

Test report

24-0136RP29-013

Product / EUT: *High pressure cleaner*
Type designation: *RE04*
Tested type: *RE140 VARIO CONTROL Hochdruckreiniger*

EUT authorization: ☒ Certification
☐ Suppliers Declaration of Conformity

FCC ID: *2ALP8RE04A*

Product number: *RE04-011-4545*
Production level: *Prototype*
Firmware version: *v9.2.2*
S/N: *N/A*

Manufacturer: *ANDREAS STIHL AG & Co. KG*
Andreas-Stihl-Str. 4
71336 Waiblingen / Germany

Test remit: 47 CFR Part 15 – Subpart B – Unintentional radiators Class B
in accordance with the procedures given in
ANSI C63.4-2014 and ANSI C63.4a-2017

The standards were: ☒ Met
☐ Met, for the limited scope of testing
☐ Not met

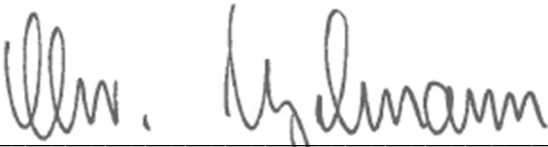
Remark: ☒ Validation covered by the accredited scope
☐ Validation not covered by the accredited scope
according: _____
☐ Validation of the EMC-requirements partly proceeded

Applicant: ANDREAS STIHL AG & Co. KG
Andreas-Stihl-Str. 4
71336 Waiblingen / Germany

EUT-
Date of arrival: 04/28/2025 07/03/2025
Test ID: 24-0136PR18-006 24-0136PR27-020
Date(s) of test: 06/16/2025 and 07/11/2025

Burgrieden, 01/12/2026

Released by:



Principal Engineer - Christian Vogelmann

Test laboratory: EMCE GmbH
Ingenieurbüro für EMV-Prüfungen und
Schaltungsentwicklung
Untere Wiesen 1 / 88483 Burgrieden / Germany

DAkS-Registration No: D-PL-12122-01-00
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Designated by:
Bundesnetzagentur



BNetzA-CAB-02/21-01

Accredited by:
Deutsche Akkreditierungsstelle GmbH





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1 General information

Project manager: M.Sc. S. Vogelmann
Inspector: M.Sc. S. Vogelmann

EMCE GmbH
Ingenieurbüro für EMV-Prüfungen und Schaltungsentwicklung

Contact person: Mr. Grohmann / ANDREAS STIHL AG & Ko. KG

Remarks: N/A

State of revision:

Source document	New Document	Date / Reviser	Modifications

2 EUT information

Sampling:	The device was selected and provided by the customer.
Description:	<i>The EUT is a high-pressure cleaner with an RF interface to regulate the water pressure, controlled via a spray gun as a companion device.</i>
Voltage supply:	120 V / 60 Hz
Frequency list:	N/A
Max. clock frequency:	< 1 GHz
Temperature range:	0 °C – 60 °C
Dimension (mm):	420 x 370 x 930 (LxWxH)

RF Applications:

Application	Frequency range	Architecture for application
Remote control for regulation of the water pressure.	Lowest channel: 915.4 MHz Highest channel: 917.8 MHz	☐ Receiver ☐ Transmitter ☒ Transceiver ☐ Tagging system (RFID)

Used antennas:

Antenna designation	Manufacturer	Connector / cable length	Gain (dBi) @ f / GHz
<i>Integral antenna</i>	N/A	N/A	N/A

Used band filter:

Filter designation	Filter type	Manufacturer	Connector
N/A			



Supplied /
used equipment:

Designation	Type	Manufacturer	S/N
<i>Spray gun</i>	<i>N/A</i>	<i>STIHL</i>	<i>N/A</i>
<i>Adjustable nozzle</i>	<i>RE04-530-0710-A</i>	<i>STIHL</i>	<i>N/A</i>

Configuration: ☒ As-delivered condition
☐ Modified
* _____

Cable designation	Type	Length	Remarks
<i>AC power cord</i>	<i>3-core</i>	<i>11.00 m</i>	<i>With PRCD</i>
<i>High-pressure hose</i>	<i>Stihl no. 4950-501-0302-A / 2024-08</i>	<i>10.00 m</i>	<i>N/A</i>

Software designation	Type	Manufacturer	Version
<i>N/A</i>			



Pictures of the EUT

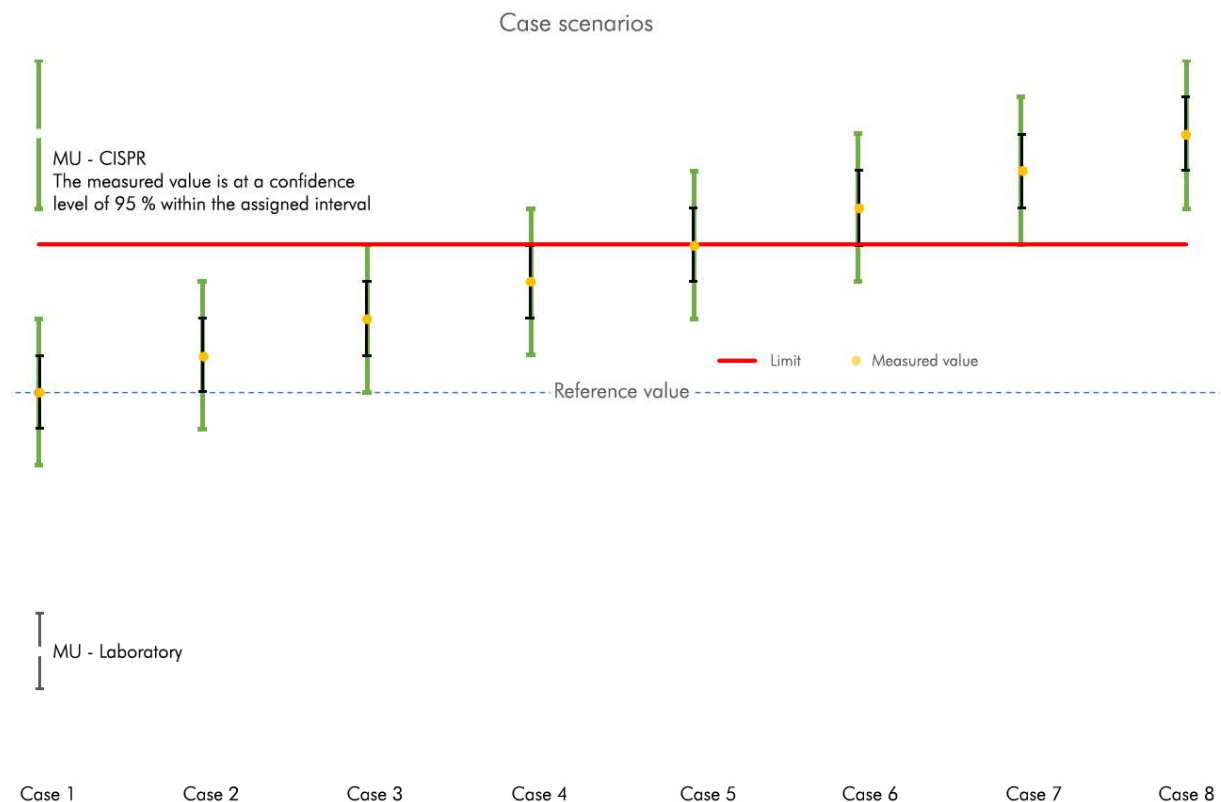


3 Decision rules for conformity assessment

"Binary" decision rule - pass / fail

Unless otherwise stated in the test module, the following specifications apply:
Interference emission

No measurement uncertainties are taken into account for the statement of conformity. In the case of conducted and radiated interference emission, the measurement is considered passed if the measurement result is below the permitted limit value. The accepted measurement uncertainties for a direct statement of conformity, determined for the U_{Lab} laboratory, must be less than the U_{CISPR} values determined in the CISPR16-4-2 standard. The measurement uncertainties are stated with a confidence level of 95 %. In this case the uncertainty of measurement is not taken into account for the conformity statement.



The test is passed for case 1 - 5. A rejection is made in case 6 - 8.

The test is considered as passed if the evaluation criteria for immunity to interference and the limits of emitted interference of the specified standard are met. Measurement uncertainties are not considered.

