

EXAMINATION PROTOCOL

Test Report
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Inspection technique ● UT-inspection ○ ET- inspection ○ VT- inspection ○		Title : Laminar Indications RV Shell 1 to 5- EPZ 2013									
Examination by Acquisition Evaluation Date : 21-04-3013 to 02/05/2013.		Protocol number : NRG-UT-P23278-13-27 rev. 0 Project number : P23278 Number of pages : 49 (supplements included)									
Client Name : EPZ Address : Borssele Site of examination : KCB, Borssele											
Examination subject Installation : KCB Component : RV YC 001 B001 in KCB Part (volume) : Shell 1 to 5 Material : 22NiMoCr37, cladding X6CrNiNb1810											
Examination details Method/surface : UT immersie techniek Specification/procedure : Execution deviations (from procedure) : No											
Limitations/ obstructions No other then stated.											
Examination results No reportable laminar indications were detected according procedure in segment 1,2,3,4,5 of the RV of Borssele. (see 1.1.1Appendix BAppendix B).											
Author : Reviewed : Approved :	(level 3 UT) 	Distribution EPZ Project archive Lloyds	<table border="1"> <thead> <tr> <th>Header sheet</th> <th>Supplement(s)</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>X</td> </tr> <tr> <td>X</td> <td>X</td> </tr> <tr> <td>X</td> <td>X</td> </tr> </tbody> </table>	Header sheet	Supplement(s)	X	X	X	X	X	X
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Appendix A UT Data Sheet

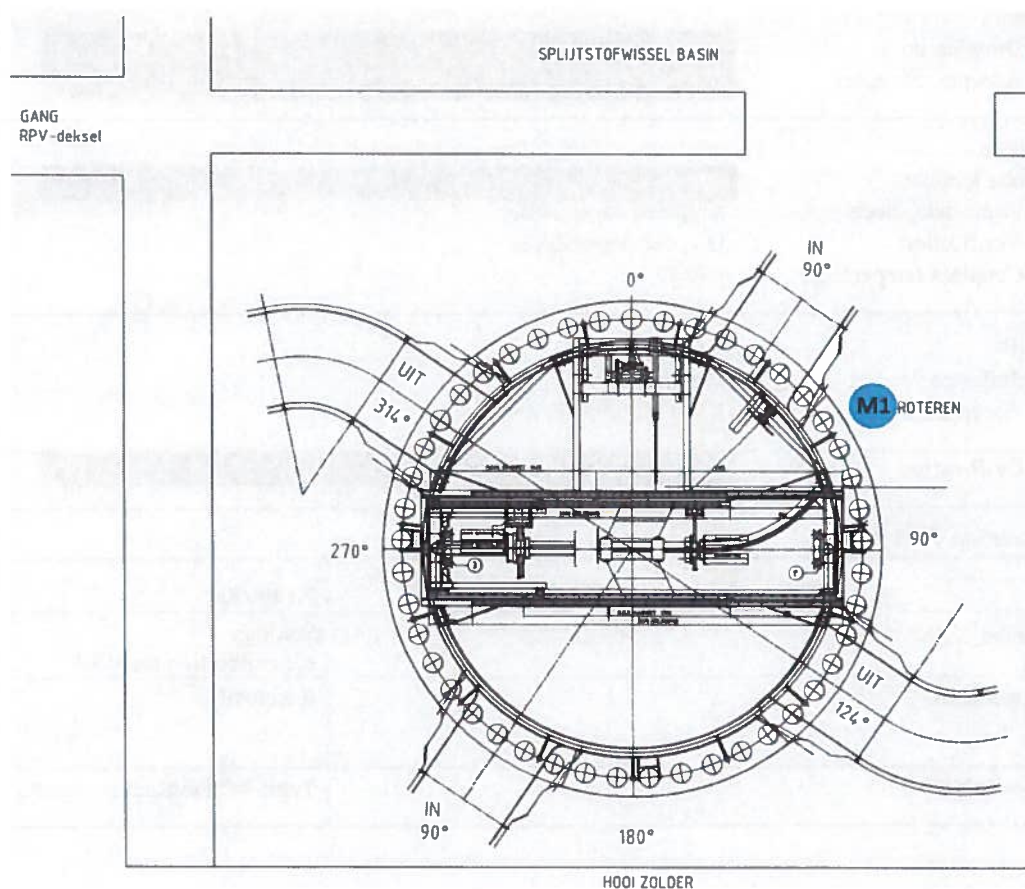
Object details:		
• Wall thickness	:	Segment 5: 341 mm, Segment 3&4: 181 mm, Segment 2: 109, Segment 1: 105/100 mm excl cladding ~4/6 mm
• Inside Diameter	:	Segment 5: Ø 3610 mm Segment 3&4: Ø 3730 mm Segment 2: 3203 mm Segment 1 2013 (radius bodem)
• Surface condition	:	OK
Equipment		
UT acquisition, evaluation and storage system		
• Equipment type	:	MicroPulse 5/ 15012
• Damage (Y/N)	:	N
• Calibration expiry date	:	14-05-2013
Scanner		
• Drawing no	:	[REDACTED]
• Acceptance report	:	[REDACTED]
UT-probes		
• Probe numbers	:	[REDACTED]
• Probe data sheets	:	Archive probes NRG
• Verification	:	OK, see Appendix E
• Couplant temperature	:	<40°C
Software		
• Software version	:	kcc_mpV70
• Acceptance report	:	K5073/ 09.95059 rev. 0
• Calibration	:	[REDACTED]
Examination data files		
Name	Size, Date, time	Remarks
<input type="checkbox"/> Lamind_EPZ2013.ist	4/23/2013 2:57	2,195 K Settings see calibration protocol
See Appendix C		Result-files
Not applicable		Table with evaluation results

Appendix B Remarks/Results

Coordinates and axes

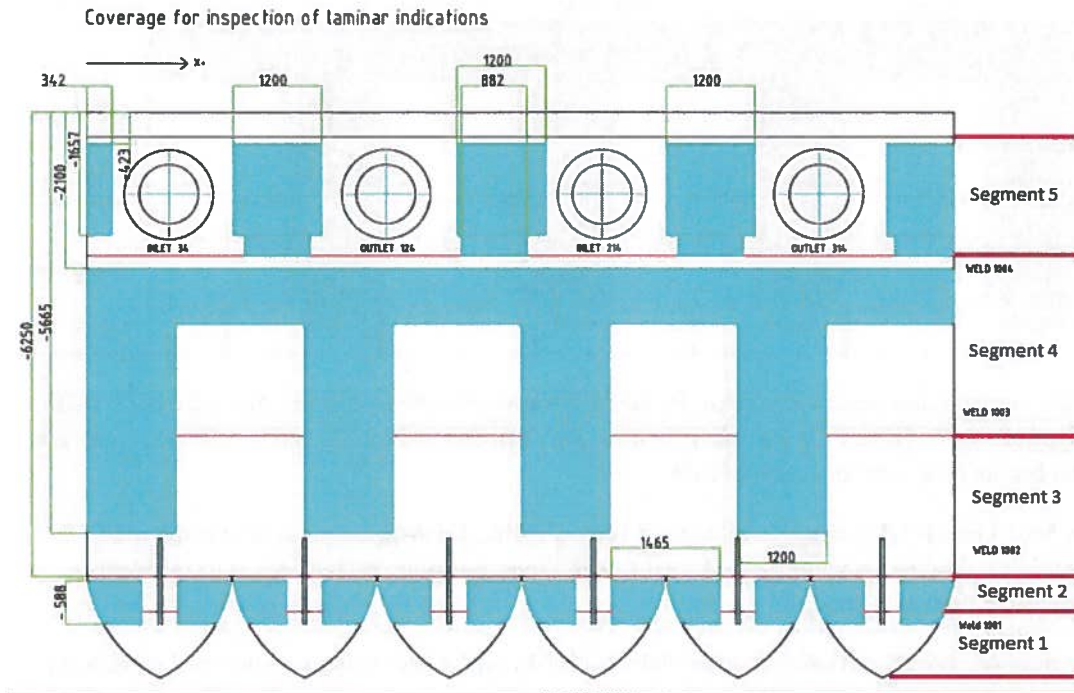
For the inspection area following coordinates are valid:

- X-axis : Distance in mm's in circumferential direction along the vessel wall projected to a diameter of \varnothing 3730mm. $360^\circ = 11718$ mm
- X positive : Clockwise
- X = 0 : The 0-position is according drawing of KCB. The begin switch is positioned at X=0. (see figure below). The 0-position in the probe holder is probe 13- 0L.
- Y-axis : Distance in mm from the vessel head flange
- Y positive : Moving upwards
- Y = 0 : At the vessel head flange.
- Z = : Depth in mm's from the inside surface (z values are positive)
- Z = 0 : At the inside surface.



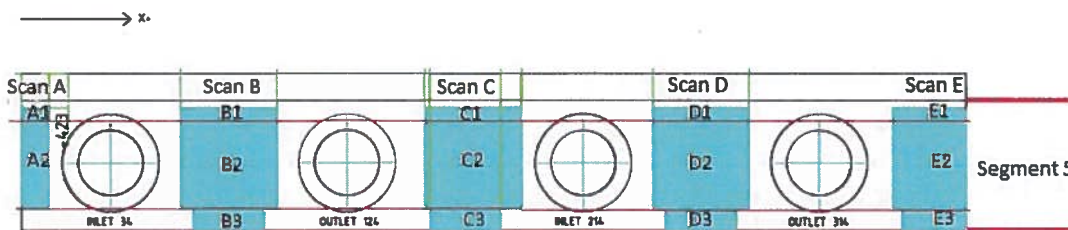
Coverage

The inspection coverage of the 5 segments on laminar indications is marked in the sketch below.



Results

Segment 5 was scanned in 5 vertical strips (A to E) divided in three scan patches (1,2,3) as shown in the image below.

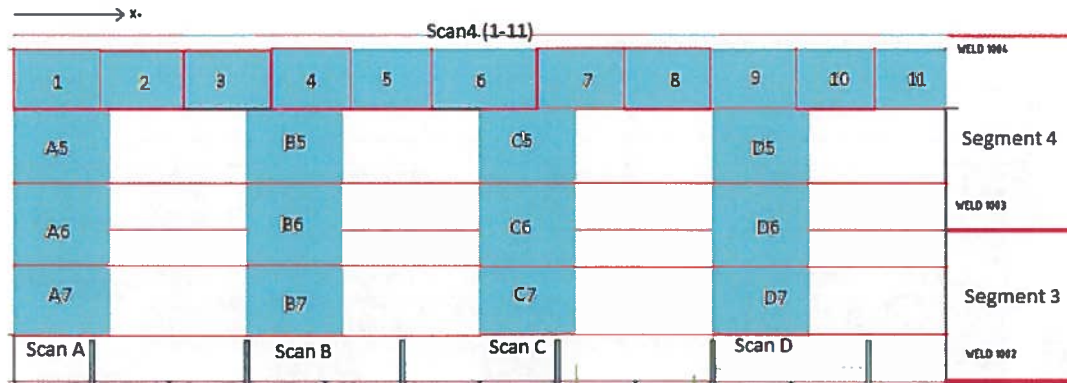


Each separate scan patch is evaluated, for the BCD-views of probe 14-0L2 see Appendix D.1 to Appendix D.14. Probe 14 is applicable for detection of laminar indications and is calibrated on $\varnothing 3$ mm flat bottom holes with an upgain of 9 dB.

In segment 5 no indications above 100% FSH are detected.

According to procedure no reportable laminar indications were detected in segment 5.

Segment 3&4 was scanned in together with the inspection of Weld 1004 (Scan4) and in 4 vertical strips (A to D) divided in three scan patches (5,6,7) as shown in the image below.



Each separate scan patch is evaluated, for the BCD-views of probe 14-0L2 see Appendix D.15 D.1 to Appendix D.37. Probe 14 is applicable for detection of laminar indications and is calibrated on $\varnothing 3$ mm flat bottom holes with an upgain of 9 dB.

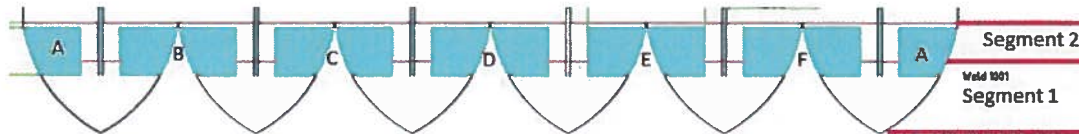
In Scan 4 (patch 1-11) circumferential weld 1004 is visible due to higher noise level in the weld, multiple indication above 100% FSH are detected. When evaluating the indications no reportable laminar indication is detected.

In Scan A6, B6, C6 and D6 circumferential weld 1003 is visible due to higher noise level in the weld, No indications above 100% FSH are detected.

In the other scan patches of segment 3 and 4 no indications above 100% FSH are detected.

According to procedure no reportable laminar indications were detected in segment 3 and 4.

Segment 1&2 were scanned in 6 scans (A to F) between the core supports as shown in the image below.



Each separate scan patch is evaluated, for the BCD-views of probe 14-0L2 see Appendix D.38 to Appendix D.43. Probe 14 is applicable for detection of laminar indications and is calibrated on $\varnothing 3$ mm flat bottom holes with an upgain of 9 dB.

Weld 1001 is visible due to higher noise level in the weld, no indication above 100% FSH is detected

In segment 1&2 no indications above 100% FSH are detected.

According to procedure no reportable laminar indications were detected in segment 1&2.

Conclusion

No reportable laminar indications were detected according procedure in segment 1,2,3,4,5 of the RV of Borssele. Only indications below reporting level were detected near the circumferential weld 1001, 1003 and 1004 of the RV.

Appendix C Result Files

Scan Segment 5/4/3

Scan A+E

1A + 1E.res	5/2/2013 3:51	452,975 KB	RES File
2E + 2A.res	4/22/2013 16:48	1,174,370 KB	RES File
2E.res	4/22/2013 16:13	854,307 KB	RES File
3E.res	4/22/2013 17:15	174,739 KB	RES File
5A.res	4/22/2013 19:25	1,339,532 KB	RES File
6A met ingetekende las.res	4/22/2013 21:26	1,340,688 KB	RES File
6A.res	4/22/2013 21:14	1,340,688 KB	RES File
7A.res	4/22/2013 22:17	867,862 KB	RES File

Scan B

1B en ophangoor 1021 M2_-288...	5/2/2013 9:56	1,579,041 KB	RES File
1B en ophangoor 1021.res	5/2/2013 9:19	1,179,741 KB	RES File
2B geheel.res	4/23/2013 9:12	1,383,361 KB	RES File
2B UCC2002.tls	4/30/2013 14:26	2 KB	TLS File
2B_deel1.res	4/23/2013 3:53	444,415 KB	RES File
3B.res	4/22/2013 17:55	187,042 KB	RES File
5B.res	4/23/2013 2:19	1,339,532 KB	RES File
6B met ingetekende las.res	4/23/2013 0:49	1,340,698 KB	RES File
6B.res	4/23/2013 0:51	1,340,698 KB	RES File
7B.res	4/22/2013 23:29	867,871 KB	RES File

Scan C














1C.res	5/2/2013 10:45	RES File	429,309 KB
2C.res	4/21/2013 18:43	RES File	1,116,680 KB
3C rescen.res	4/21/2013 20:03	RES File	188,006 KB
3C.res	4/21/2013 19:26	RES File	241,302 KB
5C.res	4/21/2013 16:46	RES File	1,338,935 KB
6C M1_6700_7000 M2_-4400_-4000 Grid 2...	4/22/2013 0:26	RES File	561,005 KB
6C M1_6800_6900 M2_-4300_-4100 extra ...	4/22/2013 0:43	RES File	619,710 KB
6C M1_6800_6900 M2_-4300_-4100 Grid 2...	4/21/2013 23:52	RES File	97,244 KB
6C met ingetekende las.res	4/22/2013 1:42	RES File	1,337,628 KB
6C.res	4/21/2013 23:28	RES File	1,337,628 KB
7C.res	4/21/2013 21:53	RES File	865,414 KB

Scan D

1D met ophangoor 1023.res	5/2/2013 12:22	RES File	1,686,277 KB
2D compleet met ophangoor lijnen.res	4/22/2013 16:15	RES File	1,364,980 KB
2D compleet.res	4/22/2013 14:51	RES File	1,364,980 KB
2D deel2.res	4/22/2013 14:58	RES File	423,860 KB
2D M1_897-8064 zonder ophangoren.res	4/22/2013 13:31	RES File	842,858 KB
2D.res	4/22/2013 14:20	RES File	946,565 KB
3D.res	4/22/2013 12:00	RES File	238,190 KB
5D.res	4/22/2013 11:03	RES File	1,335,745 KB
6D M1_8788_9334 M2_-4810_-3620.res	4/22/2013 3:58	RES File	615,838 KB
6D met lijntjes en taster 13 delay halverw...	4/22/2013 9:44	RES File	1,342,845 KB
6D taster 13 delay halverwege aangepast....	4/22/2013 9:00	RES File	1,342,845 KB
6D.res	4/22/2013 8:54	RES File	1,342,845 KB
7D.res	4/22/2013 2:37	RES File	865,414 KB



