

Formblatt FB-K2-34-00**HAMMELMANN®****Test report application engineering****Hammelmann GmbH**

Carl-Zeiss-Straße 6 - 8

59302 Oelde

Phone: 02522 / 76-0

Fax: 02522 / 76-444

E-mail: mail@hammelmann.de

Report number: VO 913628-01**Purchase order: KA 218184**

Date: 30 August 2016

Subject: Protective boots testConfidential: ☐**Requested by: Hammeli Oy**Internal: ☒External: ☐

Contact name:	Mr. Rundberg
Street:	Jänismäentie 2
City:	01260 Vantaa
Country:	Finnland

Phone:	+358 (0) 400 433779
Mobile:	+358 (0) 40 729 3990
Fax:	
E-mail:	tom.rundberg@hammeli.fi

Sales internal: Mr. A. Papenfort

Phone: 02522 / 76 418

Test location:	Technologie Center, room 2						
Test time envelope:							
30.08.16	10:00 h	to	12:00 h	total	2:00 h	diff.	
31.08.16	13:00 h	to	14:00 h	total	1:00 h	diff.	
Set-up-, take-down time	1:00 h						
Test duration:					3:00 h		

Persons present:**Hammelmann**

Test Engineer:

Mr. S. Lückemeier

Test aims and methods:

Tests are to be made on protective rubber boots. For this the material is to be secured in a parallel vice and tested at a pressure of 3000 bar and max. nozzle reaction force of 250 N. The stand-off distance from the single nozzle and rotor jet to the surface of the material has to be a constant 75 mm and the feedrate should be 0,2 m/s.

Report number: VO 913628-01

Purchase order: KA 218184

Subject: Protective boots test

Material: rubber boots **Amount:** 3 **Condition:** new

Pump: HDP: 174 $\dot{V}$ [l/min]: 22 p [bar]: 4000

Accessories: round jet nozzle type P, rotor jet RD-flex

Test set up:

Pos. 1:

Tool

Pos. 2:

Robot

Pos. 3:

Parallel vice

Pos. 4:

Test material

Arrow:

Advance direction



Test procedures:

In the tests the tool (Pos.1) was guided by a robot (Pos.2) in a straight line across the surface of the test material. The test material (Pos.4) was secured in a parallel vice (Pos.3).

Test sequence:

Run no.1: single round jet nozzle, pressure 3000 bar, **cut** through the boot material

Run no.2: single round jet nozzle, pressure 2500 bar, **cut** through the boot material

Run no.3: single round jet nozzle, pressure 2000 bar, **cut** through the boot material

Run no.4: single round jet nozzle, pressure 1250 bar, **no cut** through the boot material

Run no.5: single round jet nozzle, pressure 1500 bar, **no cut** through the boot material

Run no.6: rotor jet, pressure 3000 bar, **no cut** through the boot material

Run no.7: mono rotor jet, pressure 3000 bar, **cut** through the boot material

Run no.8: mono rotor jet, pressure 2500 bar, **no cut** through the boot material

Run no.9: single round jet nozzle, pressure 1700 bar, **no cut** through the boot material

Conclusion: The tested boots protect against 3000 bar rotor jet, 2500 bar mono rotor jet and 1700 bar single round jet nozzle.

Report number: VO 913628-01
Purchase order: KA 218184

HAMMELMANN®

protective rubber

boot type Viking

VW 40



specification of the

boots



singel round jet

nozzle, run no. 1-5,9



Report number: VO 913628-01
Purchase order: KA 218184

HAMMELMANN®

rotor jet, run no.6-8



results run no.1-6



results run no.1-3,
cut through the boot
material



Report number: VO 913628-01
Purchase order: KA 218184

HAMMELMANN®

results run no.7-9



Formblatt FB-K2-34-00

HAMMELMANN®

Test protocol application engineering

Requested by: Hammeli Oy Pump: HDP: 174 $\dot{V}$ [l/min]: 22 p [bar]: 4000 Accessories: round jet nozzle type P, rotor jet RD-flex Material: rubber boots											Date: 30. August 2016 Report number: VO 913628-01 Purchase order: KA 218184	
											Test location: Technologie Center, room 2	
											Test Engineer: Mr. S. Lückemeier	
											Assisted by:	
											Subject: Protective boots test	

Run. no.	Pressure [bar]	$\dot{V}$ [l/min]	Nozzle			Feed rate [m/s]	React. force [N]	RPM [1/min]	α [°]	Distance [mm]	Result	Comments
			n	$\emptyset$ [mm]	Type							
1	3000	18,3	1	0,85	P	0,2	235	-	90	75	Cut through the boot material	Test-Material: rubber boot "Viking VW 40"
												Art. No. 8944
												Single nozzle type P, nozzle holder 01.01599.0317
2	2500	20,8	1	0,95	P	0,2	243	-	90	75	Cut through the boot material	Test-Material: rubber boot "Viking VW 40"
												Art. No. 8944
												Single nozzle type P, nozzle holder 01.01599.0317
3	2000	20,6	1	1	P	0,2	216	-	90	75	Cut through the boot material	Test-Material: rubber boot "Viking VW 40"
												Art. No. 8944
												Single nozzle type P, nozzle holder 01.01599.0317
4	1250	23,5	1	1,2	P	0,2	194	-	90	75	No cut through the boot material	Test-Material: rubber boot "Viking VW 40"
												Art. No. 8944
												Single nozzle type P, nozzle holder 01.01599.0317
5	1500	21,6	1	1,1	P	0,2	196	-	90	75	No cut through the boot material	Test-Material: rubber boot "Viking VW 40"
												Art. No. 8944
												Single nozzle type P, nozzle holder 01.01599.0317

Formblatt FB-K2-34-00

HAMMELMANN®

Test protocol application engineering

Requested by: Hammeli Oy Pump: HDP: 174 $\dot{V}$ [l/min]: 22 p [bar]: 4000 Accessories: round jet nozzle type P, rotor jet RD-flex Material: rubber boots											Date: 30. August 2016 Report number: VO 913628-01 Purchase order: KA 218184	
											Test location: Technologie Center, room 2	
											Test Engineer: Mr. S. Lückemeier	
											Assisted by:	
											Subject: Protective boots test	

Run. no.	Pressure [bar]	$\dot{V}$ [l/min]	Nozzle			Feed rate [m/s]	React. force [N]	RPM [1/min]	α [°]	Distance [mm]	Result	Comments
			n	$\emptyset$ [mm]	Type							
6	3000	18,9	3	0,5	P	0,2	243	~3000	90	75	No cut through the boot material	Test-Material: rubber boot "Viking VW 40"
												Art. No. 8944
												Rotor jet nozzle 00.00786.0080
7	3000	18,3	1	0,85	P	0,2	235	~3000	90	75	Cut through the boot material	Test-Material: rubber boot "Viking VW 40"
												Art. No. 8944
												Rotor jet nozzle RD-flex Mono
8	2500	18,7	1	0,9	P	0,2	218	~3000	90	75	No cut through the boot material	Test-Material: rubber boot "Viking VW 40"
												Art. No. 8944
												Rotor jet nozzle RD-flex Mono
9	1700	19,0	1	1	P	0,2	183	-	90	75	No cut through the boot material	Test-Material: rubber boot "Viking VW 40"
												Art. No. 8944
												Single nozzle type P, nozzle holder 01.01599.0317