4 Test equipment list of EMCE GmbH

Inv.- No.	Designation	Type	Manufacturer	S/N	Calibration: Interval /valid until
002	Passive probe	ESH2-Z3	Rohde & Schwarz		1 Year(s)/ 2026-01-31
003	LISN 1	ESH3-Z5	Rohde & Schwarz	835268/007	1 Year(s)/ 2026-02-28
004	LISN 2	ESH3-Z5	Rohde & Schwarz	835268/003	1 Year(s)/ 2026-02-28
007	Absorbing clamp	MDS 21	Schwarzbeck	942436	1 Year(s)/ 2026-01-31
008	Loop antenna 9kHz-30MHz	HFH2-Z2	Rohde & Schwarz	835776/0002	3 Year(s)/ 2026-02-28
011	Antenna 30-300MHz	VHBA9123 / BBA9106	Schwarzbeck	0403/94	3 Year(s)/ 2028-01-09
012	Antenna 250-1200MHz	UHALP 9108A	Schwarzbeck	166	3 Year(s)/ 2028-01-09
013	Antenna 9 kHz-30 MHz	Ø 1.5 m	EMCE GmbH		1 Year(s)/ 2026-01-31
014	OATS	Test site 3 m referred to ANSI C63.4a-2017	EMCE GmbH		3 Year(s)/ 2027-05-06
015	OATS	Test site 10 m referred to ANSI C63.4a-2017	EMCE GmbH		3 Year(s)/ 2027-05-06
041	Loop antenna shielded	HZ-10 0816.2511.02	Rohde & Schwarz	849788/0020	3 Year(s)/ 2026-01-10
042-2	AC-Source	EMV D 5000/PAS/SyCore	Spitzenberger & Spies	A274700 / 00501	3 Year(s)/ 2026-02-10
042-1	Analyzer Reference System	ARS 16/3	Spitzenberger & Spies	A274707 / 00501	3 Year(s)/ 2028-01-02
043	Receiver	3DH/E Field meter ESM-100	Maschek	971521	3 Year(s)/ 2026-09-11
059	Log.-per. antenna	HL050	Rohde & Schwarz	100006	3 Year(s)/ 2025-10-21
067	LISN	ESH2-Z5	Rohde & Schwarz	872460/043	1 Year(s)/ 2026-02-28
068	LISN	ESH2-Z5	Rohde & Schwarz	872460/042	1 Year(s)/ 2026-02-28
070	Pulse limiter + 10 dB Attenuator	ESH3-Z2	Rohde & Schwarz	N/A	1 Year(s)/ 2025-08-31
116	Vertical rod antenna	VAMP 9243	Schwarzbeck	9243-205	3 Year(s)/ 2026-05-19

Inv.-No.	Designation	Type	Manufacturer	S/N	Calibration: Interval /valid until
117	LISN	ESH3-Z6	Rohde & Schwarz	100521	1 Year(s)/ 2026-02-28
174	LISN	ESH3-Z6	Rohde & Schwarz	101003	1 Year(s)/ 2026-02-28
175	EMI Test receiver	ESR7	Rohde & Schwarz	101108 Firmware: FW V3.46 SP3	1 Year(s)/ 2025-11-26
178	V-LISN 5 μ H	NNHV 8123-400	Schwarzbeck	018	1 Year(s)/ 2026-02-28
184	V-LISN 5 μ H	NNHV8123-400	Schwarzbeck	019	1 Year(s)/ 2026-02-28
222	Broadband Preamplifier 0.5-18 GHz	BBV 9718	Schwarzbeck	9718-316	1 Year(s)/ 2025-07-31
223	Broadband Preamplifier 12-28 GHz	BBV 9719	Schwarzbeck	9719-024	6 Month(s)/ 2025-07-31
225	Electric and Magnetic Field Probe-Analyzer	EHP-200A	Narda S.T.S. / PMM	170WX70205	3 Year(s)/ 2025-07-22
226	HL050 Log.-Per. Antenna 850 MHz to 26.5 GHz	HL050 4062.4063.02	Rohde & Schwarz	100829	3 Year(s)/ 2026-07-27
229	Test receiver	ESS 5 Hz - 1000 MHz	Rohde & Schwarz	845420/0005	1 Year(s)/ 2026-02-11
230	FSV40 Signal Analyzer 40 GHz	FSV40	Rohde & Schwarz	101717	2 Year(s)/ 2026-02-06
236	Broad-Band Horn Antenna 0.5-6 GHz	BBHA 9120 E	Schwarzbeck	00831	3 Year(s)/ 2027-06-25
237	Exposure Level Tester	ELT-400	Narda Safety Test Solutions	O-0028	3 Year(s)/ 2026-03-03
239	Broadband Horn Antenna 15-40 GHz	BBHA 9170	Schwarzbeck	00932	5 Year(s)/ 2029-05-23
253	Broadband Preamplifier 20-1000 MHz	ESV-Z3	Rohde & Schwarz	881 909/030	1 Year(s)/ 2025-08-31
257	Pulse limiter + 10 dB Attenuator	ESH3-Z2	Rohde & Schwarz	102769	1 Year(s)/ 2025-08-31
718	EMC-Software	BAT-EMC Vers. 3.18.0.19	Nexio	N/A	
997	EMC Software	EMC32 Vers. 10.60.20	Rohde & Schwarz	N/A	
1046	Environmental Simulation Chamber	MKF 115 (E3.1)	Binder GmbH	12-02215	3 Year(s)/ 2026-03-24

Inv.-No.	Designation	Type	Manufacturer	S/N	Calibration: Interval /valid until
1212	EMC Software	WMS32 Vers. 10.60.20	Rohde & Schwarz	N/A	
8004	Broadband Preamplifier 18-40 GHz	BLMA 1840-5G	BONN Elektronik GmbH	2113300	1 Year(s)/ 2025-07-31
8007	LPDA Broadband Antenna 180 - 1500 MHz	VULP 9118A	Schwarzbeck	899	3 Year(s)/ 2027-10-30
8008	LPDA Broadband Antenna 180 - 1500 MHz	VULP 9118A	Schwarzbeck	900	3 Year(s)/ 2028-02-10
8009	Field Monitoring Loop	FESP 5134-1	Schwarzbeck	00078	3 Year(s)/ 2028-02-05
8033	Antenna 30-300 MHz	VHBB9124 / BBA9106	Schwarzbeck	1808	3 Year(s)/ 2027-10-30
8034	Antenna 30-300 MHz	VHBB9124 / BBA9106	Schwarzbeck	1812	3 Year(s)/ 2028-02-10
8044	EMI Test Receiver	ESW44	Rohde & Schwarz	103371	1 Year(s)/ 2026-03-06



5 Testplan provided by customer

- ☐ Test according to the test plan provided by the customer
- ☐ Deviation from the test plan authorized by the customer
- ☒ Test according standard

Source document	Date / Reviser	Modifications



6 Test(s) according 47 CFR Part 15 Subpart B - 06/10/2025

6.1 Requirements and conformance test specifications

Standard

47 CFR Part 15 Subpart B
ANSI C63.4-2014
ANSI-C63.4a-2017
KDB N/A

Requirement		Regulation section
☒	Terminal voltage on powerline	§ 15.107 (a)
☒	Radiated emissions E-Field of unintentional radiators	§ 15.109 (a)(c)

6.2 Terminal voltage on powerline

- ☒ No deviation from the standard
- ☐ Deviation from the standard
- ☐ Not tested

Note: Valid for EUT 24-0136PR27-020.

Measurement procedure:

Rules and specification	47 CFR Part 15 Section 15.107 (a)
Guide	ANSI C63.4-2014

The conducted disturbances are recorded in the frequency range from 150 kHz to 30 MHz. For this purpose line impedance stabilization networks (LISNs) are used which are inserted between the DUT and the mains supply. The output of one LISN is connected directly to a receiver according to CISPR 16 guidelines via a pulse limiter and 10 dB fixed attenuator.

Not used ports of the LISN are terminated by 50 Ω . The Average- and Quasi-Peak-Detectors are provided to evaluate the spectrum. To speed up the measurement process, a pre-measurement is performed with the Peak- and Average-Detectors. The 10 frequencies with the smallest distance to the limit and priority with the highest exceeding are selected and remeasured. The Average and Quasi-Peak-Detectors are used for the final measurement. This measurement procedure is performed for each individual current conductor.

Depending on the limit lines, 6 final measurements are documented. The highest limit exceeding or, in case of compliance with the limit, the emissions found with the smallest distance to the limit are documented.

If less than six emission frequencies with a distance of 20 dB are below the limit value, the noise level of the measuring device at representative frequencies is indicated.

For the measurement, it may be necessary to terminate the antenna output to distinguish the interference level caused by the unintentional part from the intentional part (see ANSI C63.4:2003 section 13.1.3.1).

The documented final test results are calculated using the following formula:

$$U(f) \text{ (dB}\mu\text{V)} = \text{Measured Value (dB}\mu\text{V)} + \text{ATF (dB)} + \text{CF (dB)}$$

$U(f)$ =	Final result of the terminal voltage at the test frequency
Measured Value =	Reading of the uncorrected measured value
ATF =	Correction factor for the pulse limiter + 10 dB attenuator
CF =	Correction factor for the cable attenuation

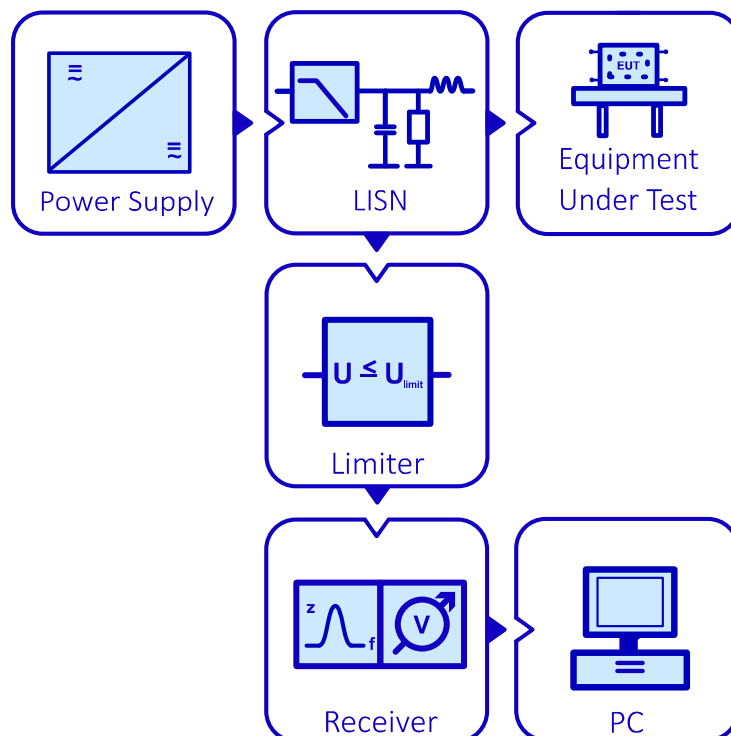
Example:

Test frequency	13.56 MHz
Reading	31.5 dB μ V
$AFT_{(13.56 \text{ MHz})}$	10.2 dB
$CF_{(13.56 \text{ MHz})}$	0.4 dB

Calculated final result for the terminal voltage $u(f)$:

$$U_{(13.56 \text{ MHz})} = 31.5 \text{ dB}\mu\text{V} + 10.2 \text{ dB} + 0.4 \text{ dB} = 42.1 \text{ dB}\mu\text{V}$$

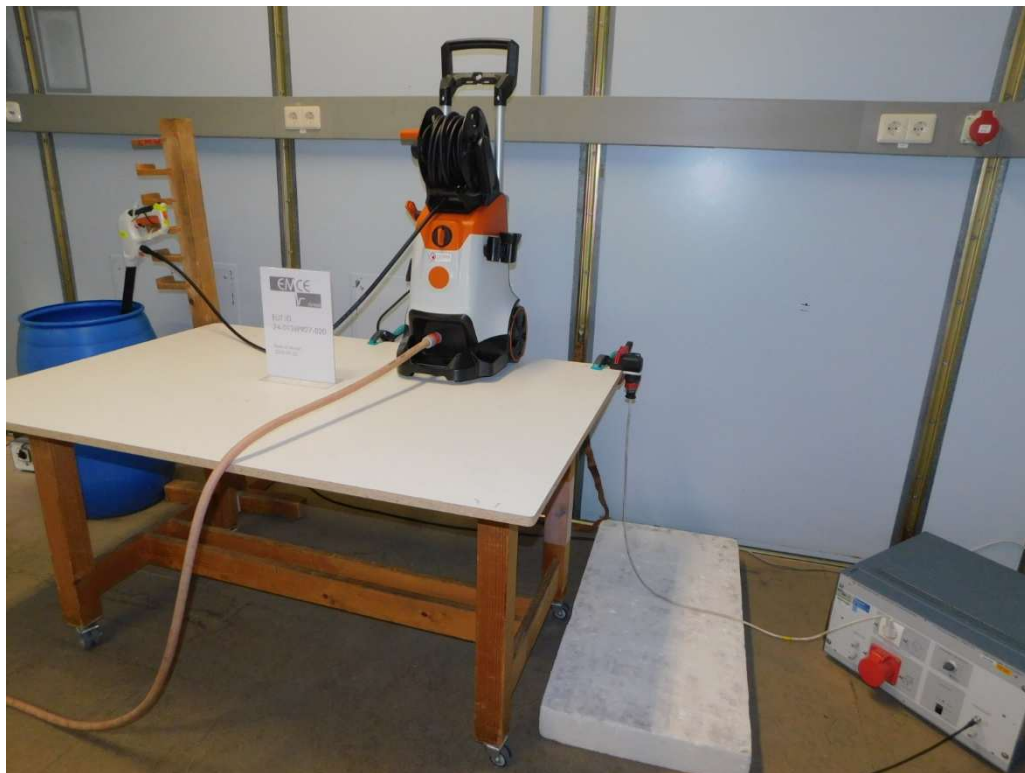
Basic structure - Setup





6.2.1 Test set up

According ANSI C63.4-2014



Test location

☒	Inv.-No.	Designation	Type (L x W x H)	Manufacturer	Location
☐					
☒	0588	Shielded room # 2	8.3 x 5.5 x 3.4 m	EMC-Technik & Consulting GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden Germany
☐	1319	Shielded room #5	5.6 x 5.0 x 3.8 m	Albatross Projects GmbH	

Used test equipment

☒	Inv.-No.	Designation	Type	Manufacturer	S/N
☐	003	LISN 1	ESH3-Z5	Rohde & Schwarz	835268/007
☐	004	LISN 2	ESH3-Z5	Rohde & Schwarz	835268/003
☒	042	AC-Source / Analyzer / Norm impedance	EMV D5000/PAS	Spitzenberger + Spies	A274700/ 0 0501
☐	067	LISN 5	ESH2-Z5	Rohde & Schwarz	0872460/043
☒	068	LISN 4	ESH2-Z5	Rohde & Schwarz	0872460/042
☒	070	Pulse limiter / 10 dB attenuator	ESH3-Z2	Rohde & Schwarz	357.8810.52
☒	175	Test receiver	ESR 7	Rohde & Schwarz	101108
☒	997	Software	EMC32	Rohde & Schwarz	N/A

All used test equipment are checked resp. calibrated periodically.

☒ Test equipment was checked and complied to the requirements

Test-/Measurement uncertainty

The measurement uncertainty in the test met the guideline of CISPR16-4-2 or better.

Measurement uncertainty of the terminal voltage with an extended coverage factor of $k = 2$:

Frequency	Measurement uncertainty
9 kHz – 150 kHz	4.0 dB
150 kHz – 30 MHz	3.6 dB



6.2.2 Test

Rules and specification 47 CFR Part 15 Section 15.107 (a)

Frequency range: 150 kHz – 30 MHz

Limits for conducted emissions

Technical requirements			
Detector	Frequency / MHz	Limit QP-Detector / dBµV	Limit AV-Detector / dBµV
QP AV	0.15 – 0.5	66.0 – 56.0	56.0 – 46.0
QP AV	0.5 – 5.0	56.0	46.0
QP AV	5.0 – 30.0	60	50.0

Rationale for selecting the EUT test set up

Equipment units:

The handheld spray gun, functioning as auxiliary equipment and equipped with a battery-powered RF module, is connected to the main unit of the mains-powered high-pressure cleaner (EUT) via a steel-braided high-pressure hose.

Cabling:

- ☒ Standard cables
- ☐ Special cables provided by the manufacturer

Port #	Designation	Remarks
1	AC power line	L1/N/PE, with PRCD
Water connection	Water hose	High-pressure hose reinforced with steel braiding.



Operation mode

EUT arrangement: ☒ Tabletop ☐ Floor standing
Power supply: ☒ 120 V/60 Hz ☐ 240 V/60 Hz

During the entire measurement period, the EUT and the associated spray gun were powered on and operational. The high-pressure cleaner was continuously operated at its maximum rated pressure. The RF modules integrated in both the EUT and the spray gun were set to receive mode.