Scans Segment 2/1

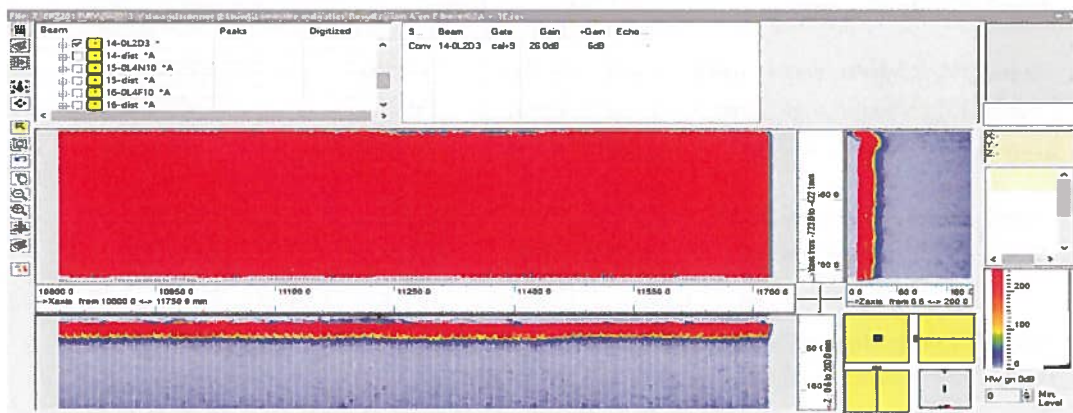
 Segm1_-30_30graden_deel1+2.res	4/21/2013 15:14	RES File	1,299,505 KB
 Segm1_-30_30graden_deel3.res	4/21/2013 15:37	RES File	364,945 KB
 Segm2_30_90graden_deel1+2.res	4/22/2013 9:53	RES File	1,104,073 KB
 Segm2_30_90graden_deel3.res	4/22/2013 10:30	RES File	296,068 KB
 Segm3_90_150graden_deel1+2.res	4/22/2013 15:58	RES File	1,114,883 KB
 Segm3_90_150graden_deel3.res	4/22/2013 16:22	RES File	303,166 KB
 Segm4_150_210graden_deel1+2 prf400....	4/23/2013 13:14	RES File	1,105,076 KB
 Segm4_150_210graden_deel1+2.res	4/23/2013 9:33	RES File	1,105,137 KB
 Segm4_150_210graden_deel3.res	4/23/2013 9:53	RES File	306,856 KB
 Segm5_210_270_graden_deel1+2.res	4/23/2013 16:20	RES File	987,602 KB
 Segm5_210_270_graden_deel3.res	4/23/2013 16:40	RES File	255,971 KB
 Segm6_270_330_graden_deel1+2.res	4/24/2013 10:15	RES File	1,105,091 KB
 Segm6_270_330_graden_deel3.res	4/24/2013 10:37	RES File	306,856 KB



Appendix D BCD-scans

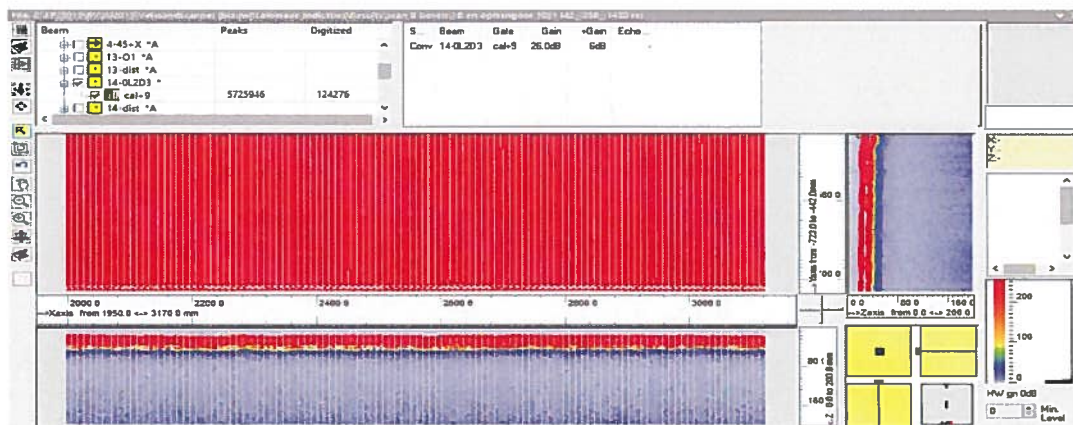
D.1 Segment 5 – Scan 1A – X=0/355mm and and Y=-420/-715 mm

Probe 0° 2MHz Calibrated on ø3 mm FBH
 No indications above 100% FSH are detected



D.2 Segment 5 – Scan 1B – X=1990/3130 mm and Y=-420/-715 mm

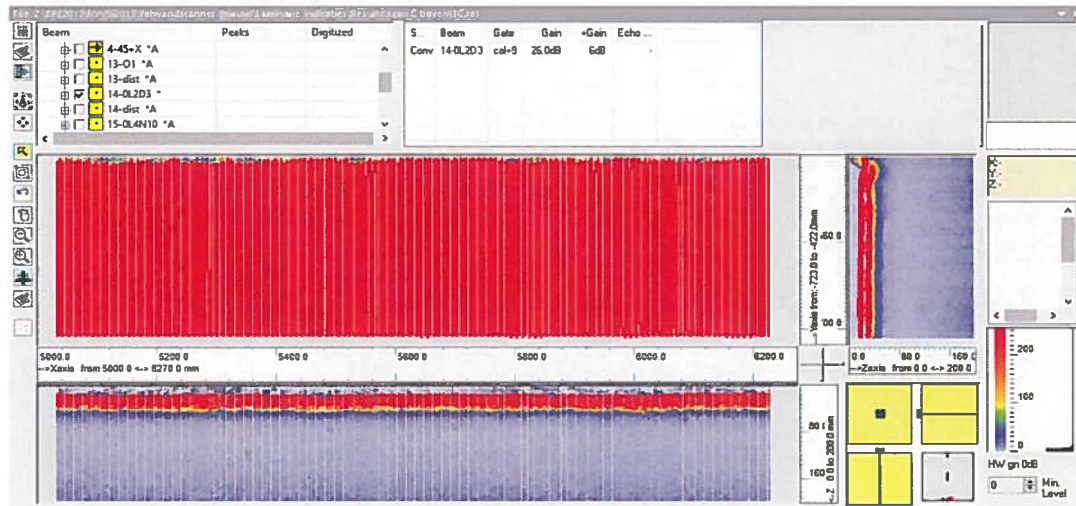
Probe 0° 2MHz Calibrated on ø3 mm FBH
 No indications above 100% FSH are detected



D.3 Segment 5 – Scan 1C – X=5030/6225mm and Y=-420/-715 mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

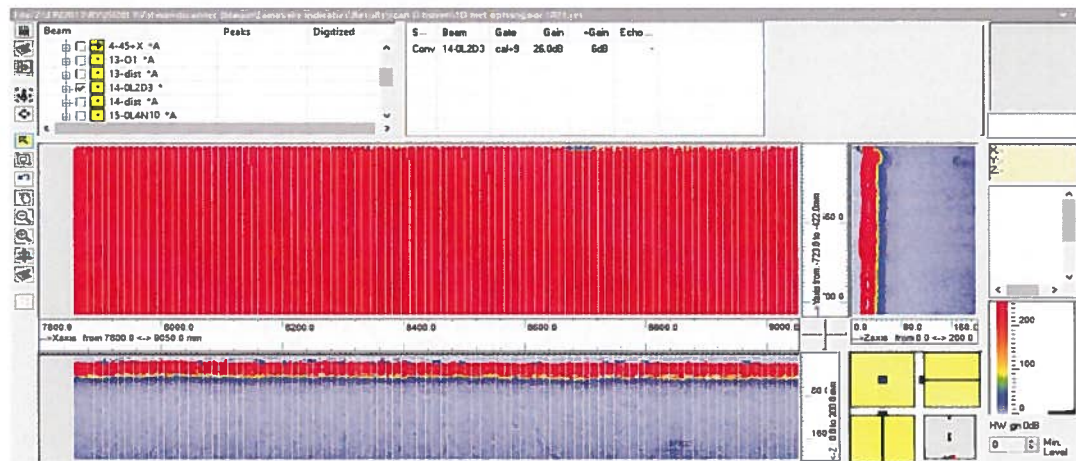
No indications above 100% FSH are detected



D.4 Segment 5 – Scan 1D – X=7850/9000mm and Y=-420/-715 mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

No indications above 100% FSH are detected

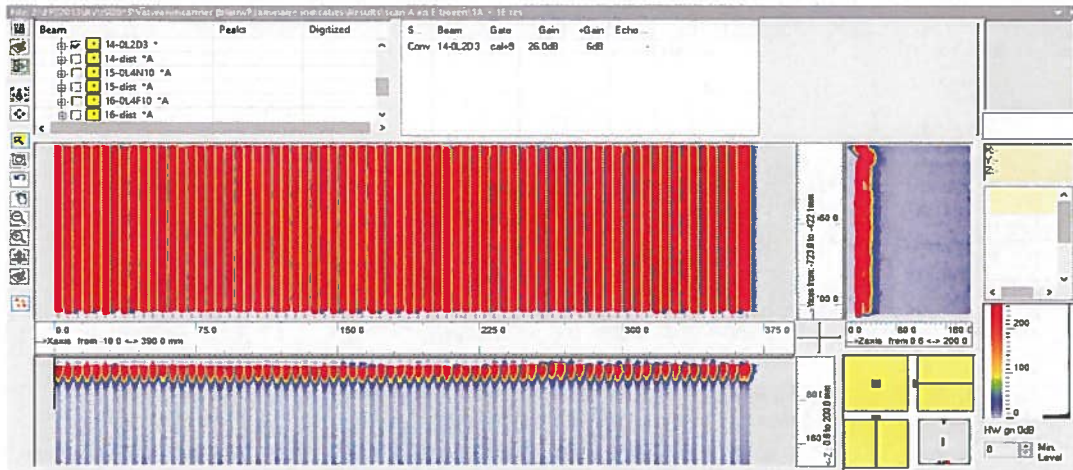




D.5 Segment 5 – Scan 1E – X=10830/11718mm and Y=-420/-715 mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

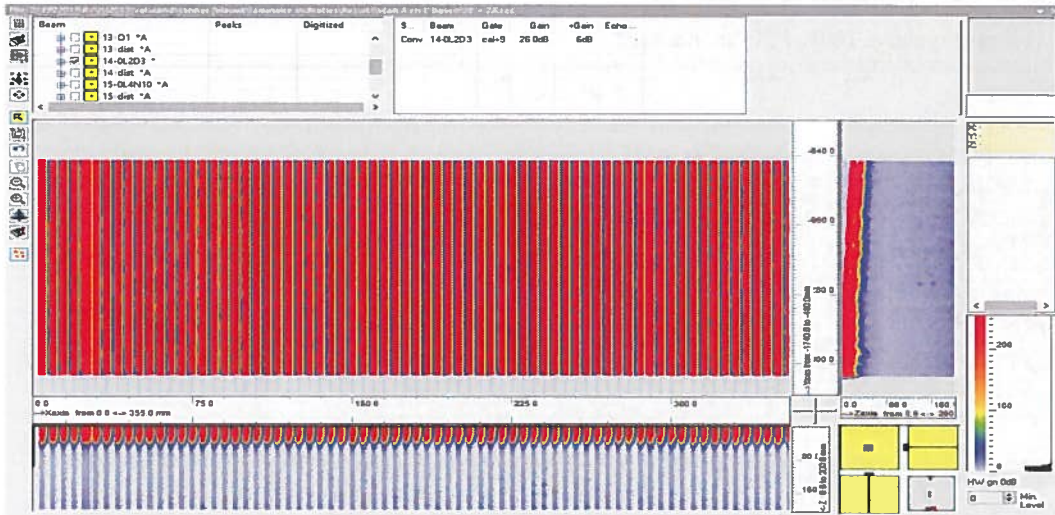
No indications above 100% FSH are detected





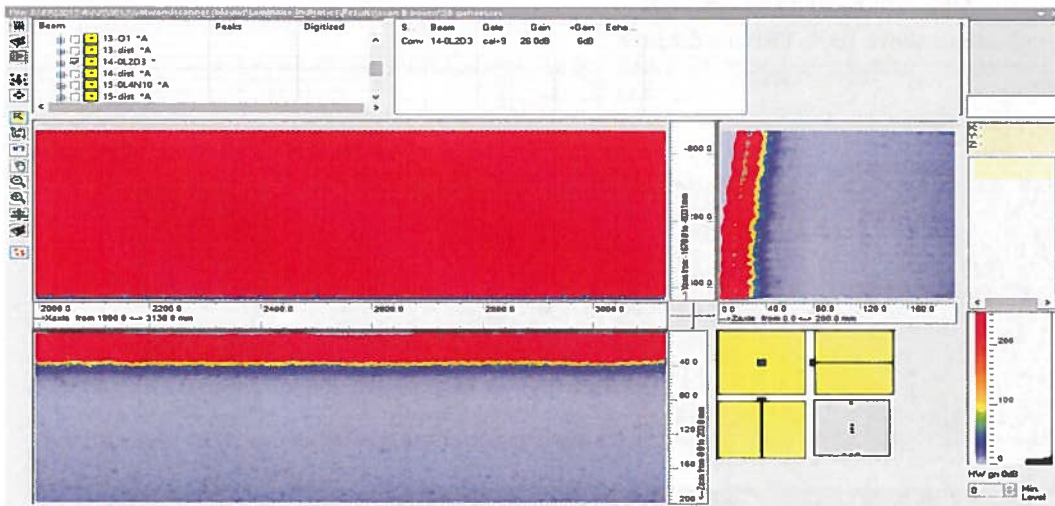
D.6 Segment 5 – Scan 2A – X=0/355mm and Y=-530/-1660mm

Probe 0° 2MHz Calibrated on ø3 mm FBH
 No indications above 100% FSH are detected



D.7 Segment 5 – Scan 2B – X=1990/3130 mm and Y=-1670/-660 mm

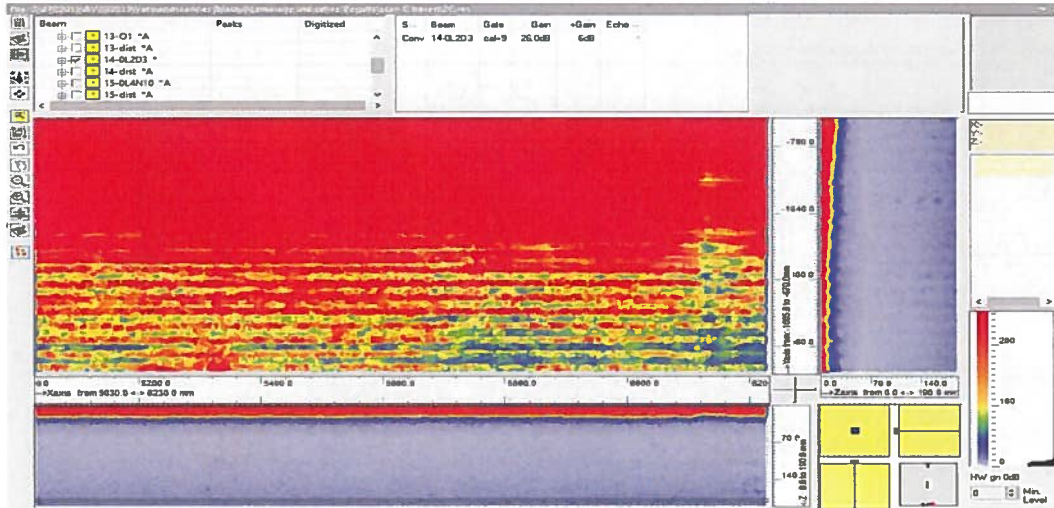
Probe 0° 2MHz Calibrated on ø3 mm FBH
 No indications above 100% FSH are detected





