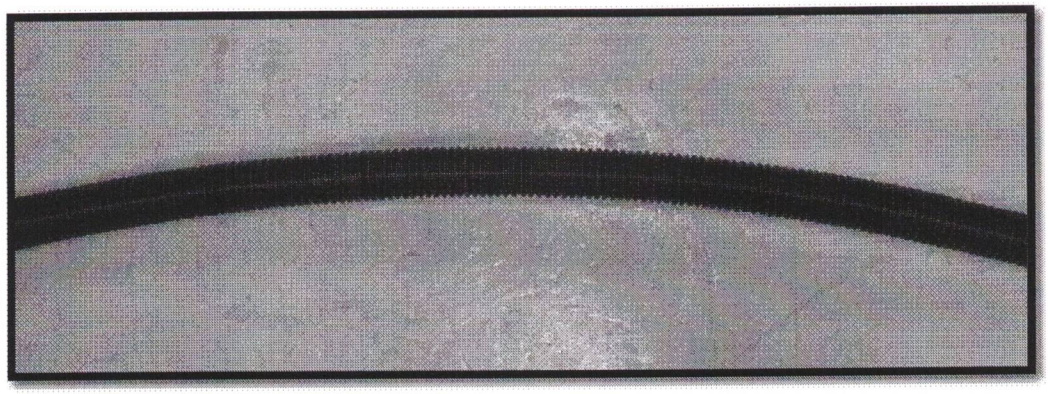

Figure 3.11: Høiax varerør 28 mm – Art. no. 5125062

4 TESTS, METHODS, REQUIREMENTS AND RESULTS

Table 4.1 Summary of results

SINTEF Test Method no. 2 **Clause 6.27 – Clamps and protection tube – resistance to pull-out**			
Clamp	Protection tube	Passed	
		Yes	No
August Kleven clamp Ø25 mm Art. no. 5113528	JRG Sanipex pipe in pipe coil Art. no. 5111515	X	
	Roth MultiPex RiR 15/25 mm Art. no. 5083703	X	
	LK PE-X Universal pipe PiP X16 x 2,0 Art. no. 8364883	X	
	Uponor Aqua Pipe PEX 15 x 2,5 mm Art. no. 5110129	X	
	Høiax rør i rør 12x2,0/25 Art. no. 5125048	X	
August Kleven clamp Ø28 mm Art. no. 5113529	JRG Sanipex Varerør 29 mm Art. no. 5111586	X	
	Roth MultiPex RiR, 18/28 mm Art. no. 5083705	X	
	Uponor Aqua Pipe PEX 18 x 2,5 mm Art. no. 5110132	X	
	Høiax varerør 28 mm Art. no. 5125062	X	

4.1 Clamps and protection tube – Resistance to pull-out (SINTEF Test Method no. 2, Clause 6.27)

Method: The test shall be made at room temperature and without the inner pipe. The protection tube, with a length of approximately 300 mm, is mounted to a wall with a clamp, according to the manufacturer's installation instruction. The clamp is fixed firmly to the wall, and a force or load of 100 N is applied in the longitudinal direction of the protection tube. See Figure 4.1-4.2.

Requirements: The protection tube shall not slip or loosen from the clamp during a period of 5 minutes.

Results:

Sample no.	Clamp	Protection tube	Samples tested	Result	
				Passed	Not passed
1, 3	August Kleven clamp Ø25 mm Art. no. 5113528	JRG Sanipex pipe in pipe coil Art. no. 5111515	3	X	
1, 4		Roth MultiPex RiR 15/25 mm Art. no. 5083703	3	X	
1, 5		LK PE-X Universal pipe PiP X16 x 2,0 Art. no. 8364883	3	X	
1, 6		Uponor Aqua Pipe PEX 15 x 2,5 mm Art. no. 5110129	3	X	
1, 7		Høiax rør i rør 12x2,0/25 Art. no. 5125048	3	X	

Sample no.	Clamp	Protection tube	Samples tested	Result	
				Passed	Not passed
2, 8	August Kleven clamp Ø28 mm Art. no. 5113529	JRG Sanipex Varerør 29 mm Art. no. 5111586	3	X	
2, 9		Roth MultiPex RiR, 18/28 mm Art. no. 5083705	3	X	
2, 10		Uponor Aqua Pipe PEX 18 x 2,5 mm Art. no. 5110132	3	X	
2, 11		Høiax varerør 28 mm Art. no. 5125062	3	X	