Environmental conditions

Temperature [10 – 40 °C]: 28.3 °C
Relative humidity [10 – 90 %]: 40.7 %

Test result

Limits for conducted powerline emissions: ☒ Met
☐ Not met
☐ Not relevant

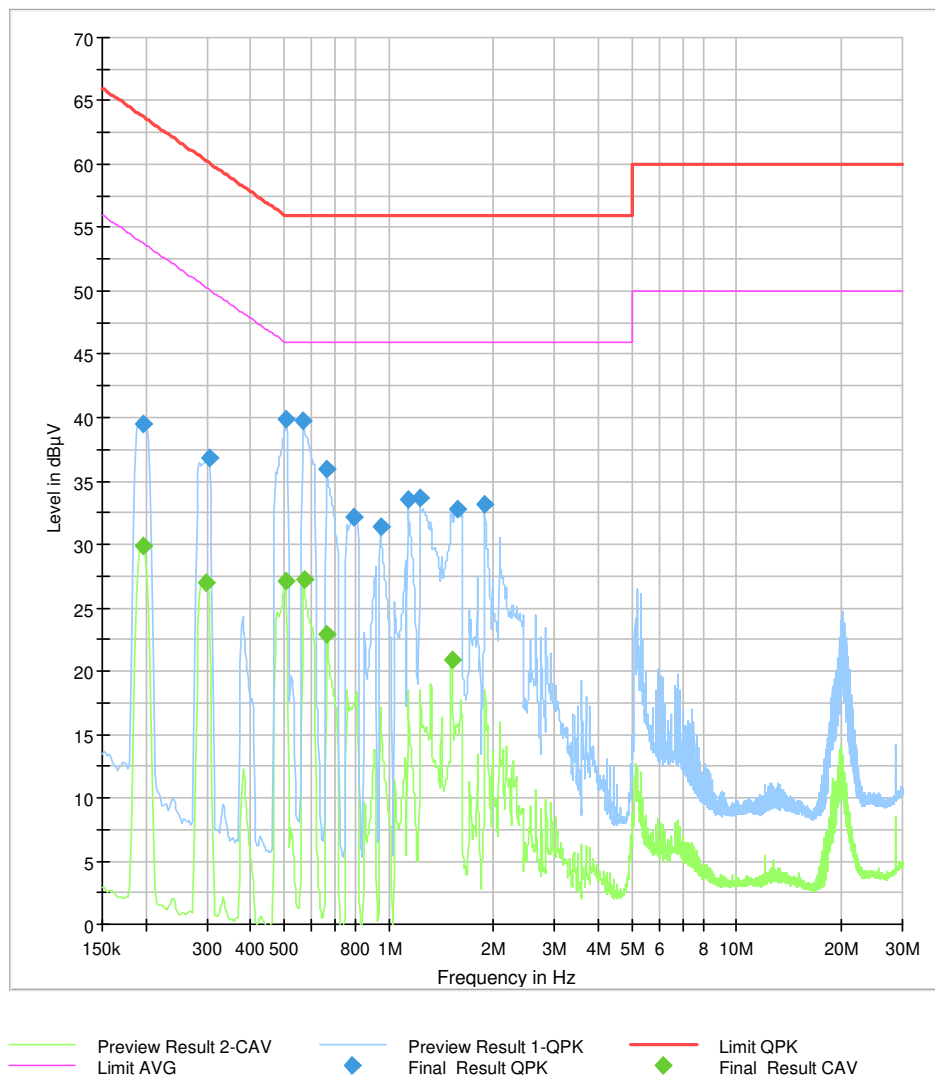
Remarks: N/A

Records

☒ Readings
☒ Diagram

EUT Information

EUT Name:	High-pressure cleaner
Test_ID: / SN:	24-0136PR27-020
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous cleaning at maximum rated pressure
Test specification:	47 CFR Part 15 Subpart B Class B - Terminal voltage on AC mains
LISN port:	N
Supply voltage:	120 V/60 Hz
Operator:	S. Vogelmann
File #:	24-0136RC27-020-001
Comment #1:	
Comment #2:	

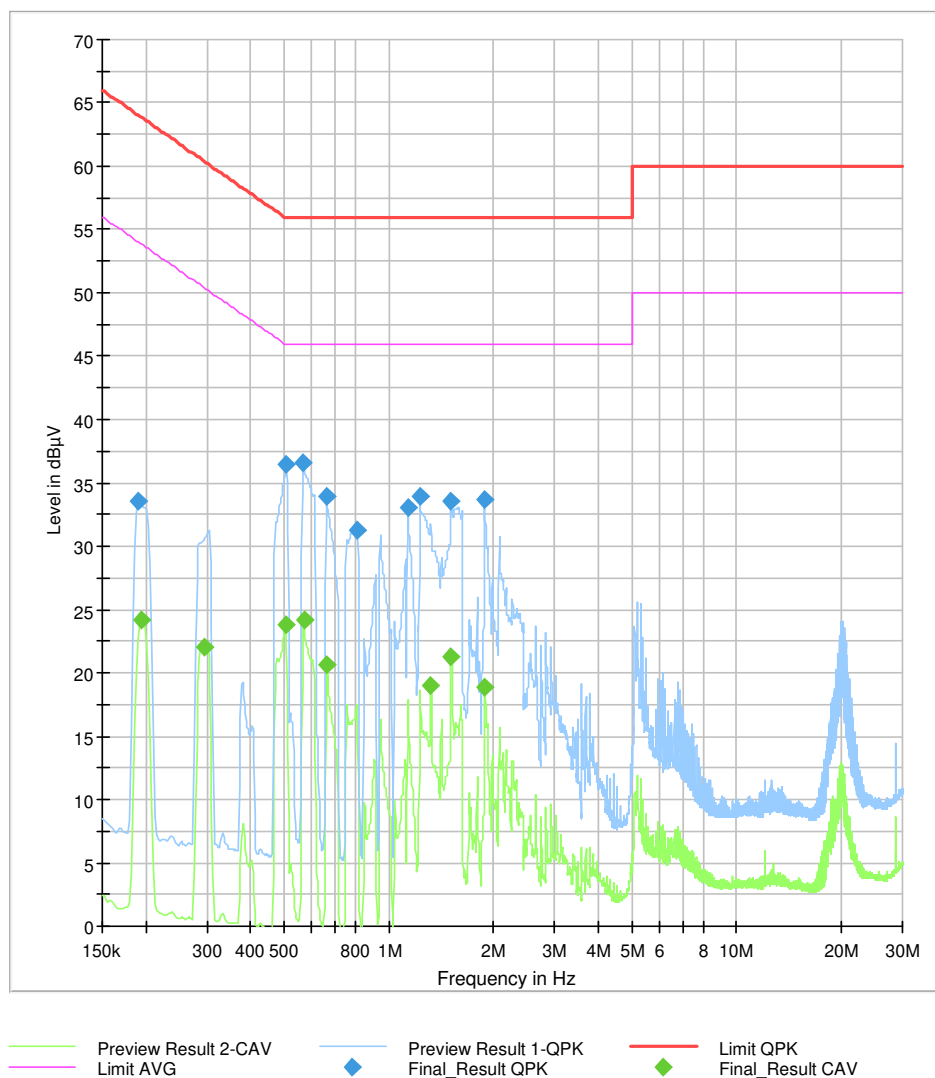


Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.197250	39.47	---	63.73	24.26	15000.0	9.000	N	10.1
0.197250	---	29.92	53.73	23.80	15000.0	9.000	N	10.1
0.298500	---	27.01	50.28	23.28	15000.0	9.000	N	10.1
0.303000	36.86	---	60.16	23.30	15000.0	9.000	N	10.1
0.503250	---	27.15	46.00	18.85	15000.0	9.000	N	10.1
0.507750	39.82	---	56.00	16.18	15000.0	9.000	N	10.1
0.568500	39.69	---	56.00	16.31	15000.0	9.000	N	10.1
0.570750	---	27.19	46.00	18.81	15000.0	9.000	N	10.1
0.663000	36.00	---	56.00	20.00	15000.0	9.000	N	10.2
0.665250	---	22.90	46.00	23.10	15000.0	9.000	N	10.2
0.789000	32.11	---	56.00	23.89	15000.0	9.000	N	10.2
0.944250	31.44	---	56.00	24.56	15000.0	9.000	N	10.2
1.135500	33.56	---	56.00	22.44	15000.0	9.000	N	10.2
1.230000	33.71	---	56.00	22.29	15000.0	9.000	N	10.2
1.515750	---	20.84	46.00	25.16	15000.0	9.000	N	10.3
1.583250	32.80	---	56.00	23.20	15000.0	9.000	N	10.3
1.889250	33.12	---	56.00	22.88	15000.0	9.000	N	10.3

EUT Information

EUT Name:	High-pressure cleaner
Test_ID: / SN:	24-0136PR27-020
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous cleaning at maximum rated pressure
Test specification:	47 CFR Part 15 Subpart B Class B - Terminal voltage on AC mains
LISN port:	L1
Supply voltage:	120 V/60 Hz
Operator:	S. Vogelmann
File #:	24-0136RC27-020-002
Comment #1:	
Comment #2:	



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.190500	33.60	---	64.02	30.41	15000.0	9.000	L1	10.1
0.195000	---	24.22	53.82	29.60	15000.0	9.000	L1	10.1
0.296250	---	22.05	50.35	28.30	15000.0	9.000	L1	10.1
0.503250	---	23.80	46.00	22.20	15000.0	9.000	L1	10.1
0.507750	36.40	---	56.00	19.60	15000.0	9.000	L1	10.1
0.566250	36.58	---	56.00	19.42	15000.0	9.000	L1	10.1
0.570750	---	24.18	46.00	21.82	15000.0	9.000	L1	10.1
0.660750	33.93	---	56.00	22.07	15000.0	9.000	L1	10.2
0.663000	---	20.63	46.00	25.37	15000.0	9.000	L1	10.2
0.809250	31.26	---	56.00	24.74	15000.0	9.000	L1	10.2
1.133250	33.05	---	56.00	22.95	15000.0	9.000	L1	10.2
1.227750	33.92	---	56.00	22.08	15000.0	9.000	L1	10.2
1.322250	---	19.01	46.00	26.99	15000.0	9.000	L1	10.3
1.511250	33.60	---	56.00	22.40	15000.0	9.000	L1	10.3
1.513500	---	21.25	46.00	24.75	15000.0	9.000	L1	10.3
1.889250	33.62	---	56.00	22.38	15000.0	9.000	L1	10.3
1.891500	---	18.86	46.00	27.14	15000.0	9.000	L1	10.3



6.3 Radiated emissions E-Field of unintentional radiators

- ☒ No deviation from the standard
- ☐ Deviation from the standard
- ☐ Not tested

Note: Valid for EUT 24-0136PR18-006.