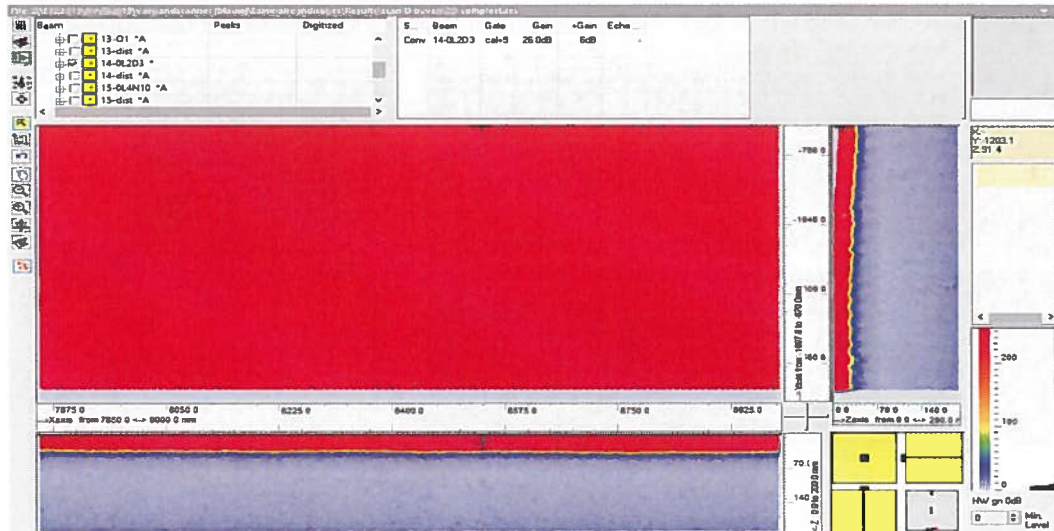
D.8 Segment 5 – Scan 2C – X=5030/6225mm and Y=-1665/-670mm

Probe 0° 2MHz Calibrated on ø3 mm FBH
 No indications above 100% FSH are detected



D.9 Segment 5–Scan 2D – X=7850/9000 mm and Y=-1690/-670mm

Probe 0° 2MHz Calibrated on ø3 mm FBH
 No indications above 100% FSH are detected

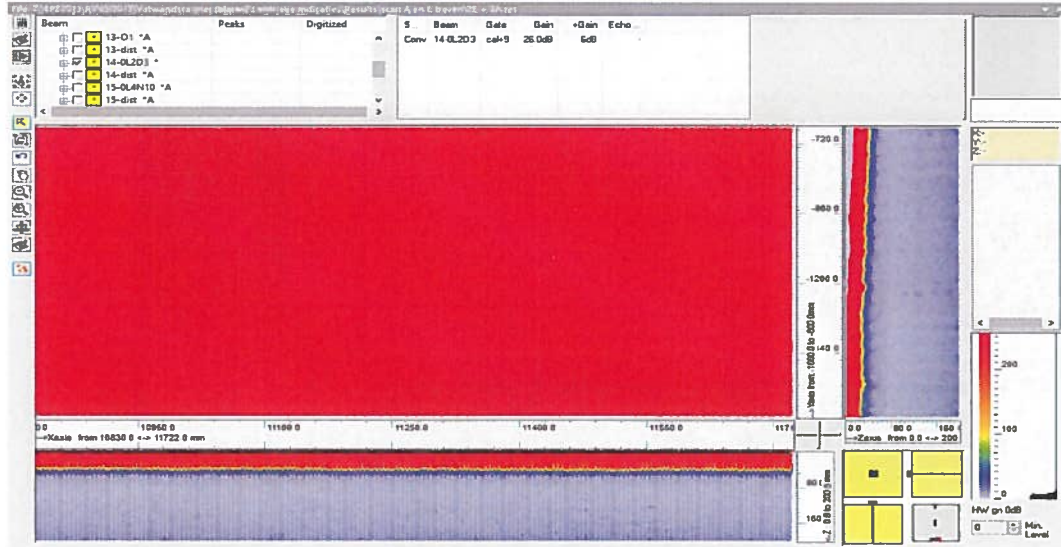




D.10 Segment 5—Scan 2E—X=10830/11718 mm and Y=-1660/-660 mm

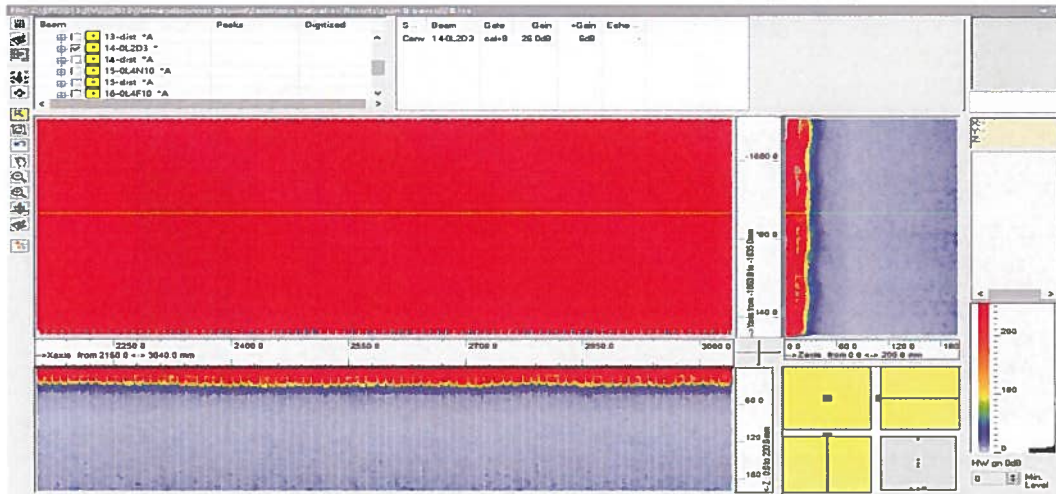
Probe 0° 2MHz Calibrated on ø3 mm FBH

No indications above 100% FSH are detected



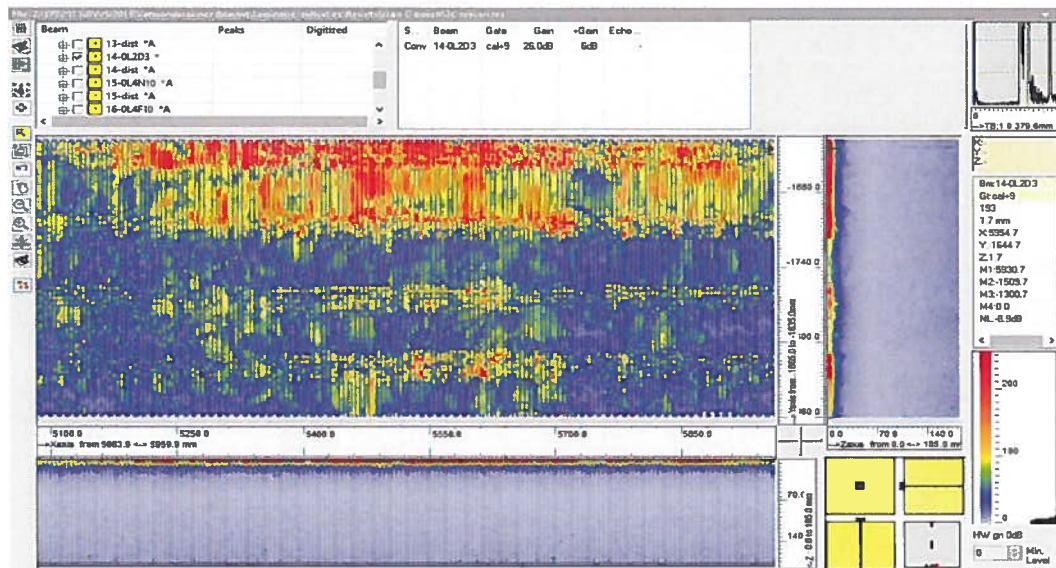
D.11 Segment 5 – Scan 3B – X=2150/3040mm and Y=-1860/-1635mm

Probe 0° 2MHz Calibrated on ø3 mm FBH
 No indications above 100% FSH are detected



D.12 Segment 5 – Scan 3C – X=5080/5960mm and Y=-1865/-1635mm

Probe 0° 2MHz Calibrated on ø3 mm FBH
 No indications above 100% FSH are detected

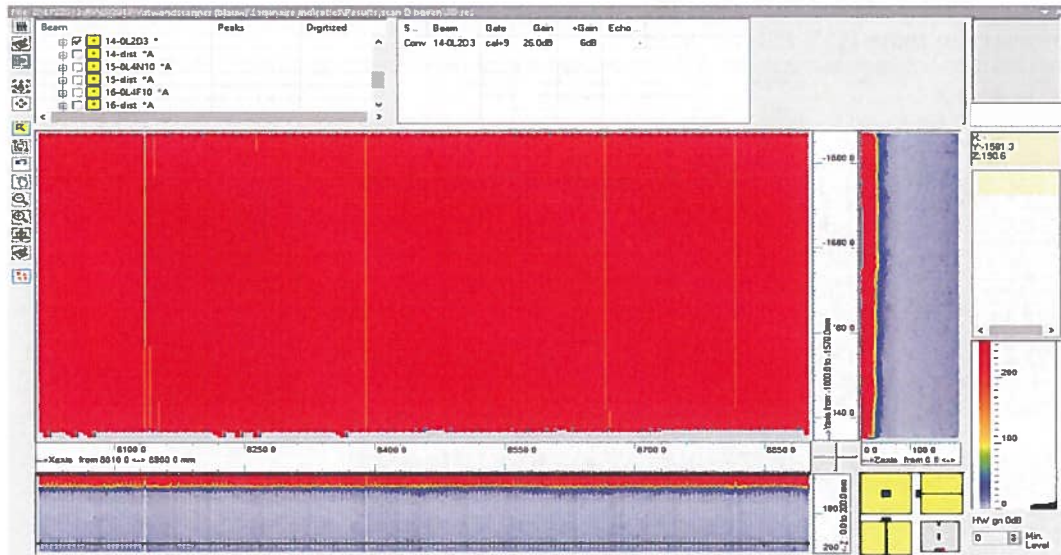




D.13 Segment 5 – Scan 3D – X=8010/8900 mm and Y=-1860/-1570mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

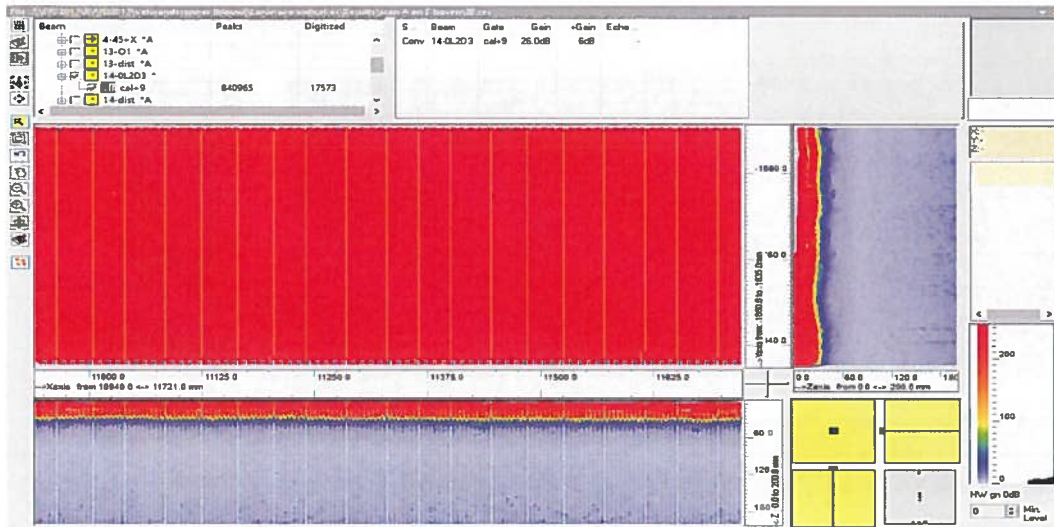
No indications above 100% FSH are detected





D.14 Segment 5 –Scan 3E– X=10940/11721mm and Y=-1860/-1635mm

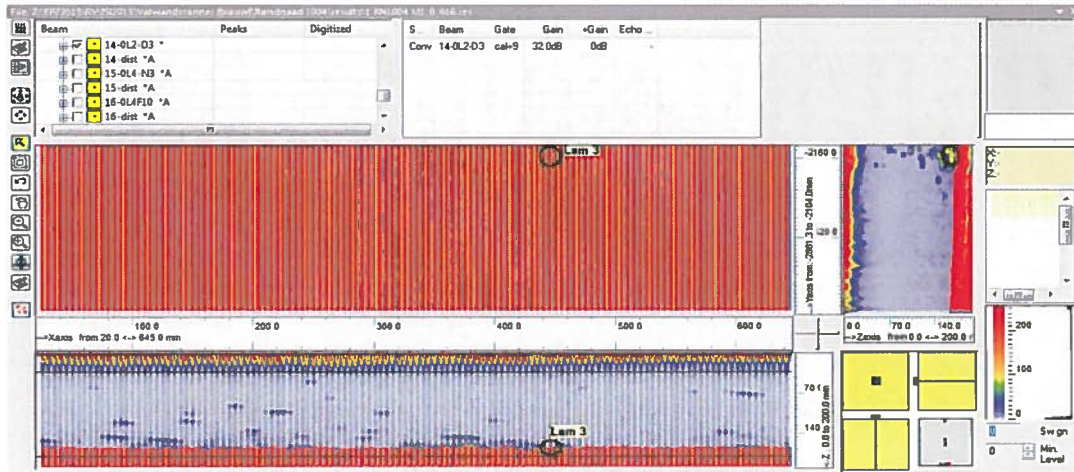
Probe 0° 2MHz Calibrated on ø3 mm FBH
 No indications above 100% FSH are detected



D.15 Segment 4 – Scan 1 – X=20/645mm and Y=-2855/-2100mm

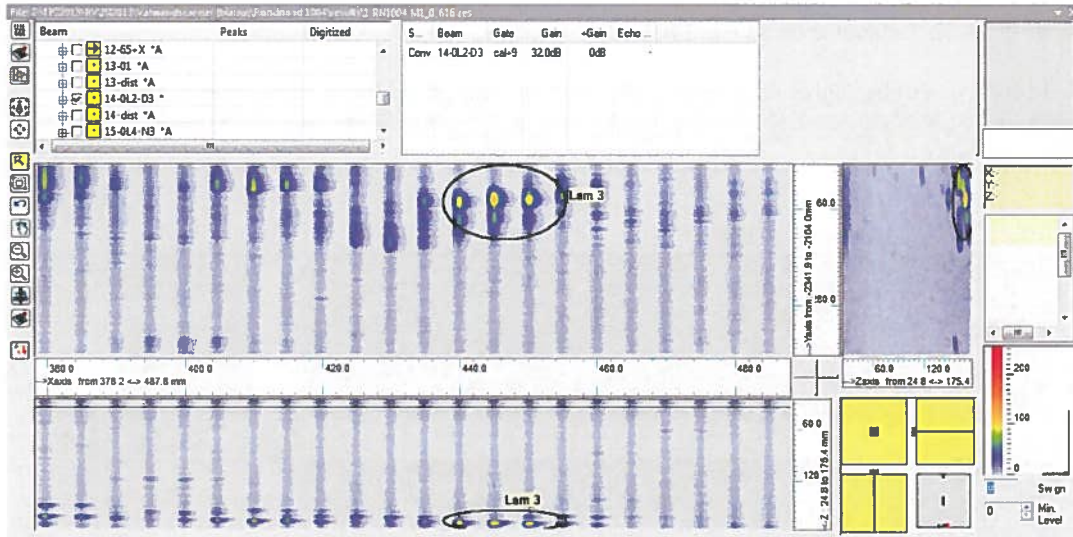
Probe 0° 2MHz Calibrated on ø3 mm FBH

Weld 1004 is visible, higher noise level in the weld, one indication above 100% FSH is detected

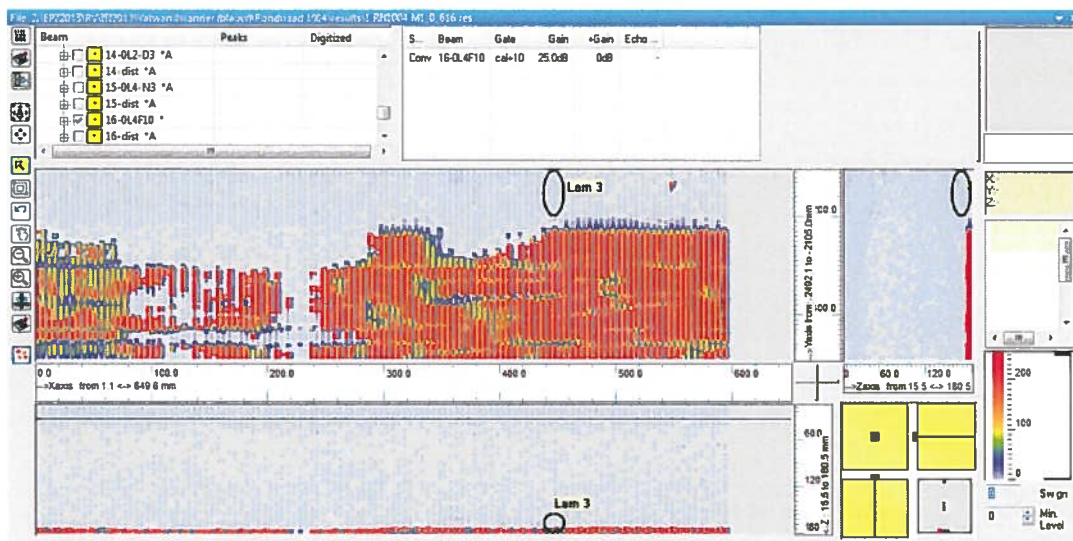


Laminaire Indicatie 3

- Probe 14 -0L2-D3 >100% FSH.