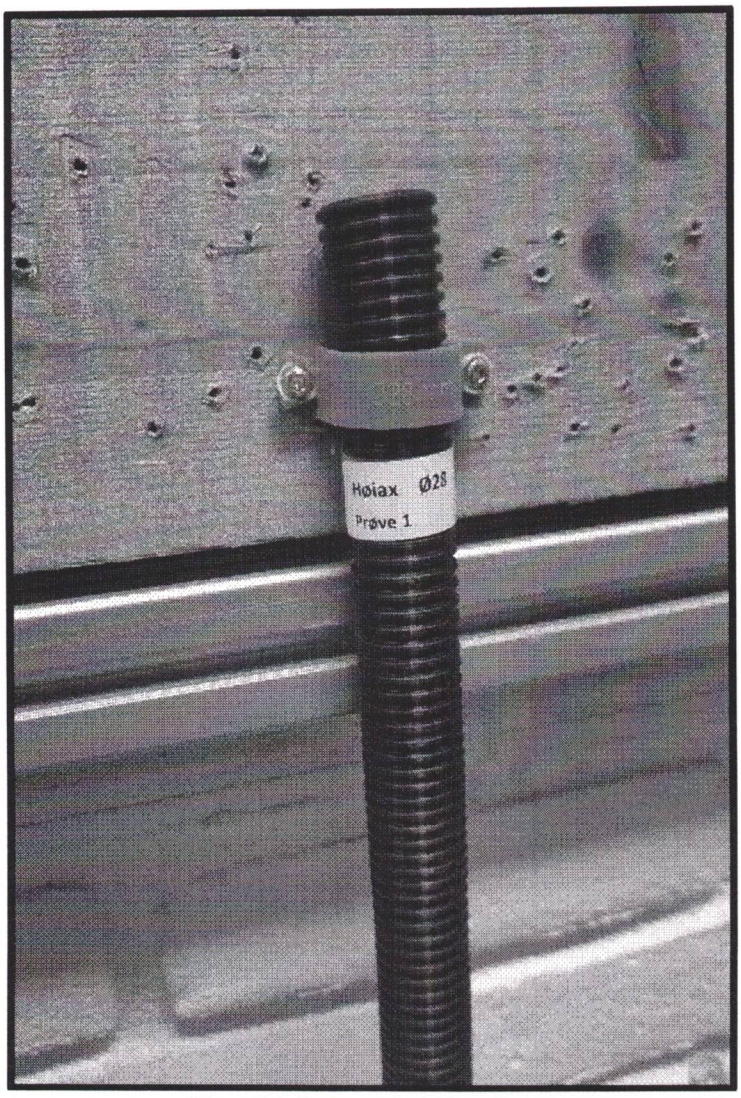

Figure 4.1: Clamp and tube installation

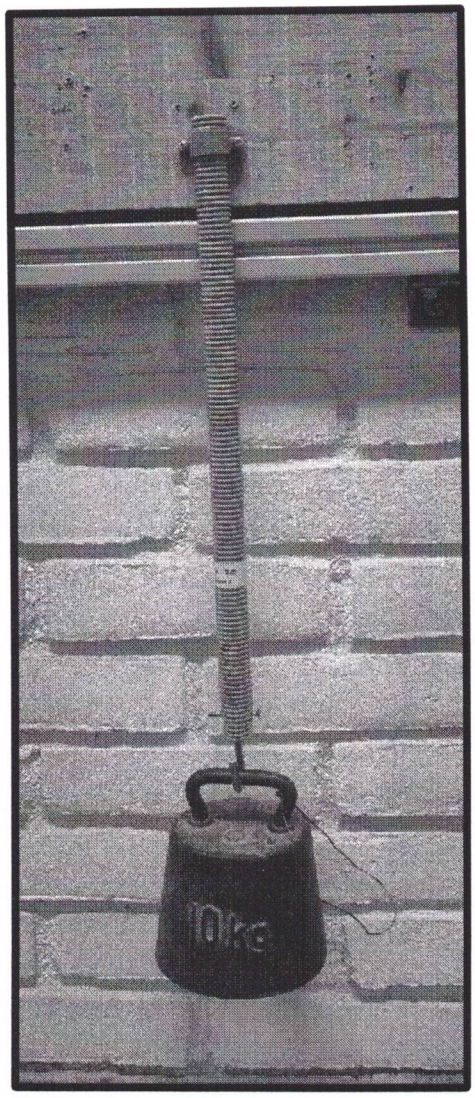

Figure 4.2: Test setup

Oslo, 2022-01-07
SINTEF Community

Dag Fredrik Nedberg

Dag Fredrik Nedberg
Adviser, M.Sc.