Measurement procedure:

Rules and specification	47 CFR Part 15 Section 15.109 (a)(c)
Guide	ANSI C63.4-2014

The radiated interference emission is measured on an alternative open area test site OATS in the frequency range 30 - 1000 MHz. The measurement distance is 3 m or 10 m, depending on the standard. Above 1 GHz, the measurement is performed in a 3 m semi-anechoic chamber with floor absorber to reduce ground reflections. For the measurement of the field strength a biconical antenna up to 200 MHz, a logperiodic antenna from 200 MHz to 1 GHz and horn antennas or double stacked logperiodic antenna above 1 GHz are used. All antennas are linearly polarized. External low-noise preamplifiers are used in the range above 1 GHz to improve measurement sensitivity. Special measures, such as filters or attenuators, are taken to avoid overloading the amplifiers. The antenna height is varied between 1 m and 4 m as required. The elevation angle of the antenna can be corrected via the antenna mast to ensure that the main lobe of the antenna is always directed at the EUT. A turntable allows the alignment of the EUT towards the antenna to maximize the radiated emission. The test sites are located above a metallic ground plane. Table-top devices are placed on a non-conductive wooden table. Hand-held, body-worn, or ceiling-mounted devices are examined in 3 orthogonal axis orientations to determine the maximum emission level. Floor-standing devices are placed directly on the grounded metal turntable/reference insulated from ground plane by an insulating material <12 mm. During an initial automated pre-test run in a semi-anechoic chamber, the desired frequency range is measured. The receiver is operated as an analyzer and the frequency ranges are run sequentially depending on the antenna. For the measurement, the turntable is continuously rotated from 0° - 360° and back, and the antenna height is changed in 0.5 m increments after each complete turntable cycle. The antenna position is then changed from 1.0 m to 4.0 m in 0.5 m steps for vertical polarization and back for horizontal polarization. During a cycle, the frequency range is continuously swept with peak detector and max hold function. Depending on the test specification, an average detector is also used if required. For each discrete antenna polarization over all positions, the maximum peak values are recorded with frequency, level, turntable position, antenna height and antenna polarization. Significant peaks or clock frequencies are marked and re-measured with increased frequency accuracy. The recordings are used to determine the



exact frequency and to optimize the interference level. At the predefined position, the turntable position is fine-adjusted in the range of $\pm 20^\circ$ and then the antenna height is varied by ± 0.3 m. At the maximized position, the emission is measured with quasi-peak or average detector and listed. The six highest emissions are selected for final measurement in the OATS.

In a final test run, an open area test site measurement is made at selected frequencies determined by the previous test procedure. For each selected frequency, the frequency setting is optimized again in the OATS and the field strength value is maximized, rotating the EUT 360° at an antenna height of 1.0 m for vertical antenna polarization and 2.0 m for horizontal antenna polarization. At the azimuth position of the EUT for the highest radiation, the antenna height is varied within 1.0 m and 4.0 m until the highest interference level is reached. To maximize the interference level at the determined position, the turntable azimuth is fine-adjusted by $\pm 45^\circ$ and the antenna height is fine-adjusted by ± 0.3 m. The setup of the instrument and the cables are manipulated within the range to produce the highest emission.

Final measurement is made using a receiver conforming to CISPR 16 guidelines with a quasi-peak and average detector.

The identified frequency and amplitude of the six highest radiated emissions relative to the limit lines are listed. If fewer than six emission frequencies are within 20 dB of the limit, the noise level of the instrument at representative frequencies is reported.

For documentation of final testing below 1 GHz on the OATS the plots recorded in den SAC are indicated as pre-test.

In case the regulation requires testing at different distances, the result is extrapolated by an extrapolation factor 20 dB / decade to the required distance.

The reported test results are calculated using the following formula to normalize the results to the requested test distance:

$$E(f) \text{ (dB}\mu\text{V/m)} = \text{Measured value (dB}\mu\text{V)} + \text{AF (dB/m)} + \text{CF (dB)} + 20 \cdot (D_T/D_R) \text{ (dB)}$$

$E(f)$ =	Final result of the electrical field strength
Measured Value =	Reading of the uncorrected measured value
AF =	Correction factor for the receiving antenna
CF =	Correction factor for the cable loss
D_T =	Test distance
D_R =	Reference distance for the limit defined in the standard

Example:

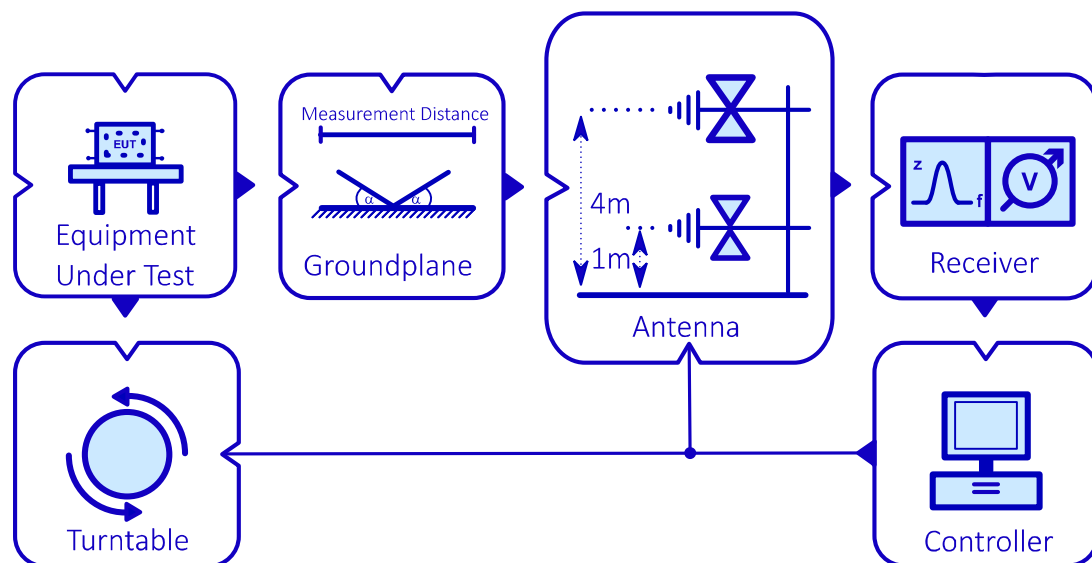
Test frequency	500.00 MHz
Reading	12.3 dB μ V
AF _(500.00 MHz)	17.1 dB/m
CF _(500.00 MHz)	1.4 dB
D _T =	3 m
D _R =	3 m

Calculated final result for the electrical field strength E(f):

$$E_{(500.00 \text{ MHz})} = 12.3 \text{ dB}\mu\text{V} + 17.1 \text{ dB/m} + 1.4 \text{ dB} + 0 \text{ dB} = 30.8 \text{ dB}\mu\text{V/m}$$

Basic structure - Setup

OATS / SAC





6.3.1 Test set up

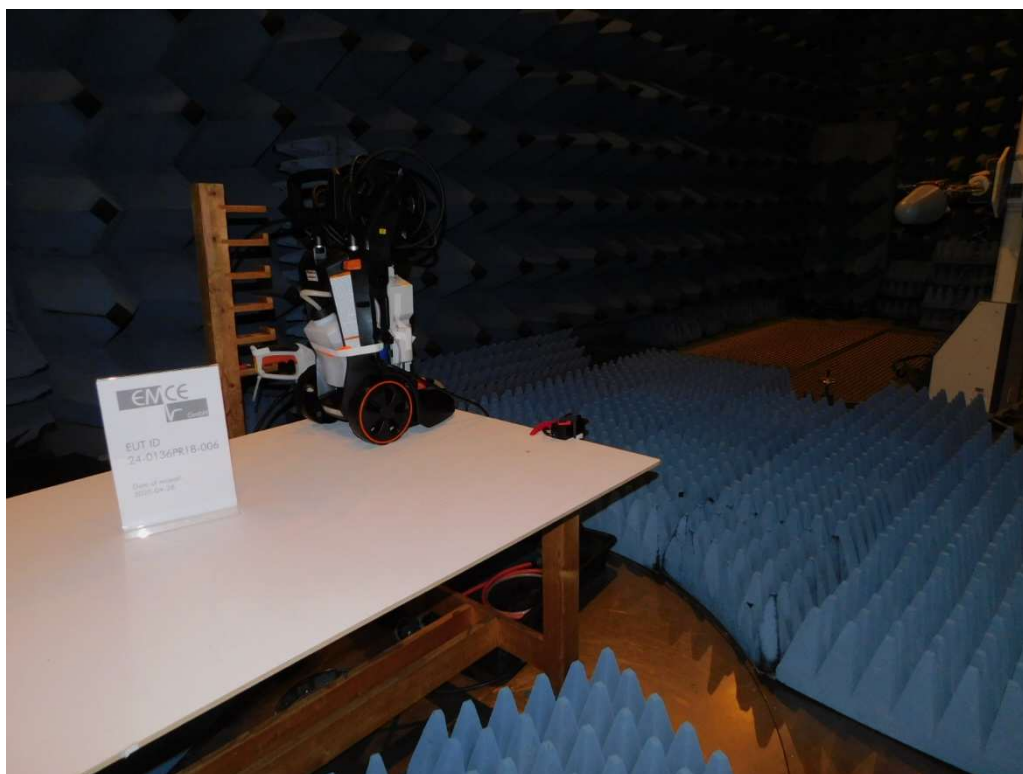
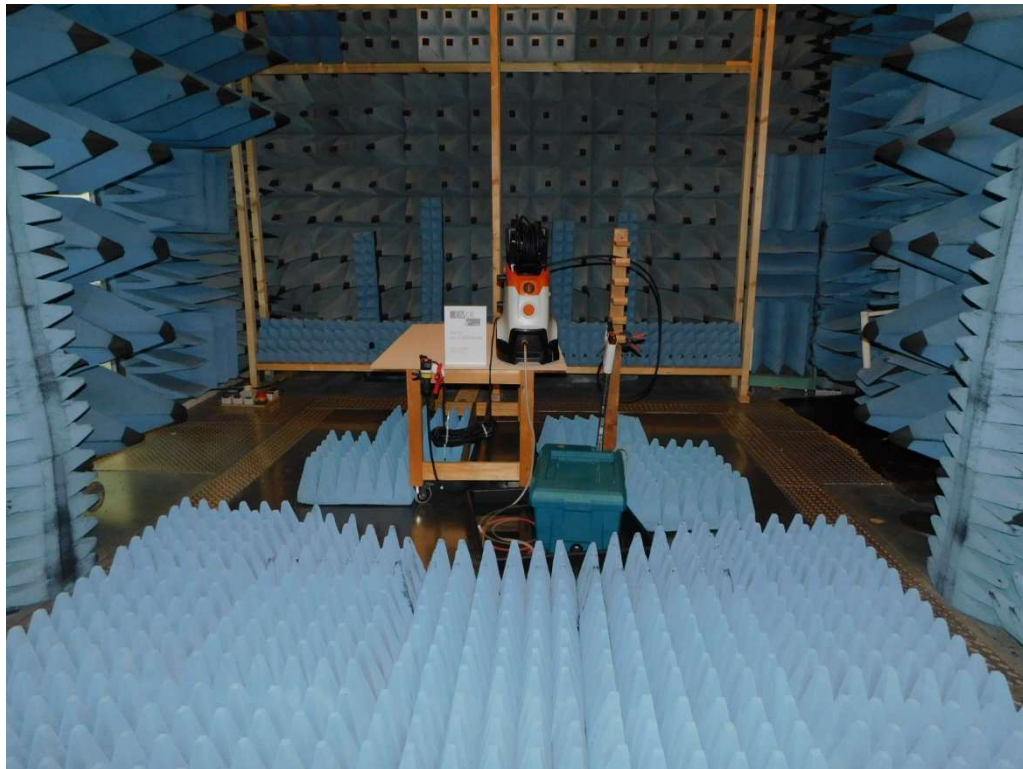
According ANSI C63.4-2014