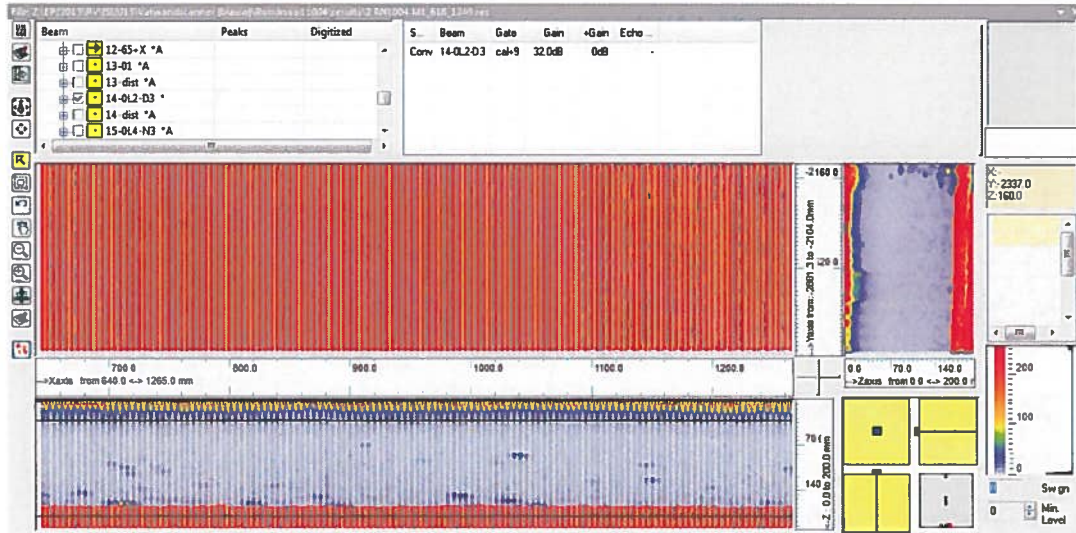
16-0L4F10. Amplitude <<50%FSH. The indication is not reportable



D.16 Segment 4 – Scan 2 – X=640/1265mm and Y=-2855/-2100mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

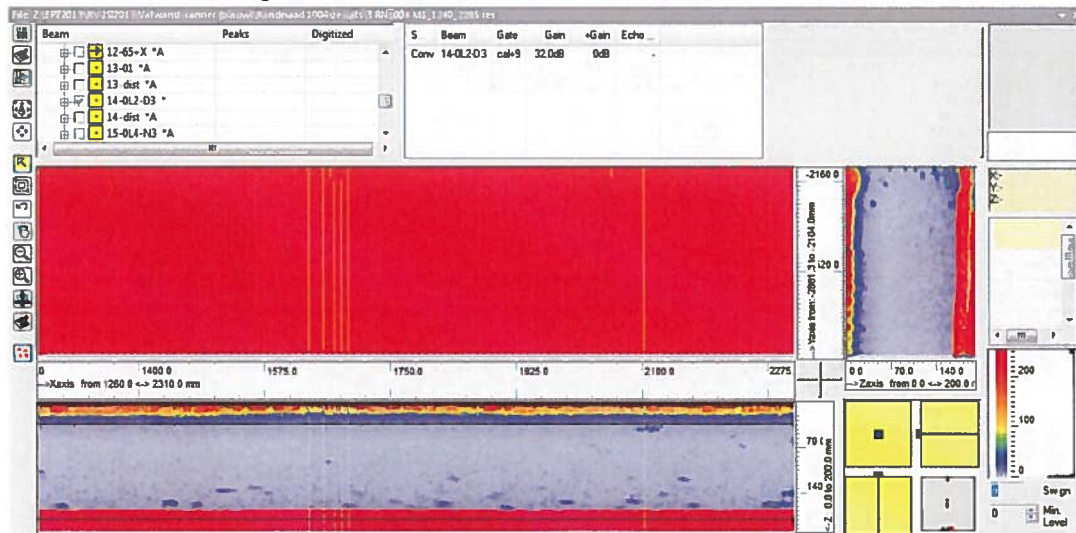
Weld 1004 is visible, higher noise level in the weld, no indication above 100% FSH is detected



D.17 Segment 4 – Scan 3 – X=1260/2310mm and Y=-2855/-2100mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

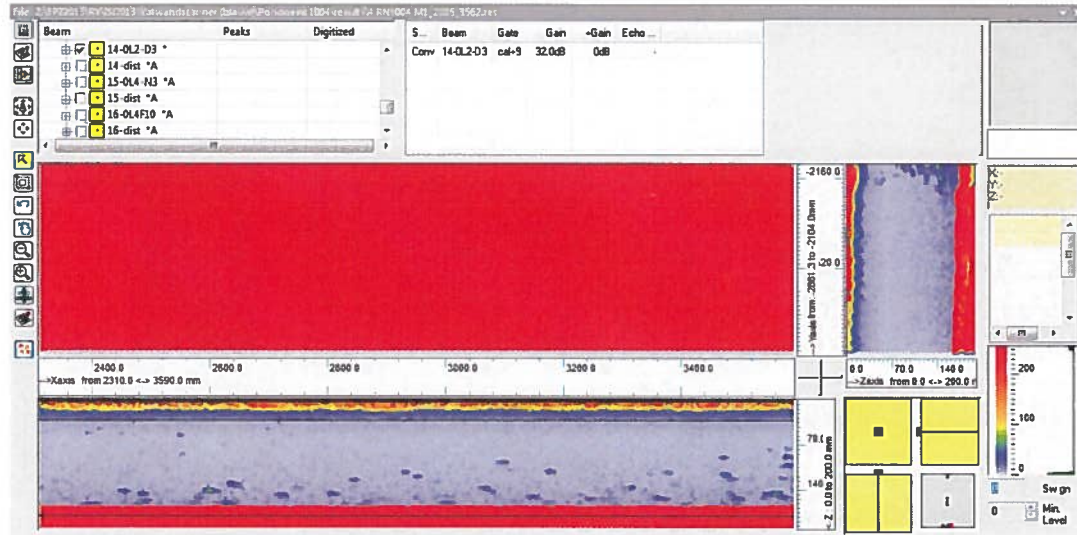
Weld 1004 is visible, higher noise level in the weld, no indication above 100% FSH is detected



D.18 Segment 4 – Scan 4 – X=2310/3590mm and Y=-2855/-2100mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

Weld 1004 is visible, higher noise level in the weld, no indication above 100% FSH is detected

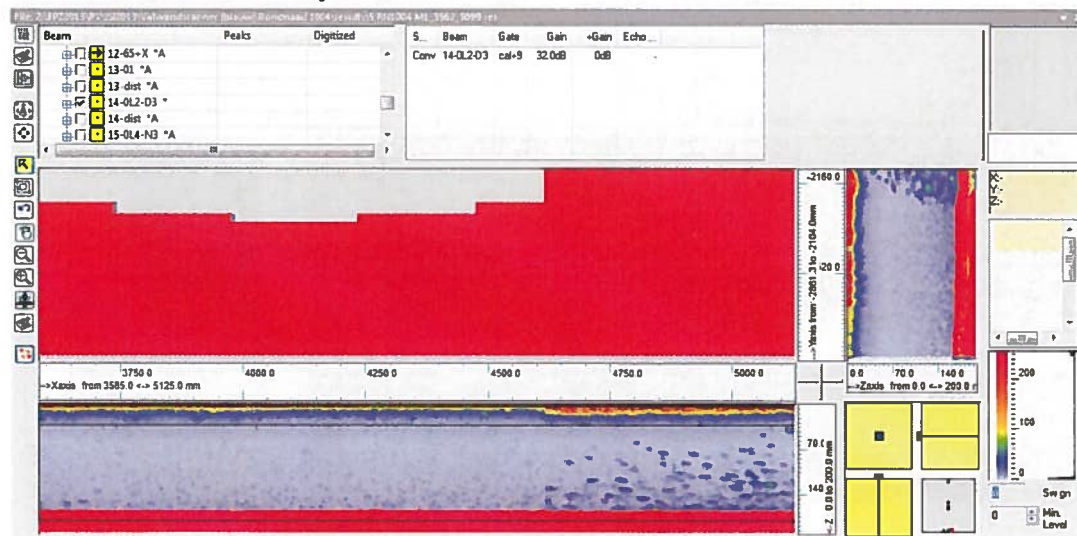


D.19 Segment 4 – Scan 5 – X=3585/5125mm and Y=-2855/-2100mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

Weld 1004 is visible, higher noise level in the weld, no indication above 100% FSH is detected

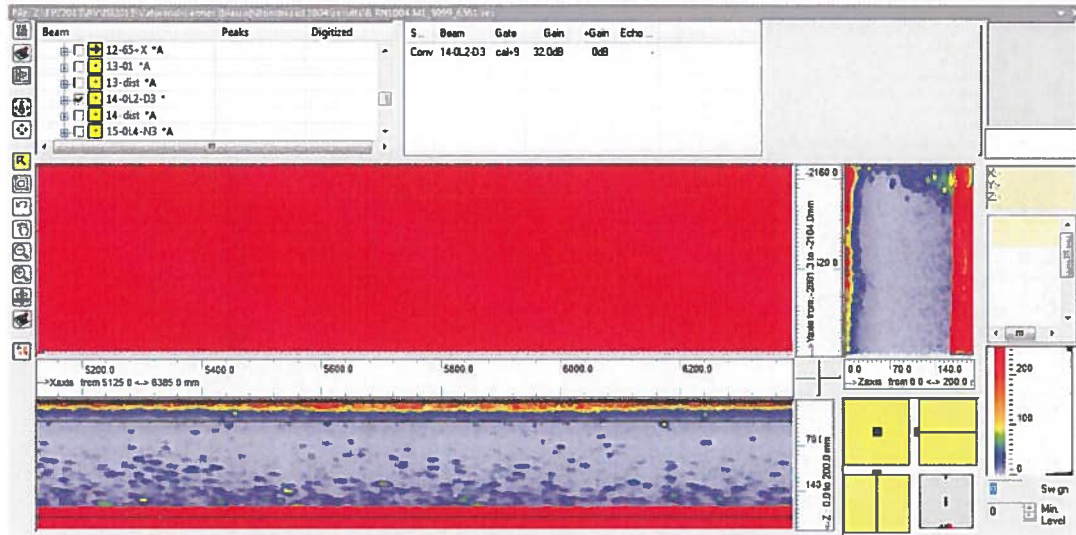
The scan area was restricted by the nozzle



D.20 Segment 4 – Scan 6 – X=5125/6385mm and Y=-2855/-2100mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

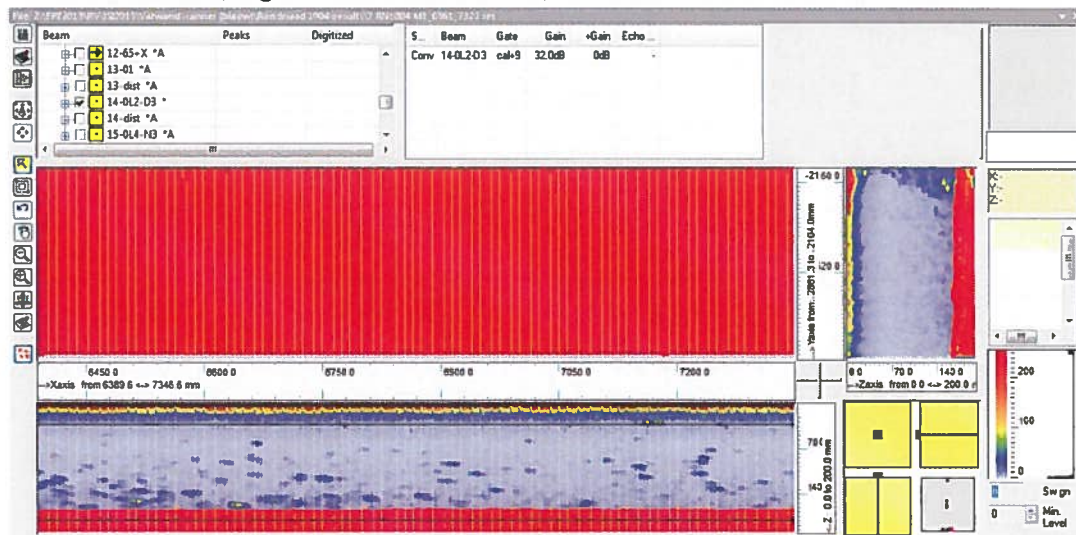
Weld 1004 is visible, higher noise level in the weld, no indication above 100% FSH is detected



D.21 Segment 4 – Scan 7 – X=6385/7346mm and Y=-2855/-2100mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

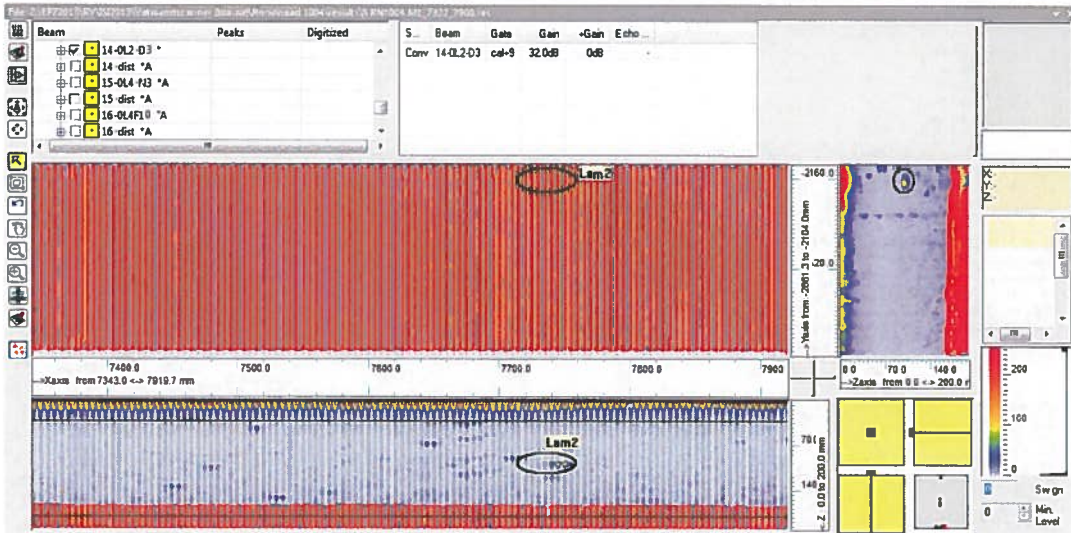
Weld 1004 is visible, higher noise level in the weld, no indication above 100% FSH is detected



D.22 Segment 4 – Scan 8 – X=7343/7924mm and Y=-2855/-2100mm

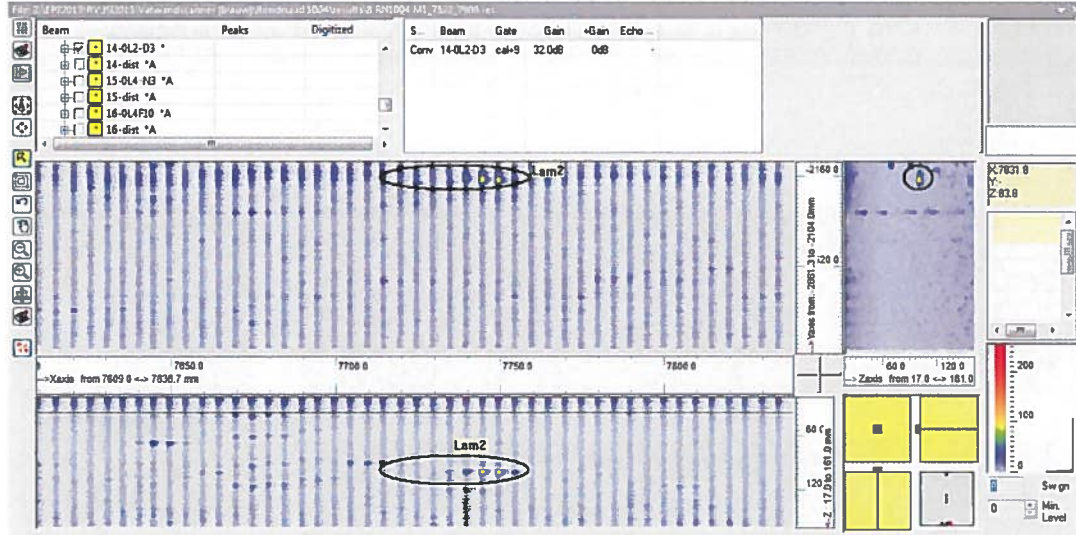
Probe 0° 2MHz Calibrated on ø3 mm FBH

Weld 1004 is visible, higher noise level in the weld, one indication above 100% FSH is detected

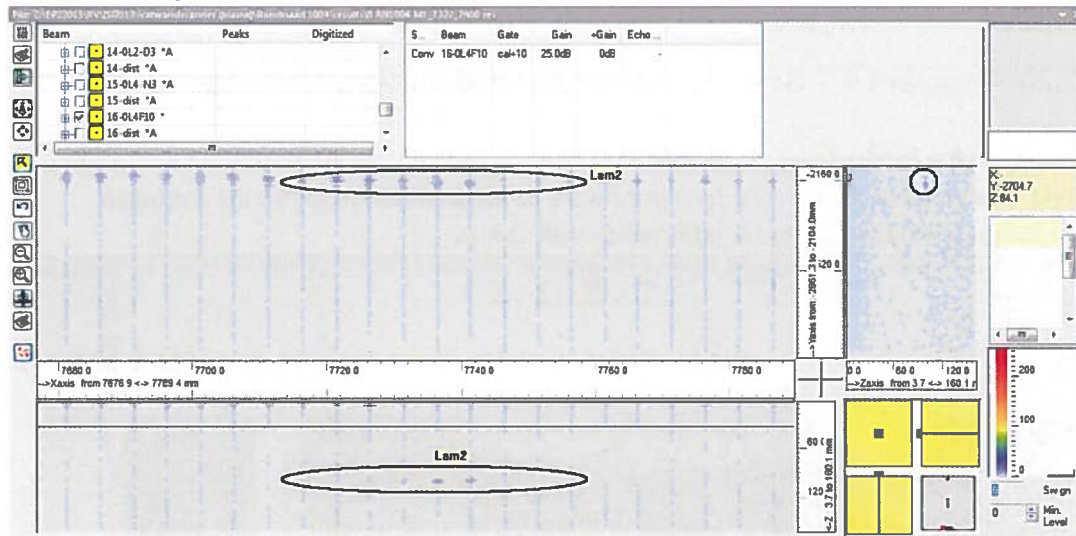


Laminaire Indicatie 2

- Probe 14 -0L2-D3 >100% FSH.



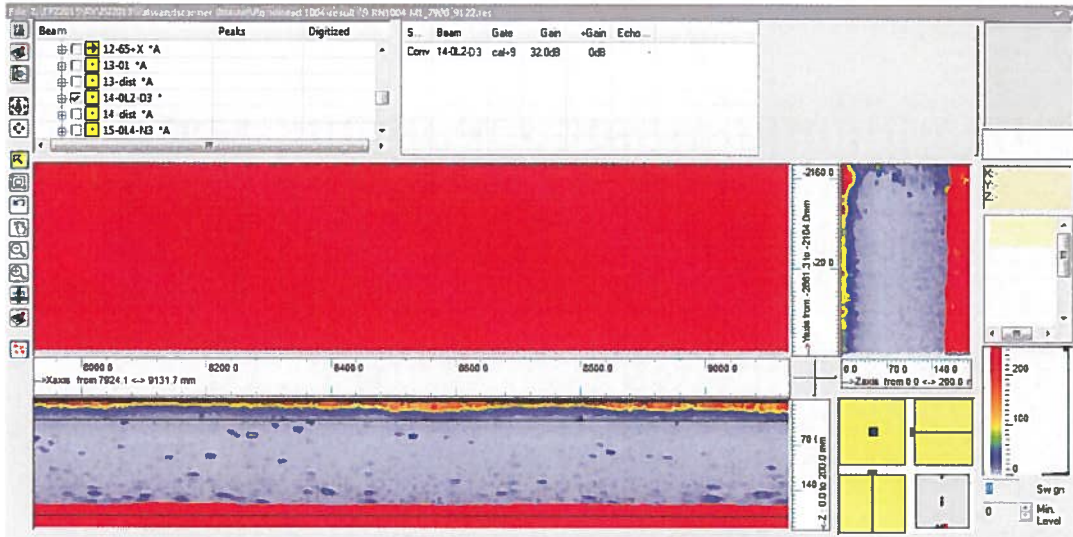
16-0L4F10. Amplitude <<50%FSH. The indication is not reportable



D.23 Segment 4 – Scan 9 – X=7924/9131mm and Y=-2855/-2100mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

Weld 1004 is visible, higher noise level in the weld, no indication above 100% FSH is detected

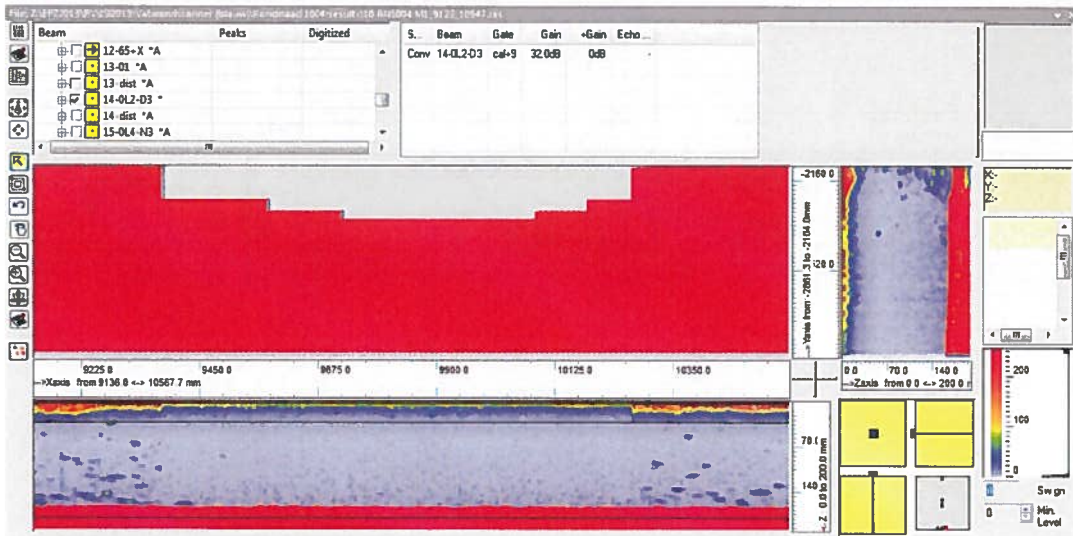


D.24 Segment 4 – Scan 10 – X=9136/10567mm and Y=-2855/-2100mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

Weld 1004 is visible, higher noise level in the weld, no indication above 100% FSH is detected

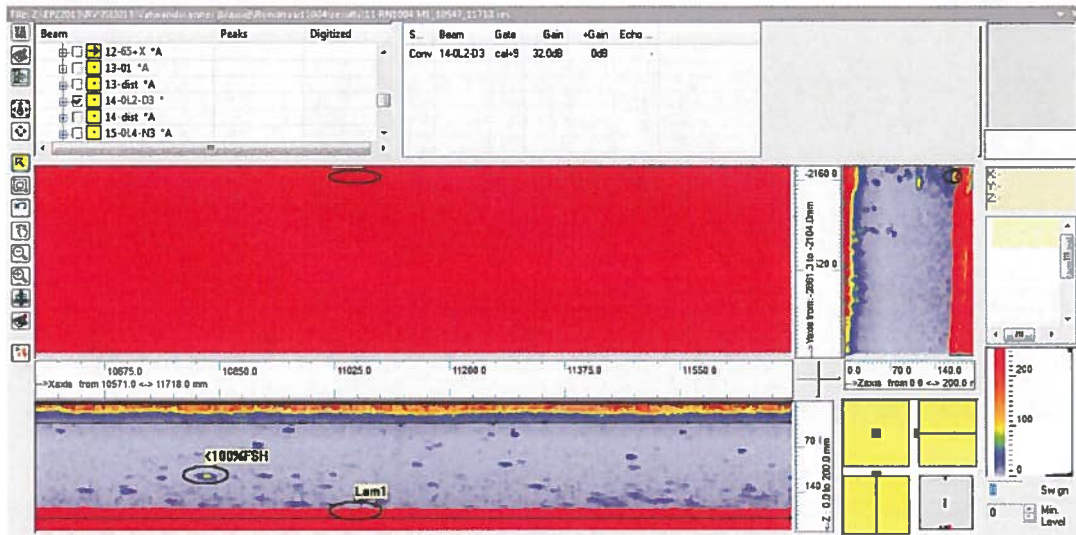
The scan area was restricted by the outlet nozzle with 529mm



D.25 Segment 4-Scan 11 - X=10571/11718 mm and Y=-2855/-2100mm

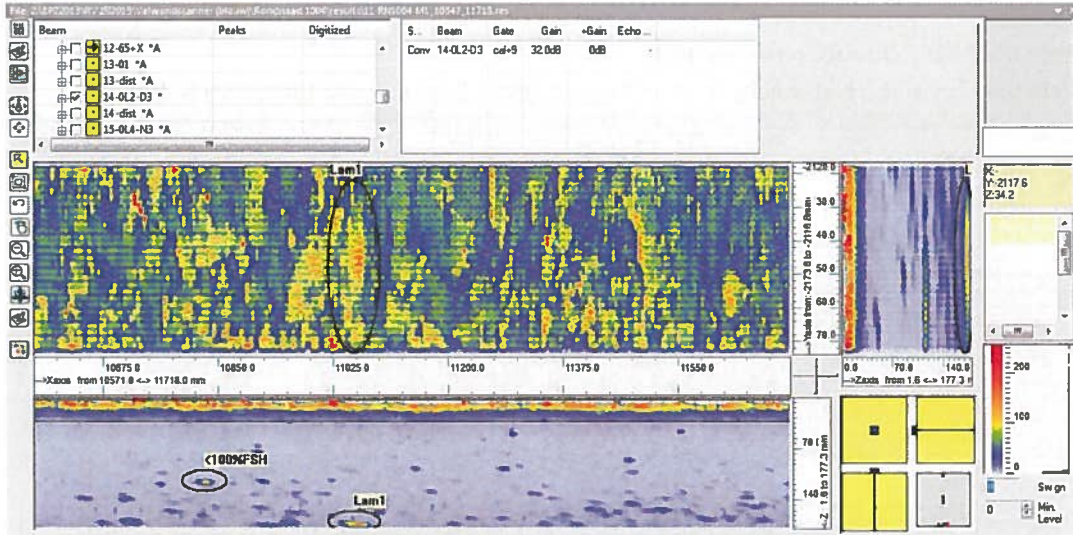
Probe 0° 2MHz Calibrated on ø3 mm FBH

Weld 1004 is visible, higher noise level in the weld, one indication above 100% FSH is detected

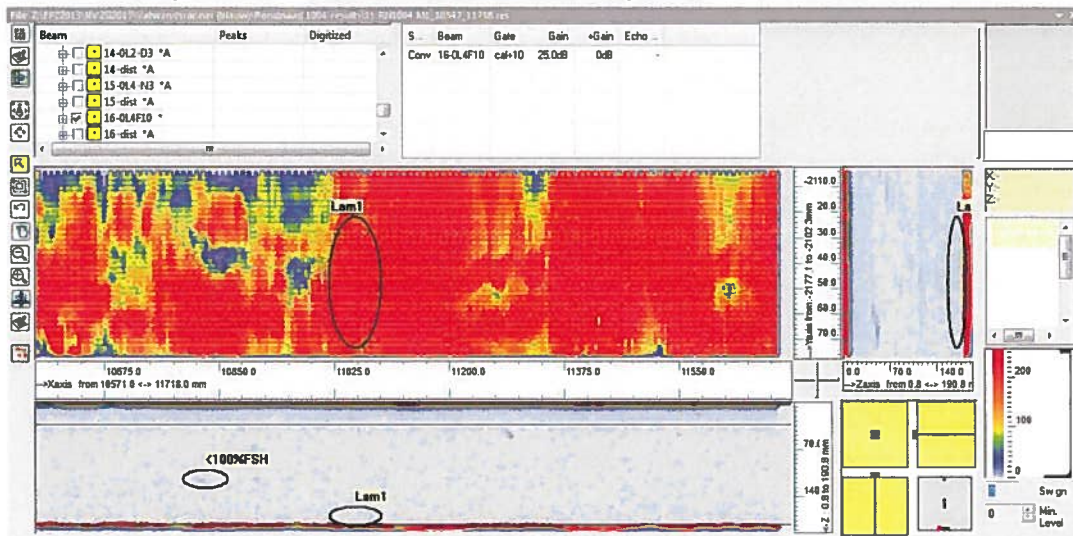


Laminaire Indicatie 1

- Probe 14 -0L2-D3 < 50% FSH.



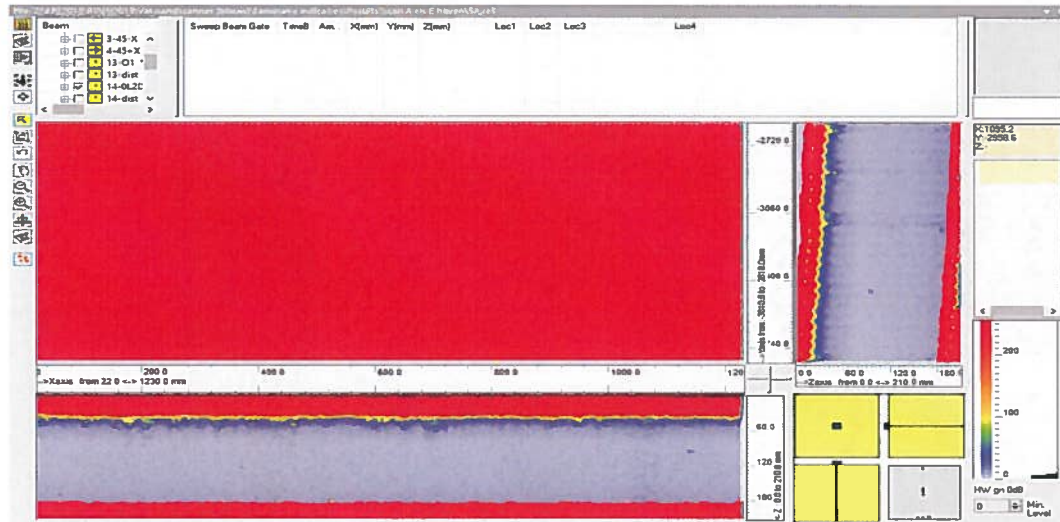
16-0L4F10. Amplitude <<50%FSH. The indication is not reportable



D.26 Segment 4 – Scan 5A – X=22/1230 and Y=-3810/-2610mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

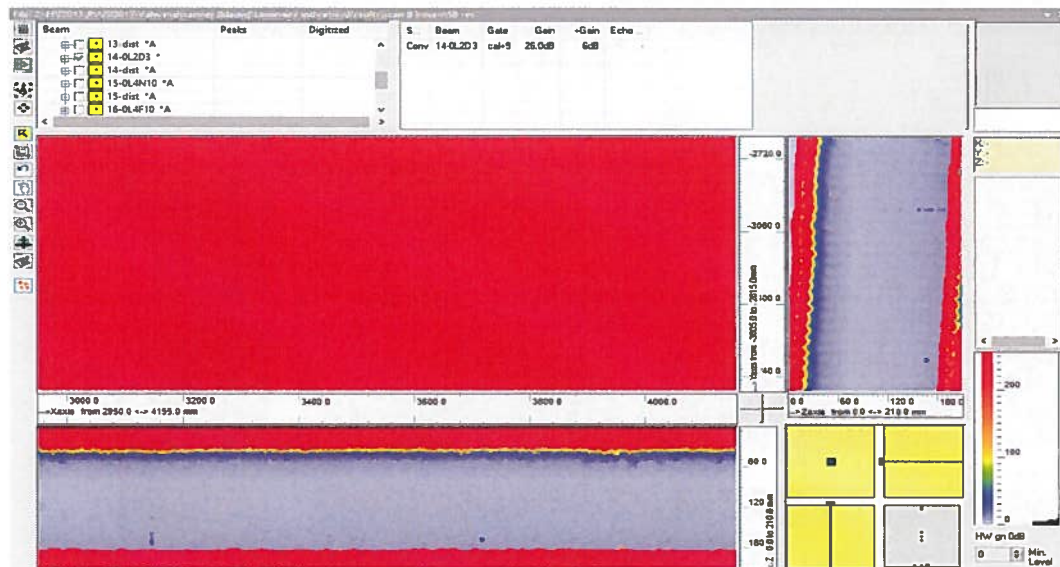
No indications above 100% FSH are detected