Final test setup – OATS [30 – 1000 MHz]



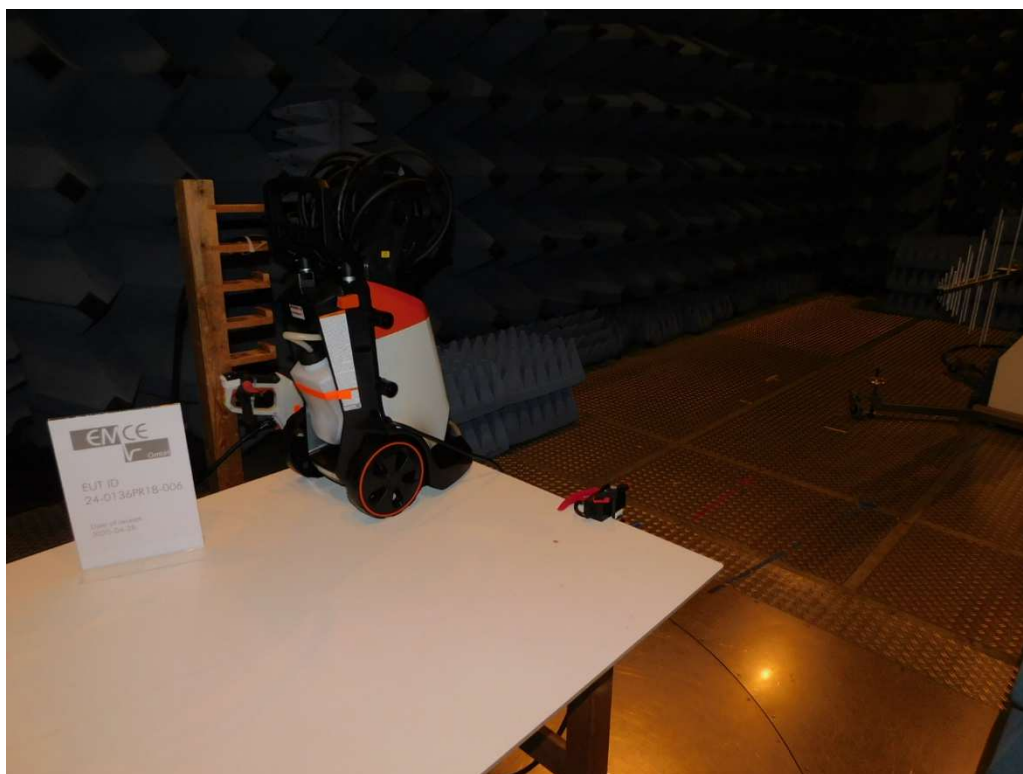
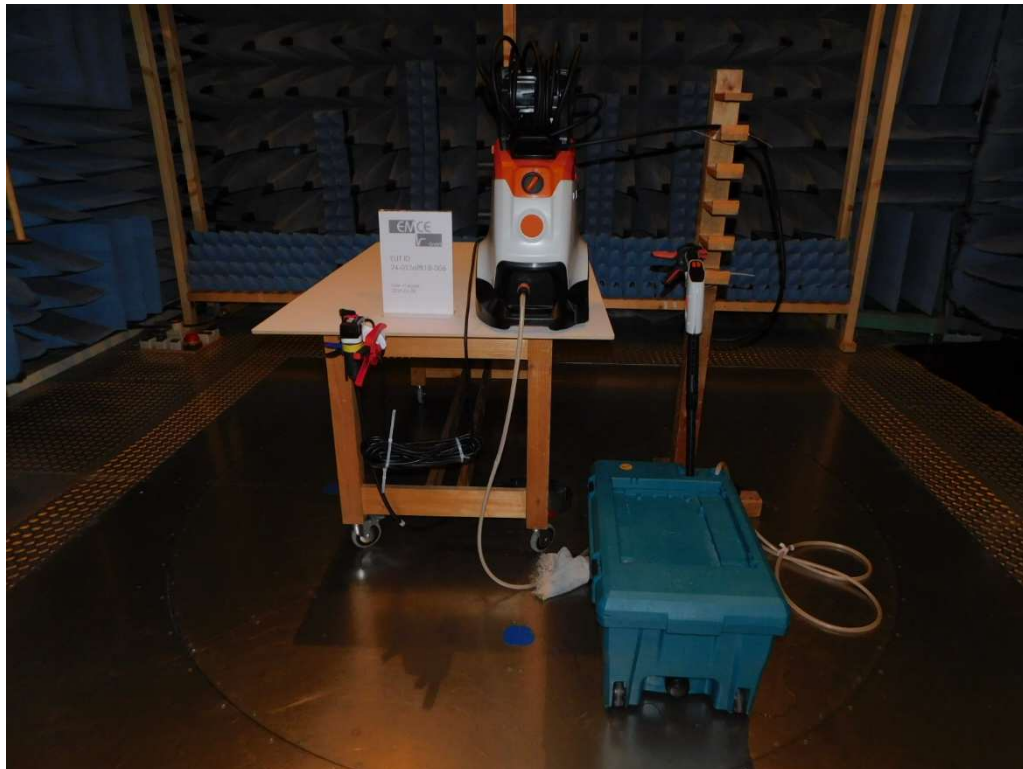


Final test setup – SAC [1 – 5 GHz]





Pre-test setup – SAC [30 – 1000 MHz]



Test location

Pre-test					
☐	Inv.-No.	Designation	Type (L x W x H)	Manufacturer	Location
☒	062	Semi anechoic chamber # 2	13.5 x 6.1 x 5.5 m	EMC-Technik & Consulting GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden Germany

Final test					
☐	Inv.-No.	Designation	Type (L x W x H)	Manufacturer	Location
☒	062	Semi anechoic chamber # 2	13.5 x 6.1 x 5.5 m	EMC-Technik & Consulting GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden Germany
☒	014	Open area test site	3 m	EMCE GmbH	
	015	Open area test site	10 m	EMCE GmbH	

Used test equipment

Pre-test					
☒	Inv.-No.	Designation	Type	Manufacturer	S/N
☒	042	AC-Source / Analyzer / Norm impedance	EMV D5000/PAS	Spitzenberger + Spies	A274700/ 0 0501
☒	997	Software	EMC32	Rohde & Schwarz	N/A
☒	8008	LPDA Broadband Antenna 180 - 1500 MHz	VULP 9118A	Schwarzbeck	900
☒	8034	Antenna 30-300 MHz	VHBB9124 / BBA9106	Schwarzbeck	1812
☒	8044	Test receiver	ESW 44	Rohde & Schwarz	103371

Final test					
☒	Inv.-No.	Designation	Type	Manufacturer	S/N
☒	042	AC-Source / Analyzer / Norm impedance	EMV D5000/PAS	Spitzenberger + Spies	A274700/ 0 0501
	059	LPDA	HL050	Rohde & Schwarz	100006
☒	222	Broadband Preamplifier 0.5-18 GHz	BBV 9718	Schwarzbeck	9718-316
☒	226	LPDA	HL050	Rohde & Schwarz	100829
☒	229	Test receiver	ESS	Rohde & Schwarz	845420/0005
	236	Broad-Band Horn Antenna 0.5-6 GHz	BBHA 9120 E	Schwarzbeck	00831
☒	997	Software	EMC32	Rohde & Schwarz	N/A
☒	8007	LPDA Antenna 180 - 1500 MHz	VULP 9118A	Schwarzbeck	899
☒	8033	Antenna 30-300 MHz	VHBB9124 / BBA9106	Schwarzbeck	1808
☒	8044	Test receiver	ESW 44	Rohde & Schwarz	103371

All used test equipment are checked resp. calibrated periodically.