D.27 Segment 4 – Scan 5B – X=2950/4155mm and Y=-3805/-2615mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

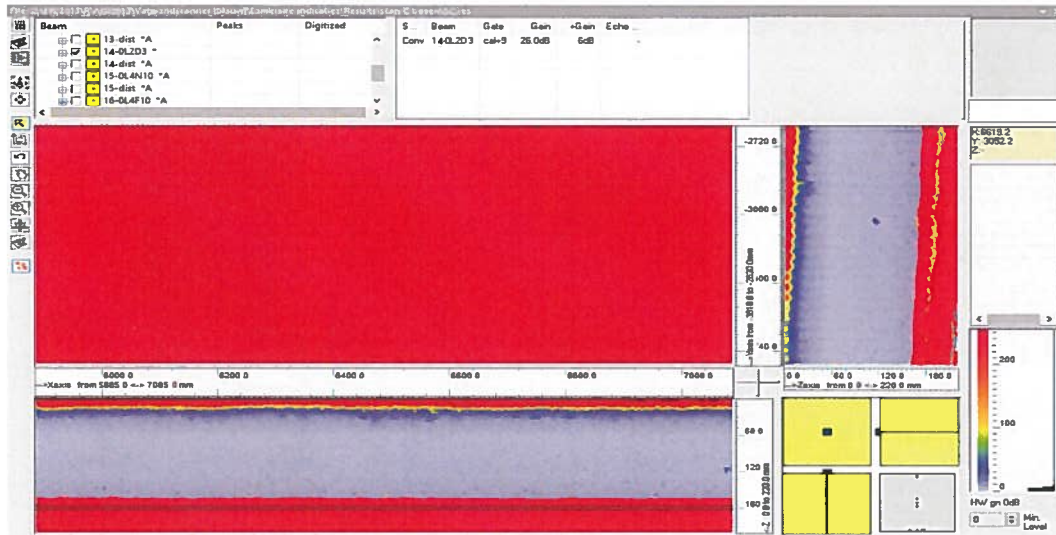
No indications above 100% FSH are detected





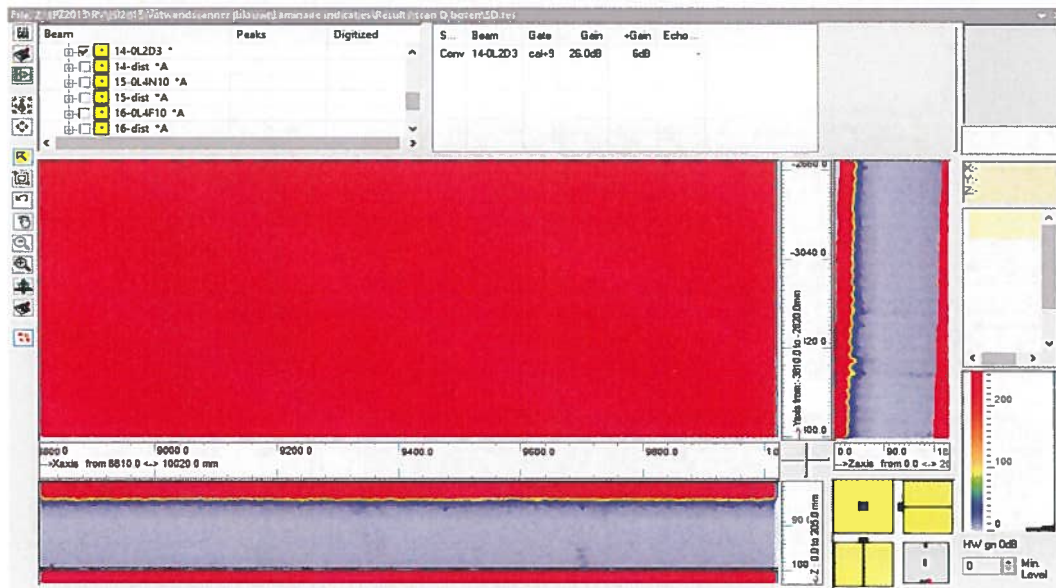
D.28 Segment 4 – Scan 5C – X=5885/7085mm and Y=-3810/-2620 mm

Probe 0° 2MHz Calibrated on ø3 mm FBH
 No indications above 100% FSH are detected



D.29 Segment 4–Scan 5D –X=8810/10020 mm and Y=-3810/-2620 mm

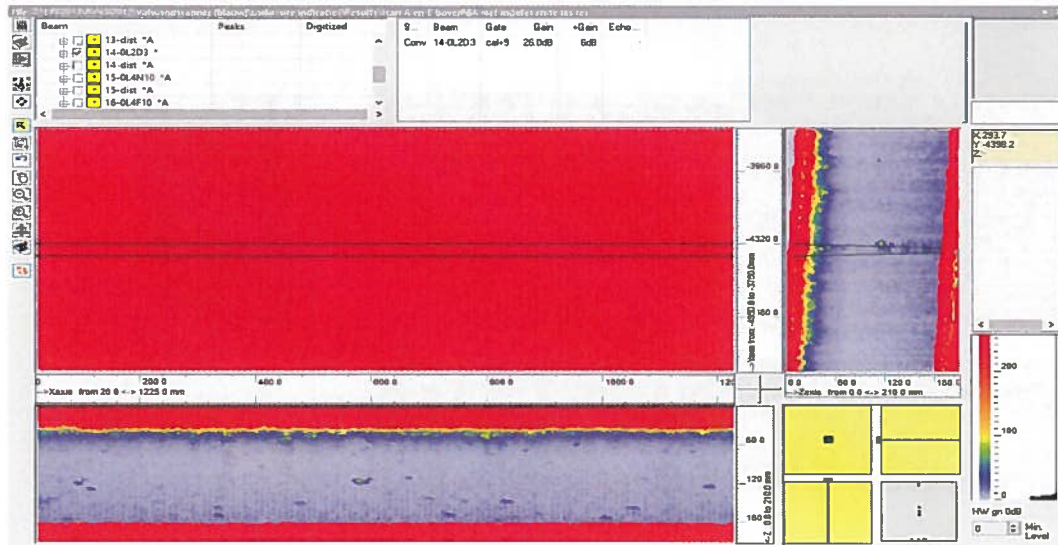
Probe 0° 2MHz Calibrated on ø3 mm FBH
 No indications above 100% FSH are detected



D.30 Segment 3&4 – Scan 6A – X=20/1225mm and Y=-4950/-3750mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

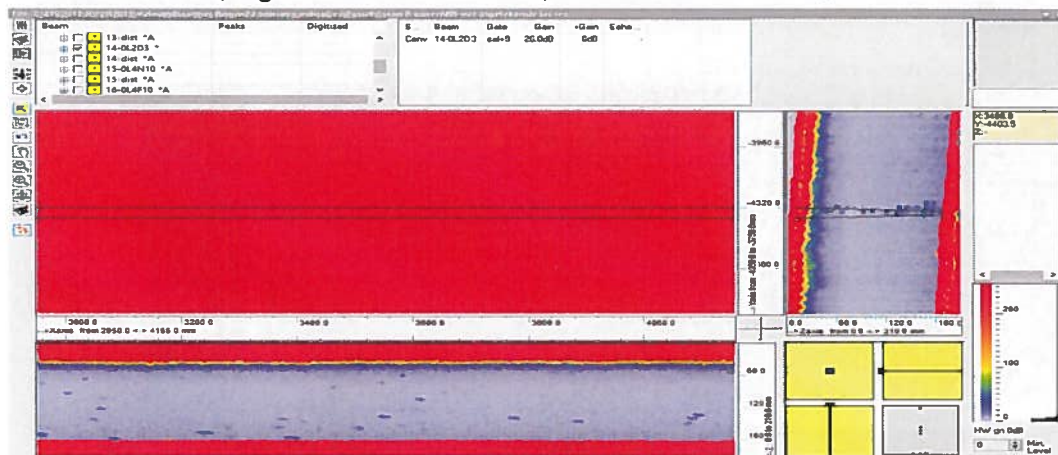
Weld 1003 is visible, higher noise level in the weld, No indications above 100% FSH are detected



D.31 Segment 3&4–Scan 6B–X=2950/4155mm and Y=-4950/-3750mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

Weld 1003 is visible, higher noise level in the weld, No indications above 100% FSH are detected

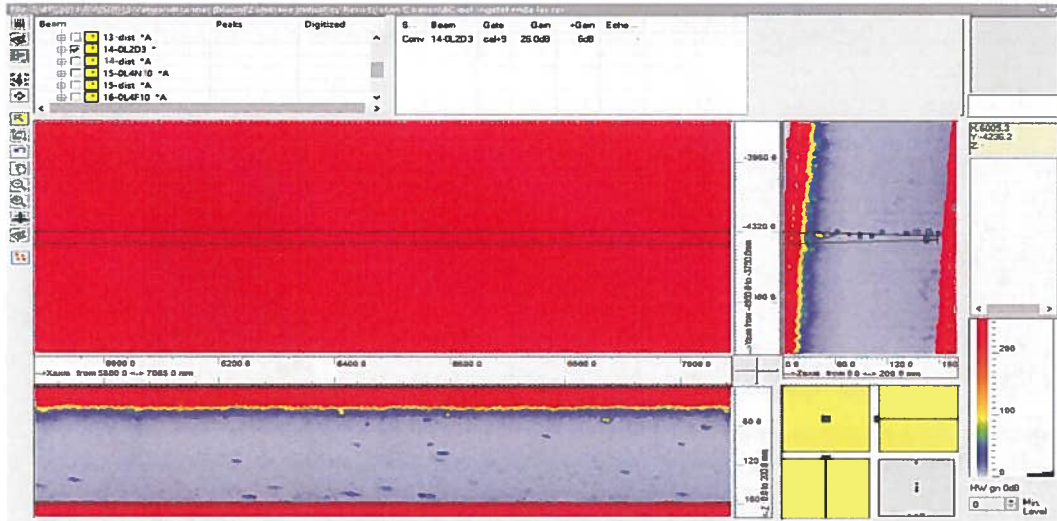




D.32 Segment 3&4–Scan 6C–X=5880/7085mm and Y=-4950/-3750mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

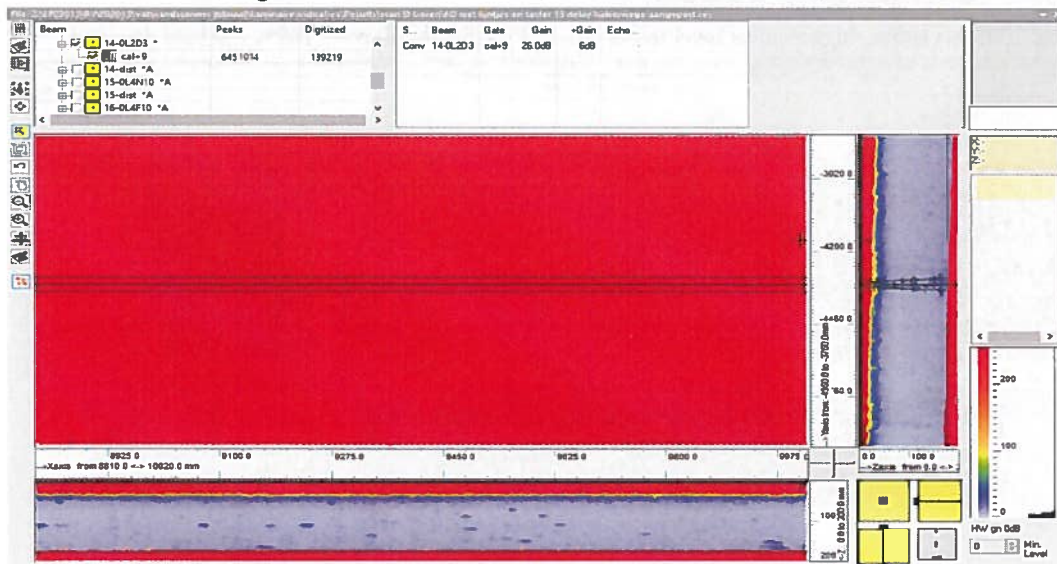
Weld 1003 is visible, higher noise level in the weld, No indications above 100% FSH are detected



D.33 Segment 3&4–Scan 6D–X=8810/10020mm and Y=-4950/-3750mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

Weld 1003 is visible, higher noise level in the weld, No indications above 100% FSH are detected

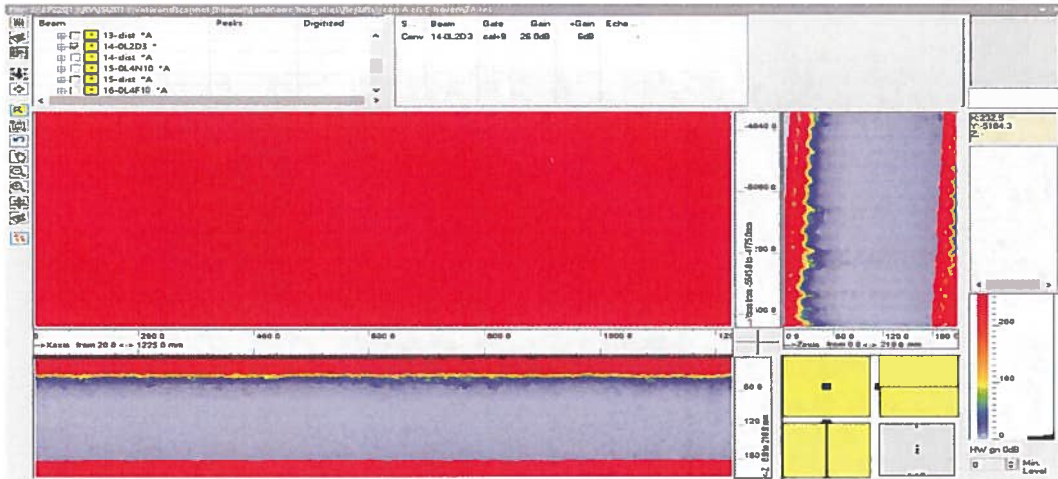




D.34 Segment 3– Scan 7A– X=20/1225mm and Y=-5545/-4775mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

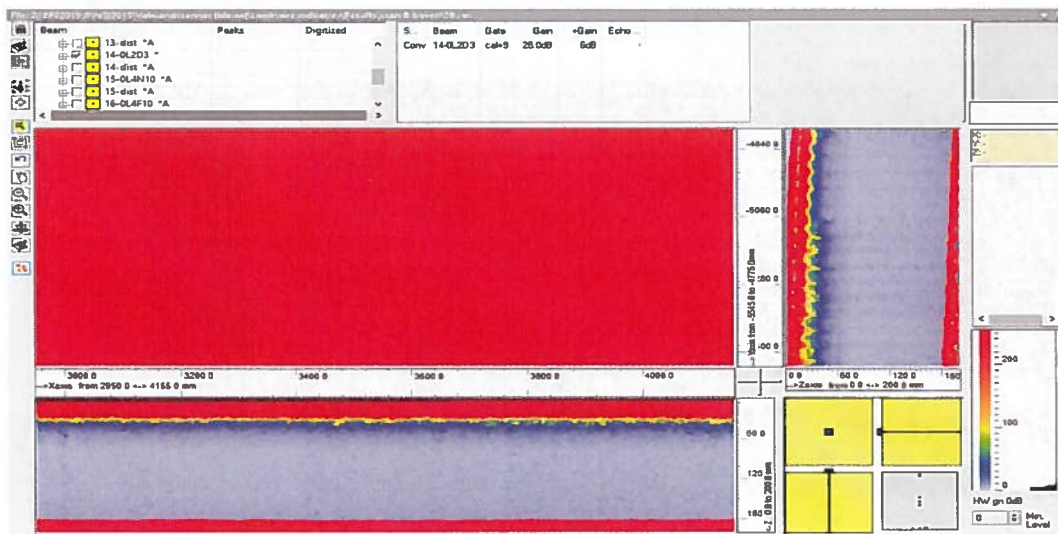
No indications above 100% FSH are detected



D.35 Segment 3– Scan 7B– X=2950/4155mm and Y=-5545/4775mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

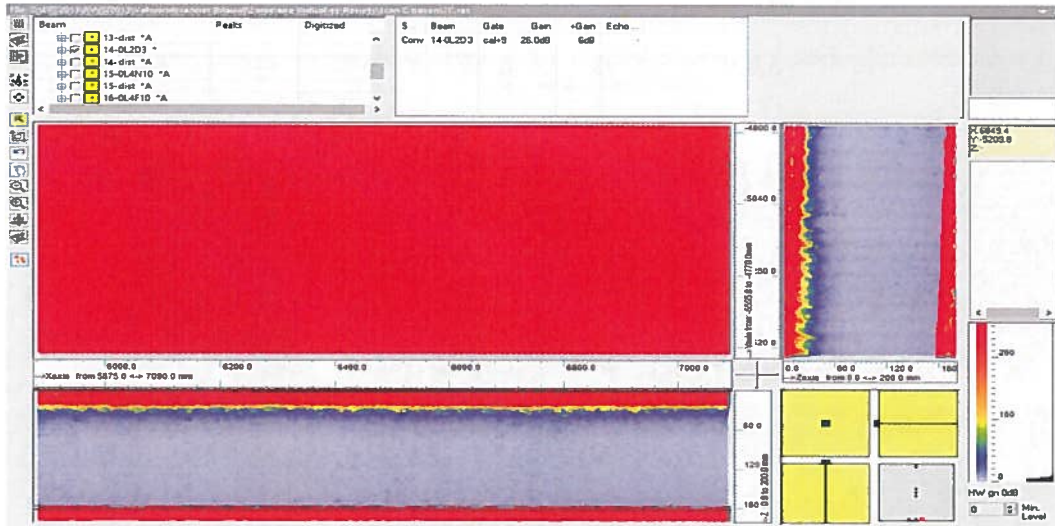
No indications above 100% FSH are detected





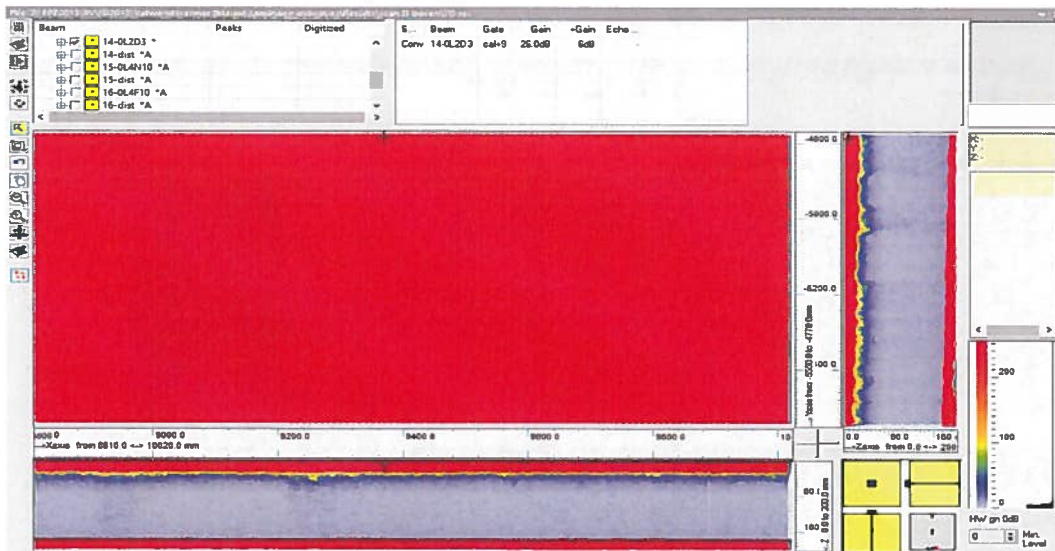
D.36 Segment 3– Scan 7C– X=5875/7090mm and Y=-5555/-4770mm

Probe 0° 2MHz Calibrated on ø3 mm FBH
 No indications above 100% FSH are detected



D.37 Segment 3– Scan 7D– X=8810/10020mm and Y=-5550/-4770mm

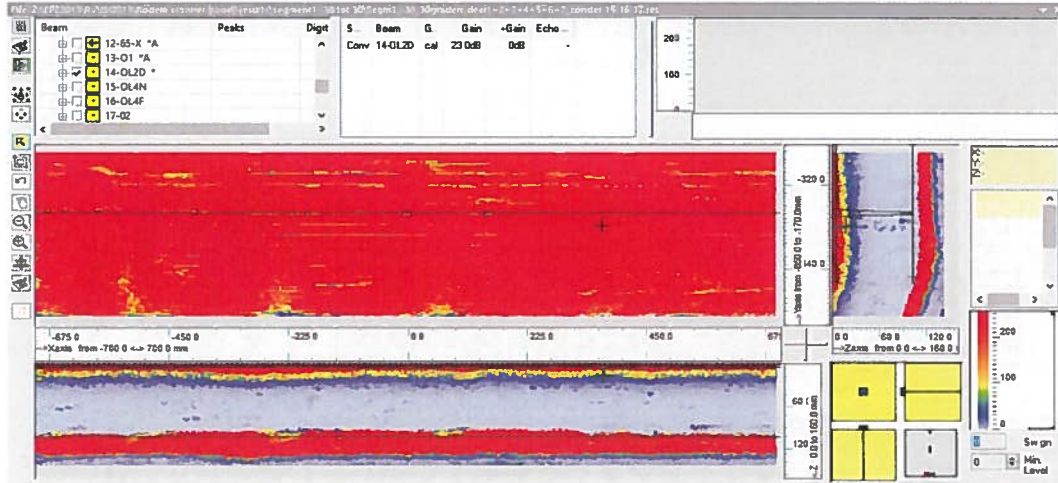
Probe 0° 2MHz Calibrated on ø3 mm FBH
 No indications above 100% FSH are detected



D.38 Segment 2/1 – Scan A X=-739/739mm and Y=-800/-200mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

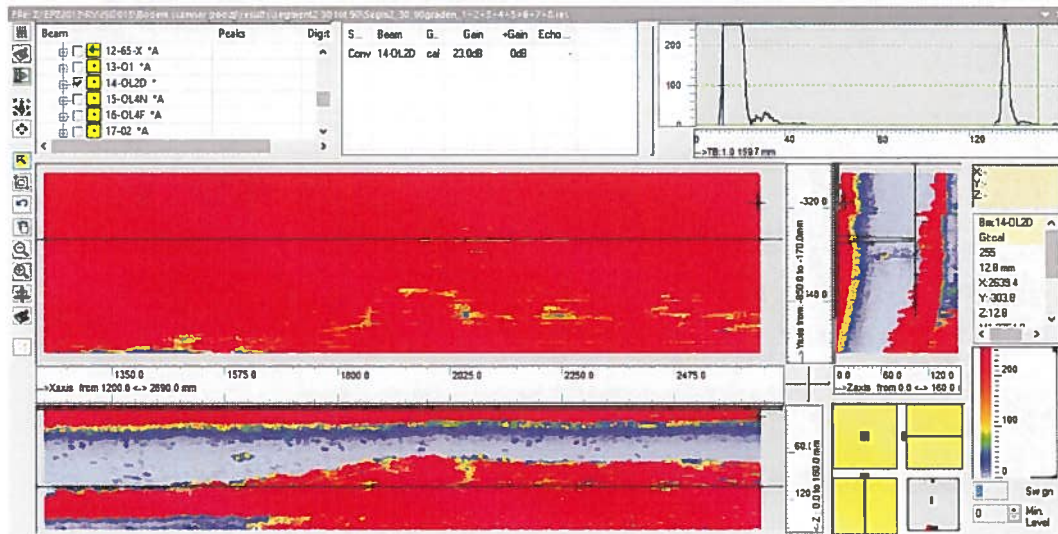
Weld 1001 is visible, higher noise level in the weld, no indication above 100% FSH is detected



D.39 Segment 2/1 – Scan B X=1279/2758mm and Y=-800/-200mm

Probe 0° 2MHz Calibrated on ø3 mm FBH, No reportable indications detected.

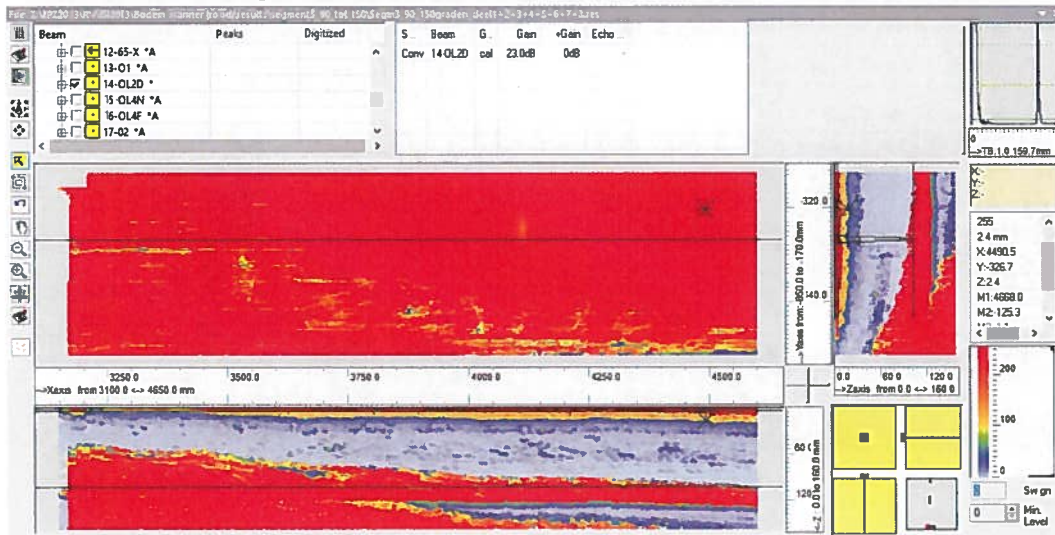
Weld 1001 is visible, higher noise level in the weld, two indication detected (~X=1600), only visible in one scan track and therefore no evaluation needed.



D.40 Segment 2/1 – Scan C X=3298/4777mm and Y=-800/-200 mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

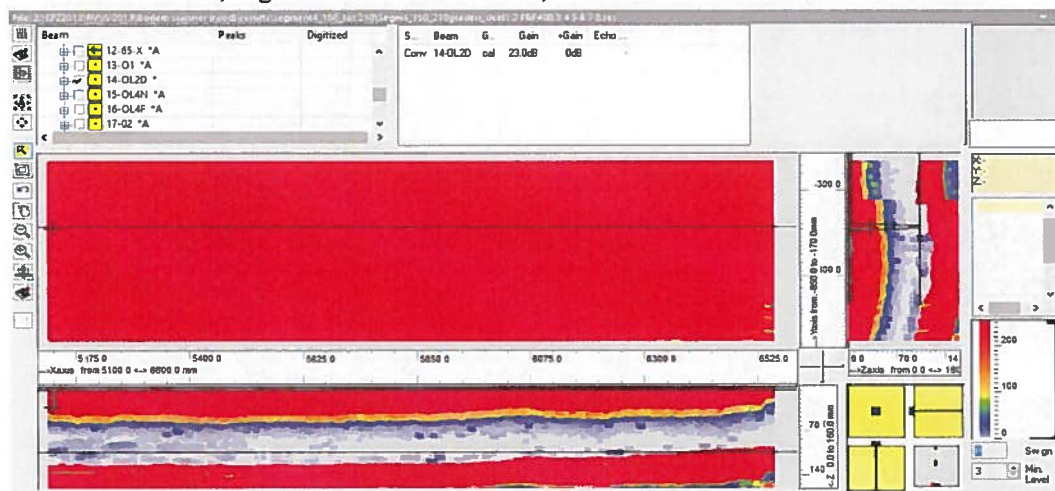
Weld 1001 is visible, higher noise level in the weld, no indication above 100% FSH is detected



D.41 Segment 2/1 – Scan D X =5317/6796mm and Y=-800/-200 mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

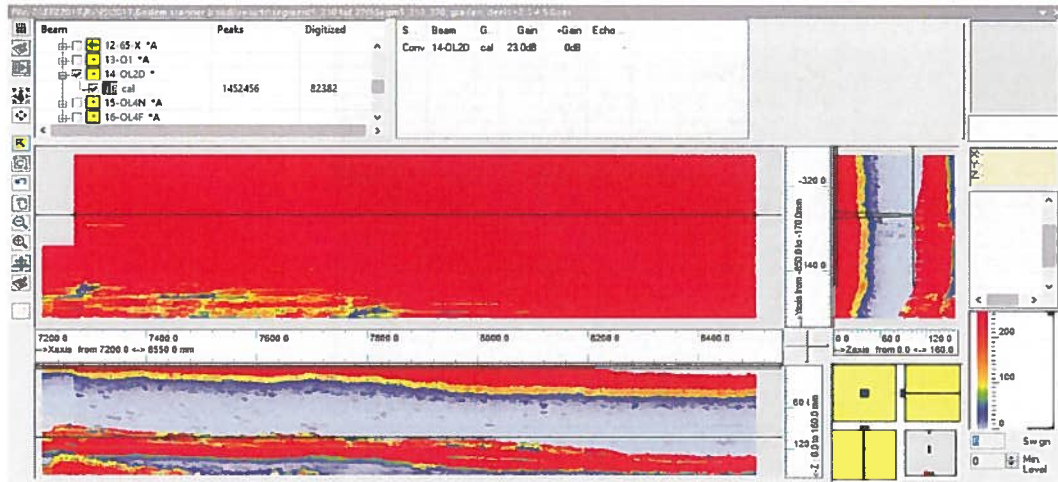
Weld 1001 is visible, higher noise level in the weld, no indication above 100% FSH is detected



D.42 Segment 2/1 – Scan E X =7336/8815 mm and Y=-800/-200 mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

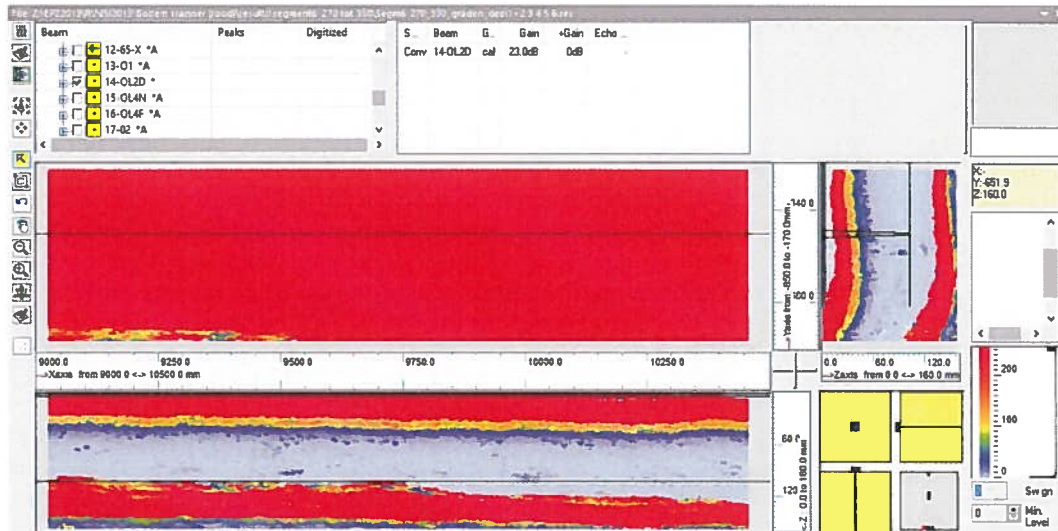
Weld 1001 is visible, higher noise level in the weld, no indication above 100% FSH is detected



D.43 Segment 2/1 – Scan F X =9355/10833 and Y=-800/-200 mm

Probe 0° 2MHz Calibrated on ø3 mm FBH

Weld 1001 is visible, higher noise level in the weld, no indication above 100% FSH is detected





Appendix E Manual Verification

E.1 Initial Verification Top Scanner

MANUAL VERIFICATION IMMERSION PROBES REACTOR VESSEL SHELL								
				Initial Verification				
				Date/ Time: 25-03-2013				
				Name: _____				
Probe No.	Probe ID no.	Angle/ Direction	Block	Gain [dB]	Delay [ns]	Soundpath [mm]	Frequency [MHZ]	Bandwidth [MHz]
1	04-518	45+Y	ID 7134	10	2.2	55	2.4	0.63
2	04-519	45-Y	ID 7134	9	2.7	55	2.4	0.83
3	04-544	45-X	ID 7134	5	2.2	55	2.4	0.63
4	04-549	45+X	ID 7134	9	2.1	55	2.4	0.63
5	04-548	60-Y	ID 7134	9	2.2	55	2.5	0.68
6	04-545	60-Y	ID 7134	10	2.4	55	2.5	0.73
7	4547	60-X	ID 7134	9	2.2	55	2.4	0.63
8	04-546	60+X	ID 7134	5	2.4	55	2.4	0.63
9	04-561	65+Y	ID 7134	1	2.3	55	2.3	1.03
10	04-562	65-Y	ID 7134	4	2.5	55	2.2	0.73
11	04-563	65-X	ID 7134	2	2.7	55	2.4	0.83
12	04-564	65+X	ID 7134	0	2.3	55	2.1	0.68
13	04-520	0-groot	ID 7134	9	2.4	55	2.4	0.73
14	13 AG-06	14-0L2D	ID 7134	0	2.3	55	2.6	1.66
15	13 AJ-01	15-0L4N	ID 7140	6	2.1	50	3.2	0.24
16	13 AK-01	16-0L4F	ID 7134	9	2.2	55	3.1	0.88
17	04-570	0-klein	ID 7139	10	5.8	50.0	2	0.29