☒ Test equipment was checked and complied to the requirements



Test-/Measurement uncertainty

The measurement uncertainty in the test met the guideline of CISPR16-4-2 or better.

Measurement uncertainty of the radiated emission with an extended coverage factor of $k = 2$:

Frequency	Measurement uncertainty
30 MHz – 200 MHz	4.8 dB (valid for 10 m-OATS)
200 MHz – 1 GHz	4.9 dB (valid for 10 m-OATS)
30 MHz – 200 MHz	4.8 dB (valid for 3 m-OATS)
200 MHz – 1 GHz	6.2 dB (valid for 3 m-OATS)

6.3.2 Test

Rules and specification 47 CFR Part 15 Section 15.109 (a)(c)

Limits for radiated emissions

Technical requirements			
Detector	Frequency / MHz	Limit / dB μ V/m	Measurement distance / m
QP	30.0 – 88.0	40.0	3
QP	88.0 – 216.0	43.5	3
QP	216.0 – 960.0	46.0	3
QP	960.0 – 1000.0	54.0	3
AV	> 1000	54.0	3
PK	> 1000	74.0	3

Highest frequency generated or used in the device or on which the device operates or tunes:

- ☐ < 1.705 MHz
☐ 1.705 – 108 MHz
☐ 108 – 500 MHz
☒ 500 – 1000 MHz
☐ > 1000 MHz

Upper frequency of measurement:

- ☐ 30 MHz
☐ 1000 MHz
☐ 2000 MHz
☒ 5000 MHz
☐ 5th harmonic of the highest frequency or 40 GHz, whichever is lower

Frequency range:

- ☐ 9 kHz – 30 MHz
☒ 1 – 5 GHz
☐ 18 – 26 GHz
- ☒ 30 MHz – 1000 MHz
☐ 5 – 18 GHz
☐ 26 – 40 GHz

Rationale for selecting the EUT test set up

Equipment units:

The handheld spray gun, functioning as auxiliary equipment and equipped with a battery-powered RF module, is connected to the main unit of the mains-powered high-pressure cleaner (EUT) via a steel-braided high-pressure hose.

Cabling:

- ☒ Standard cables
☐ Special cables provided by the manufacturer

Port #	Designation	Remarks
1	AC power line	L1/N/PE, with PRCD
Water connection	Water hose	High-pressure hose reinforced with steel braiding.

Operation mode

EUT arrangement: ☒ Tabletop ☐ Floor standing
 Power supply: ☒ 120 V/60 Hz ☐ Internal battery

During the entire measurement period, the EUT and the associated spray gun were powered on and operational. The high-pressure cleaner was continuously operated at its maximum rated pressure. The RF modules integrated in both the EUT and the spray gun were set to receive mode.

Environmental conditions - SAC

Temperature [10 – 40 °C]: 30.4 °C
 Relative humidity [10 – 90 %]: 42.2 %

Environmental conditions - OATS

Temperature [10 – 40 °C]: 27.8 °C
 Relative humidity [10 – 90 %]: 38.6 %



Test result

Limits for unwanted radiated emissions:

- ☒ Met
- ☐ Not met
- ☐ Not relevant

| Remarks: N/A

Records

Pre-test measurement

- ☒ Readings
- ☒ Diagram

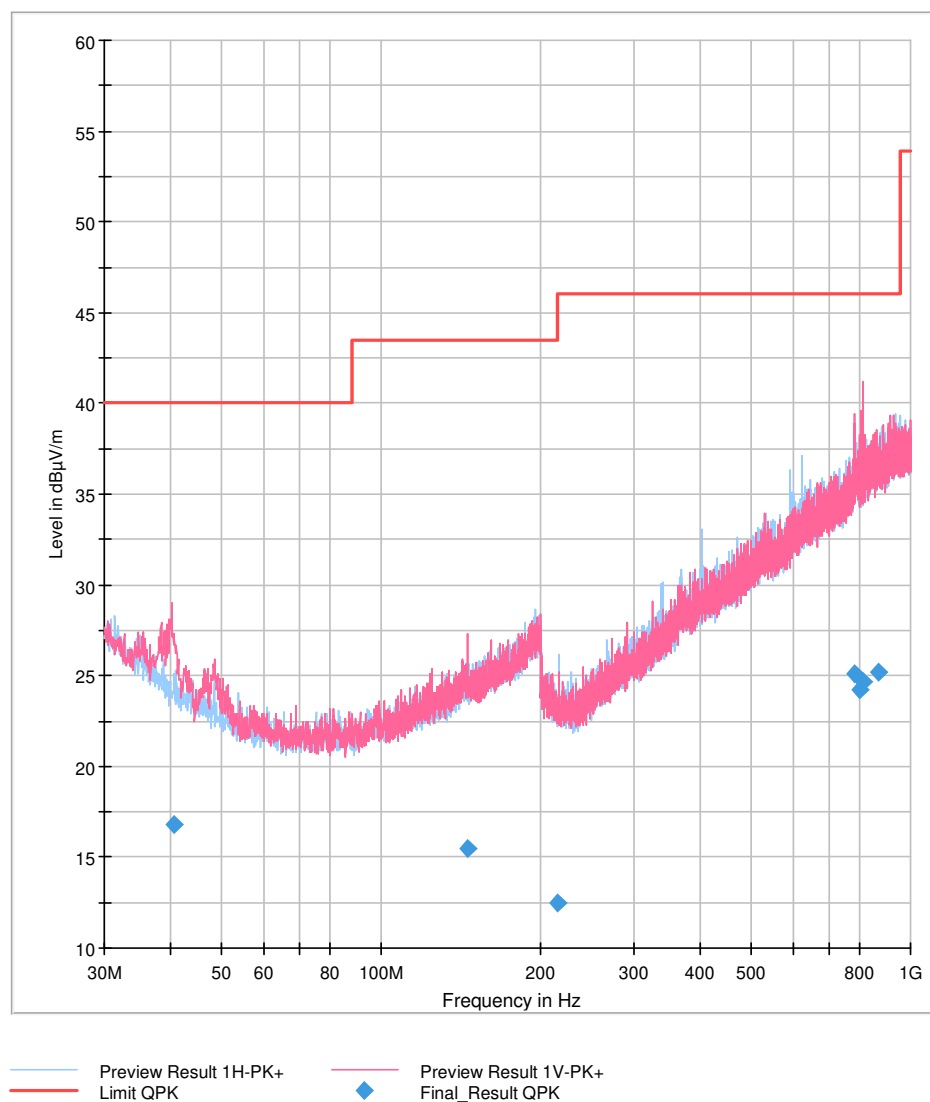
Final measurement

- ☒ Readings
- ☒ Diagram

Pre-test measurement

EUT Information

EUT Name:	High-pressure cleaner
Test_ID: / SN:	24-0136PR18-006
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous operation, RF module in receive mode
Test specification:	47 CFR Part 15 Subpart B Class B SAC @3 m
Antenna information:	Distance EUT-Ant.: 3.0 m / Polarization: H/V / Ant.Height: 1.0-4.0 m.
Operator:	S. Vogelmann
File #:	24-0136RC24-006-001
Comment #1:	Spray gun (serves as auxiliary equipment) was within the test volume.
Comment #2:	





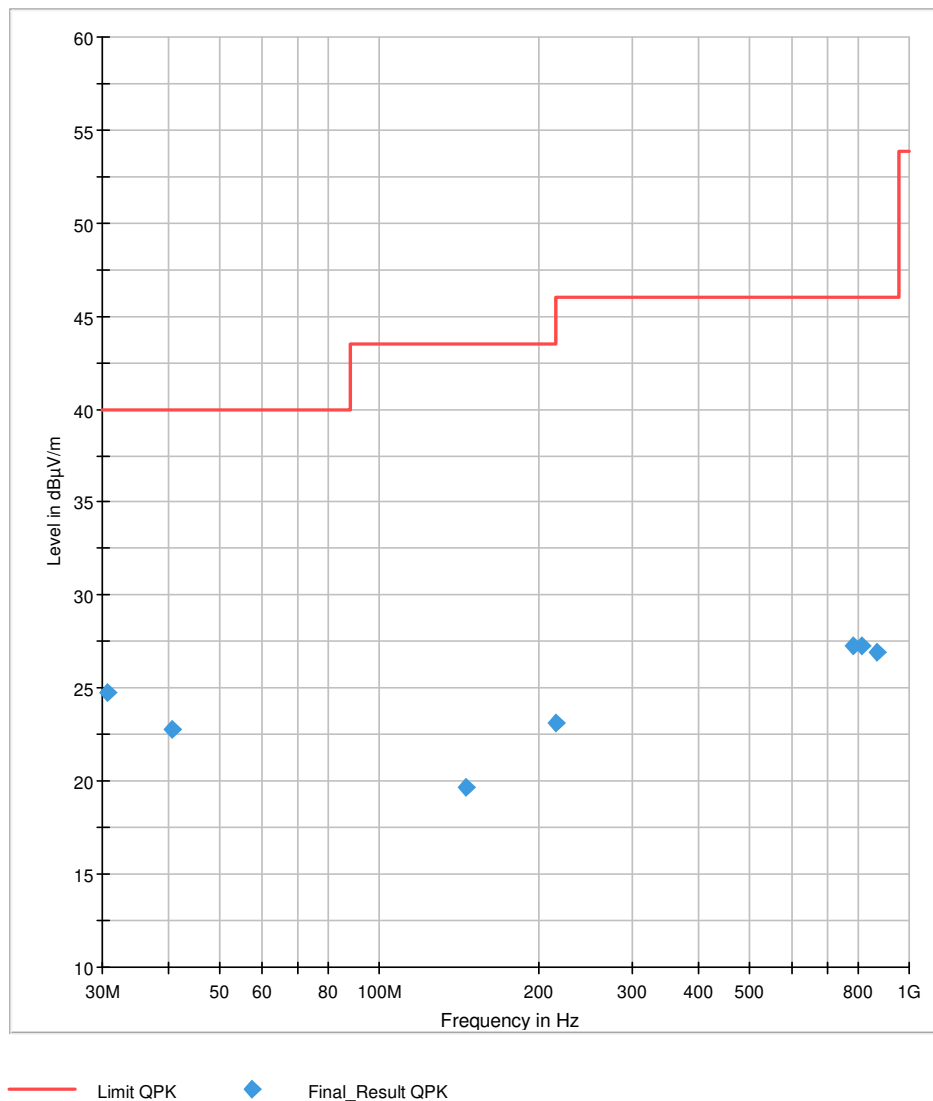
Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
40.474728	16.83	40.00	23.17	15000.0	120.000	125.0	V	28.0	11.8
145.991273	15.47	43.50	28.03	15000.0	120.000	135.0	V	153.0	12.9
784.801946	25.08	46.00	20.92	15000.0	120.000	185.0	V	10.0	23.5
803.846703	24.21	46.00	21.79	15000.0	120.000	155.0	V	-3.0	23.5
810.955567	24.63	46.00	21.37	15000.0	120.000	185.0	V	10.0	23.5
869.620973	25.16	46.00	20.84	15000.0	120.000	335.0	V	84.0	24.5

Final measurement

EUT Information

EUT Name:	High-pressure cleaner
Test_ID: / SN:	24-0136PR18-006
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous operation, RF module in receive mode
Test specification:	47 CFR Part 15 Subpart B Class B OATS @3 m
Antenna information:	Distance EUT-Ant.: 3.0 m / Polarization: H/V / Ant.Height: 1.0-4.0 m.
Operator:	S. Vogelmann
File #:	24-0136RC24-006-001
Comment #1:	Spray gun (serves as auxiliary equipment) was within the test volume.
Comment #2:	



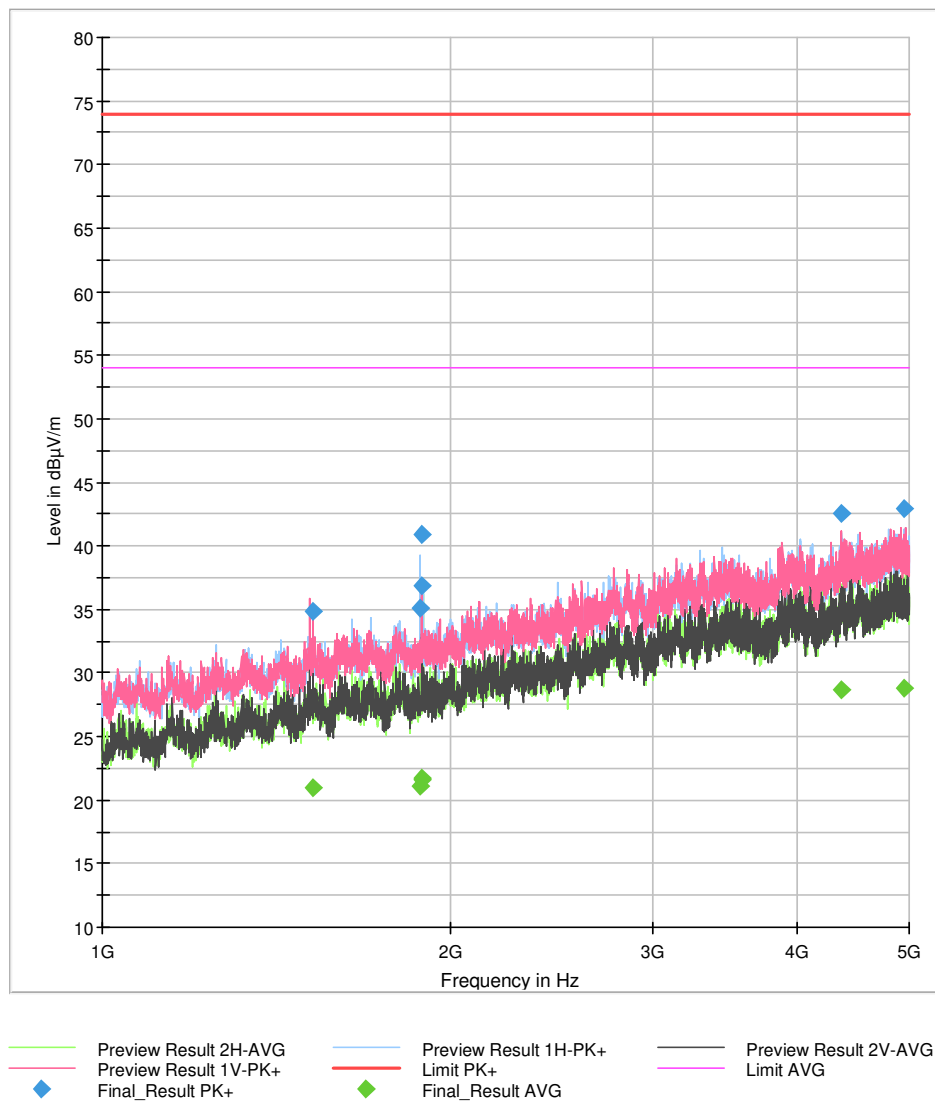


Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.775311	24.74	40.00	15.26	15000.0	120.000	100.0	V	0.0	14.1
40.474728	22.80	40.00	17.20	15000.0	120.000	125.0	V	0.0	12.1
215.900432	23.10	43.50	20.40	15000.0	120.000	235.0	H	0.0	12.9
784.801946	27.30	46.00	18.70	15000.0	120.000	185.0	V	0.0	25.0
810.955567	27.28	46.00	18.72	15000.0	120.000	185.0	V	45.0	25.1
869.620973	26.90	46.00	19.10	15000.0	120.000	335.0	V	90.0	24.5

EUT Information

EUT Name:	High-pressure cleaner
Test_ID: / SN:	24-0136PR18-006
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous operation, RF module in receive mode
Test specification:	47 CFR Part 15 Subpart B Class B SAC @3 m
Antenna information:	Distance EUT-Ant.: 3.0 m / Polarization: H/V / Ant.Height: 1.0-4.0 m.
Operator:	S. Vogelmann
File #:	24-0136RC24-006-002
Comment #1:	Spray gun (serves as auxiliary equipment) was within the test volume.
Comment #2:	



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1520.861364	34.80	---	74.00	39.20	15000.0	1000.000	185.0	V	268.0	-5.7
1520.861364	---	20.95	54.00	33.05	15000.0	1000.000	185.0	V	268.0	-5.7
1886.588636	---	21.11	54.00	32.89	15000.0	1000.000	135.0	H	18.0	-3.8
1886.588636	35.16	---	74.00	38.84	15000.0	1000.000	135.0	H	18.0	-3.8
1890.470454	---	21.56	54.00	32.44	15000.0	1000.000	173.0	H	289.0	-3.8
1890.470454	40.87	---	74.00	33.13	15000.0	1000.000	173.0	H	289.0	-3.8
1892.329546	36.81	---	74.00	37.19	15000.0	1000.000	155.0	V	-2.0	-3.8
1892.329546	---	21.70	54.00	32.30	15000.0	1000.000	155.0	V	-2.0	-3.8
4372.384091	---	28.61	54.00	25.39	15000.0	1000.000	213.0	V	109.0	6.0
4372.384091	42.57	---	74.00	31.43	15000.0	1000.000	213.0	V	109.0	6.0
4953.861364	42.88	---	74.00	31.12	15000.0	1000.000	155.0	H	237.0	7.3
4953.861364	---	28.85	54.00	25.15	15000.0	1000.000	155.0	H	237.0	7.3



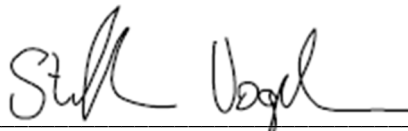
7 **Summary**

Reference
47 CFR Part 15 Subpart B

Requirement	Regulation section	Result	Remarks
Terminal voltage on powerline	§ 15.107 (a)	Pass	
Radiated emissions E-Field of unintentional radiators	§ 15.109 (a)(c)	Pass	

Burgrieden, 01/12/2026

Responsible inspector:


Project manager – Steffen Vogelmann

- End of Test Report -