RESULT: n a

REMARKS: Initial Verification

E.2 Verification before inspection Top Scanner

MANUAL VERIFICATION IMMERSION PROBES									
REACTOR VESSEL SHELL									
Verificatie									
Datum/ Tijd: 20-04-2013									
Naam: [REDACTED]									
Probe No.	Probe ID no.	Angle/ Direction	Block	Initial Gain [dB]	%FSH at initial gain [dB]	Delay [ns]	Soundpath [mm]	Frequency [MHZ]	Bandwidth [MHz]
1	04-518	45+Y	ID 7134	10	113	2.2	54.9	2.4	0.63
2	04-519	45-Y	ID 7134	9	96	2.7	54.3	2.4	0.63
3	04-544	45-X	ID 7134	5	120	2.2	54.9	2.5	6.3
4	04-549	45+X	ID 7134	9	96	2.1	55.3	2.4	0.73
5	04-548	60+Y	ID 7134	9	101	2.2	54.9	2.5	0.73
6	04-545	60-Y	ID 7134	10	105	2.4	54.3	2.4	0.63
7	4547	60-X	ID 7134	9	105	2.2	54.9	2.4	0.73
8	04-546	60+X	ID 7134	5	104	2.4	55.8	2.4	0.68
9	04-561	65+Y	ID 7134	1	101	2.3	55.4	2.3	0.83
10	04-562	65-Y	ID 7134	4	96	2.5	54.8	2.1	0.63
11	04-563	65-X	ID 7134	2	102	2.7	54.6	2.2	0.68
12	04-564	65+X	ID 7134	0	101	2.3	55.5	2.1	0.68
13	04-520	0-groot	ID 7134	9	108	2.4	54.5	2.3	0.68
14	13 AG-06	14-0L2D	ID 7134	0	215	2.3	54.6	2.5	1.37
15	13 AJ-01	15-0L4N	ID 7140	6	97	2.1	49.8	3.2	0.24
16	13 AK-01	16-0L4F	ID 7134	9	98	2.2	54.6	3.1	0.78
17	04-570	0-klein	ID 7139	10	88	5.8	49.7	1.9	0.34
RESULT: OK									
REMARKS: OK									

E.3 Verification after inspection Top Scanner

MANUAL VERIFICATION IMMERSION PROBES									
REACTOR VESSEL SHELL									
Verificatie									
Datum/ Tijd: 01-05-2013 17:50									
Naam: _____									
Probe No.	Probe ID no.	Angle/ Direction	Block	Initial Gain [dB]	%FSH at initial gain [dB]	Delay [ns]	Soundpath [mm]	Frequency [MHZ]	Bandwidth [MHz]
1	04-518	45+Y	ID 7134	10	100	2.2	54.2	2,4	0.68
2	04-519	45-Y	ID 7134	9	125	2.7	54.2	2,3	0.24
3	04-544	45-X	ID 7134	5	98	2.2	54.2	2,4	0.68
4	04-549	45+X	ID 7134	9	91	2.1	55.3	2,4	0.59
5	04-548	60+Y	ID 7134	9	87	2.2	54.2	2,5	0.68
6	04-545	60-Y	ID 7134	10	106	2.4	54.3	2,4	0.68
7	4547	60-X	ID 7134	9	91	2.2	54.9	2,4	0.63
8	04-546	60+X	ID 7134	5	65	2.4	54.3	2,3	0.59
9	04-561	65+Y	ID 7134	1	55	2.3	54.7	2,1	0.63
10	04-562	65-Y	ID 7134	4	83	2.5	54.1	2,1	0.68
11	04-563	65-X	ID 7134	2	66	2.7	53.4	2,1	0.78
12	04-564	65+X	ID 7134	0	54	2.3	54.7	2,1	0.68
13	04-520	0-groot	ID 7134	9	91	2.4	54.3	2,3	0.63
14	13 AG-06	14-0L2D	ID 7134	0	201	2.3	54.6	2,6	1.66
15	13 AJ-01	15-0L4N	ID 7140	6	102	2.1	49,8	3,5	0.29
16	13 AK-01	16-0L4F	ID 7134	9	118	2.2	54.6	3,2	0.83
17	04-570	0-klein	ID 7139	10	78	5.8	49.7	2,0	0.29

RESULT: OK

E.4 Verification after removing UPR head Top Scanner

MANUAL VERIFICATION IMMERSION PROBES									
REACTOR VESSEL SHELL									
Verificatie									
Datum/ Tjd: 01-05-2013 17:50									
Naam: _____									
Probe No.	Probe ID no.	Angle/ Direction	Block	Initial Gain	%FSH at initial gain	Delay	Soundpath	Frequency	Bandwidth
				[dB]	[dB]	[ns]	[mm]	[MHZ]	[MHz]
1	04-518	45+Y	ID 7134	10	100	2.2	54.2	2,4	0.68
2	04-519	45-Y	ID 7134	9	125	2.7	54.2	2,3	0.24
3	04-544	45-X	ID 7134	5	98	2.2	54.2	2,4	0.68
4	04-549	45+X	ID 7134	9	91	2.1	55.3	2,4	0.59
5	04-548	60+Y	ID 7134	9	87	2.2	54.2	2,5	0.68
6	04-545	60-Y	ID 7134	10	106	2.4	54.3	2,4	0.68
7	4547	60-X	ID 7134	9	91	2.2	54.9	2,4	0.63
8	04-546	60+X	ID 7134	5	65	2.4	54.3	2,3	0.59
9	04-561	65+Y	ID 7134	1	55	2.3	54.7	2,1	0.63
10	04-562	65-Y	ID 7134	4	83	2.5	54.1	2,1	0.68
11	04-563	65-X	ID 7134	2	66	2.7	53.4	2,1	0.78
12	04-564	65+X	ID 7134	0	54	2.3	54.7	2,1	0.68
13	04-520	0-groot	ID 7134	9	91	2.4	54.3	2,3	0.63
14	13 AG-06	14-0L2D	ID 7134	0	201	2.3	54.6	2,6	1,66
15	13 AJ-01	15-0L4N	ID 7140	6	102	2.1	49,8	3,5	0.29
16	13 AK-01	16-0L4F	ID 7134	9	118	2.2	54.6	3,2	0.83
17	04-570	0-klein	ID 7139	10	78	5.8	49.7	2,0	0.29
RESULT: OK									

E.5 Verification after Inspection 1A-1E Top Scanner

MANUAL VERIFICATION IMMERSION PROBES REACTOR VESSEL SHELL									
				Verificatie					
				Datum/ Tijd: 02-05-2013 / 17:12					
				Naam: XXXXXXXXXX					
Probe No.	Probe ID no.	Angle/ Direction	Block	Initial Gain	%FSH at initial gain	Delay	Soundpath	Frequency	Bandwidth
				[dB]	[dB]	[ns]	[mm]	[MHZ]	[MHz]
1	04-518	45+Y	ID 7134	10	115	2,2	54,9	2,4	0,63
2	04-519	45-Y	ID 7134	9	144	2,7	54,2	2,3	0,34
3	04-544	45-X	ID 7134	5	112	2,2	54,3	2,4	0,68
4	04-549	45+X	ID 7134	9	105	2,1	55,3	2,4	0,63
5	04-548	60+Y	ID 7134	9	107	2,2	54,9	2,5	0,73
6	04-545	60-Y	ID 7134	10	125	2,4	54,3	2,5	0,63
7	4547	60-X	ID 7134	9	120	2,2	55	2,4	0,63
8	04-546	60+X	ID 7134	5	95	2,4	55,1	2,5	0,88
9	04-561	65+Y	ID 7134	1	91	2,3	55,5	2,1	0,68
10	04-562	65-Y	ID 7134	4	120	2,5	54,8	2,2	0,73
11	04-563	65-X	ID 7134	2	109	2,7	54,9	2,3	0,93
12	04-564	65+X	ID 7134	0	72	2,3	54,8	2,3	1,07
13	04-520	0-groot	ID 7134	9	116	2,4	54,4	2,4	0,68
14	13 AG-06	14-0L2D	ID 7134	0	201	2,3	54,6	2,6	1,46
15	13 AJ-01	15-0L4N	ID 7140	6	116	2,1	49,5	3,5	0,24
16	13 AK-01	16-0L4F	ID 7134	9	111	2,2	54,5	3,1	0,83
17	04-570	0-klein	ID 7139	10		5,8			

RESULT: OK

verificatie uitgevoerd met scherm voor terugkoppeling

Opnieuw geverifieerd, nu beter verificatie van 1-5 door terugkoppeling, werken zonder luchtbeademing

E.6 Initial Verification Top Scanner

MANUAL VERIFICATION IMMERSION PROBES								
Bodemnaden 1001 en 1002 en laminaire defecten								
Specification				Initial Verification				
				Date/ Time: 27-03-2013.				
				Name: [REDACTED]				
Probe No.	Probe ID No.	Angle/ Direction	Block ID No.	Gain 100%FSH [dB]	Delay [ns]	Sound Path [mm]	Frequency [MHZ]	Bandwidth [MHz]
1	04-558	45+Y	ID 7082	12	2.6	55	2.5	0.7
2	04-557	45-Y	ID 7082	10	2.9	55	2	0.8
3	04-551	45-X	ID 7082	10	2.7	55	2.3	0.7
4	04-550	45+X	ID 7082	10	2.7	55	2.4	0.7
5	04-555	60+Y	ID 7082	10	2.6	55	3	0.7
6	04-556	60-Y	ID 7082	10	2.6	55	2.5	0.7
7	04-554	60-X	ID 7082	10	2.6	55	3	0.7
8	04-553	60+X	ID 7082	11	2.5	55	2.3	0.7
9	04-535	65+Y	ID 7082	6	2.5	55	2	0.6
10	04-536	65-Y	ID 7082	6	2.5	55	2	0.6
11	04-539	65-X	ID 7082	7	2.5	55	2	0.7
12	04-537	65+X	ID 7082	7	2.5	55	2	0.7
13	04-552	0	ID 7082	11	2.4	55	2	0.6
14	13AG-09	0	ID 7082	0	2	55	3	1.8
15	13AJ-03	0	ID 7140	6	0	55	4	2.0
16	13AK-03	0	ID 7082	8	2	55	5	1.2
17	04-571	0	ID 7139	19	4	55	2	0.8

E.7 Verification before inspection Bottom Scanner

MANUAL VERIFICATION IMMERSION PROBES									
Bodemnaden 1001 en 1002 en laminaire defecten									
Specification				Verification					
				Date/ Time: 20-04-2013 9h10					
Probe No.	Probe ID No.	Angle/ Direction	Block ID No.	Initial Gain	%FSH at initial gain	Delay	Sound	Frequency	Bandwidth
				[dB]	[%FSH]	[ns]	[mm]	[MHZ]	[MHz]
1	04-558	45+Y	ID 7082	12	125	2.6	55	2.7	0.9
2	04-557	45-Y	ID 7082	10	115	2.9	55	2.4	0.8
3	04-551	45-X	ID 7082	10	130	2.7	55	2.3	0.7
4	04-550	45+X	ID 7082	10	126	2.7	55	2.4	0.9
5	04-555	60+Y	ID 7082	10	125	2.6	55	2.4	0.8
6	04-556	60-Y	ID 7082	10	125	2.6	55	2.4	0.7
7	04-554	60-X	ID 7082	10	130	2.6	55	2.5	0.7
8	04-553	60+X	ID 7082	11	130	2.5	55	2.3	0.7
9	04-535	65+Y	ID 7082	6	126	2.5	55	2.1	0.6
10	04-536	65-Y	ID 7082	6	125	2.5	55	2.1	0.6
11	04-539	65-X	ID 7082	7	134	2.5	55	2.1	0.6
12	04-537	65+X	ID 7082	7	139	2.5	55	2.1	0.7
13	04-552	0	ID 7082	11	130	2.4	55	2.4	0.6
14	13AG-09	0	ID 7082	0	106	2	55	2.5	1.8
15	13AJ-03	0	ID 7140	6	109	0	55	4.2	2.0
16	13AK-03	0	ID 7082	8	118	2	55	3.3	0.9
17	04-571	0	ID 7139	19	109	4	55	2.1	0.8



E.8 Verification after inspection Bottom Scanner

MANUAL VERIFICATION IMMERSION PROBES									
Specification				Verification					
				Date/ Time: 01-05-2013 22h20					
				Name					
Probe No.	Probe ID No.	Angle/ Direction	Block ID No.	Initial Gain	%FSH at initial gain	Delay	Sound Path	Frequency	Bandwidth
				[dB]	[%FSH]	[ns]	[mm]	[MHZ]	[MHz]
1	04-558	45+Y	ID 7082	12	101	2.6	55	2.4	0.8
2	04-557	45-Y	ID 7082	10	103	2.9	55	2.4	0.8
3	04-551	45-X	ID 7082	10	105	2.7	55	2.3	0.7
4	04-550	45+X	ID 7082	10	107	2.7	55	2.4	0.9
5	04-555	60+Y	ID 7082	10	108	2.6	55	2.4	0.8
6	04-556	60-Y	ID 7082	10	108	2.6	55	2.4	0.8
7	04-554	60-X	ID 7082	10	105	2.6	55	2.5	0.8
8	04-553	60+X	ID 7082	11	110	2.5	55	2.3	0.7
9	04-535	65+Y	ID 7082	6	110	2.5	55	2.1	0.6
10	04-536	65-Y	ID 7082	6	105	2.5	55	2.1	0.6
11	04-539	65-X	ID 7082	7	115	2.5	55	2.1	0.6
12	04-537	65+X	ID 7082	7	110	2.5	55	2.1	0.7
13	04-552	0	ID 7082	11	125	2.4	55	2.4	0.6
14	13AG-09	0	ID 7082	0	106	2	55	2.1	1.8
15	13AJ-03	0	ID 7140	6	95	0	55	3.7	1.8
16	13AK-03	0	ID 7082	8	118	2	55	3.3	0.9
17	04-571	0	ID 7139	19	109	4	55	2.1	0.8



Appendix F Linearity Check

Linearity-Check UT-equitment						
UT device:	Micropulse					
Filter:	0,75-12Mhz,					
Used Resultfile:	S15012 18042013					
Used Settings file:	Z:\frequency_check\Setting Files (IST)\Frequency_check_mp.					
File saving date:	4/18/2013 13:50					
Calibration due:	5/14/2013					
Print Date and Time:	2013/4/18 13:48					
Tested by:	[REDACTED]					
Function generator:	127					
Calibration due:	1/10/2014					
Amplifier linearity (dB)						
Deviation in signal amplitude (dB). Reporting value: 0dB is at 200 BSP						
Testing frequency = 2Mhz						
Allowable deviation +/- 2dB						
Allowable Channel dependent gain <= 1dB						
Input	100.0mV	50.0mV	33.3mV	25.0mV	20.0mV	16.7mV
Gain	G_1	G_2	12dB	G_4	G_5	G_6
Channel						
1	-1.0	-1.0	-1.0	-1.0	-0.8	-0.3
2	-1.0	-1.0	-1.0	-1.0	-0.8	-0.5
3	-1.0	-1.0	-1.0	-0.8	-0.8	-0.3
4	-1.0	-1.0	-1.0	0.3	-1.0	-0.5
5	-1.0	-1.0	-1.0	-1.0	-0.8	0.3
6	-1.0	-1.0	-1.0	-1.0	-0.8	-0.3
7	-1.0	-1.0	-1.0	-1.0	-0.8	-0.5
8	-1.0	-1.0	-1.0	-1.0	-0.8	-0.3
9	-1.0	-1.0	-1.0	-0.8	-1.0	-0.3
10	-1.0	-1.0	-1.0	-1.0	-1.0	-0.5
11	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
12	-1.0	-1.0	-1.0	-1.0	-1.0	-0.5
13	-1.0	-1.0	-1.0	-1.0	-1.0	-0.8
14	-1.0	-1.0	-1.0	-1.0	-1.0	-0.5
15	-1.0	-1.0	-1.0	-1.0	-1.0	-0.8
16	-1.0	-1.0	-1.0	-1.0	-0.8	-0.3
Results: OK						



Timebase linearity (mm)						
Echo nr	1	2	3	4	5	6
nom.						
soundpat						
h[mm]	0±4	40±4	80±4	120±4	160±4	200±4
Measured	0.0	40.0	80.0	118.8	160.0	200.0
Results: OK						
Screen linearity (dB)						
	0dB	-6dB	-12dB	-18dB		
Reported (in dB)	-0.8	-6.2	-12.4	-17.4		
Tolerances:						
Gain difference over 2dB will be noted						
Results: OK						

