WikiCAP

GNSS valid

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GNSS devices and VHR ortho imagery already validated/certified

The lists have been updated in order to take into account the new rules defined by Article 38 (4) of Commission Implementing Reg. (EU) No 809/2014 (http://eur-lex.europa.eu/search.html?DTN=0809&DTA=2014&qid=1449065138893&DB_TYPE_OF_ACT=regulation&CASE_LAW_SUMMARY=false&DTS_DOM=ALL&excConsLeg=true&typeOfActStatus=REGULATION&type=advanced&SUBDOM_INIT=ALL_ALL&DTS_SUBDOM=ALL_ALL) stating that "A single value buffer tolerance shall be defined for all area measurements performed using GNSS and/or orthoimagery. For this purpose the measurement tools used shall be validated for at least one validation class of buffer tolerance below the single value. However, the single tolerance value shall not exceed 1.25 m."

As a consequence, only validated tools with a buffer tolerance at least <= 1 m can be use for parcel area measurement.

GNSS devices validated by Member States or device distributors

The measurements were carried out by the Member States (MS) in accordance with the JRC guidelines on test parcels selected by the MS. The statistical analysis of the measurements was made by JRC, or checked by JRC when the MS did the analysis by themselves. Information concerning the JRC tool validation method can be found [HERE (https://marswiki.jrc.ec.europa.eu/wikicap/index.php/Valid_Method)]).

For the analyses, an xls template (with instructions) can be downloaded HERE. The spreadsheet must filled in with the area measurements and reference values (i.e. area and perimeter) of the parcel. A separate .xls file must be created and filled in *for each of the tested parcels*.

More information on the device settings, measurement method (number of positions per vertex) and protocol used during the validation test could be requested directly to the MS concerned.

No	Device	Buffer width, m	Validated in	Member State	Antenna	Software/Firmware	Measurement method	Differential correction	DOP	Measurement interval	Elevation mask	Minimum number of satellites
106	Stonex S70G standalone	0.50	2022	IT (Stonex)	External	Stonex Cube-a version 6.0.11	Vertex	no	PDOP 3	3 epoch/vertex	10°	n/a
107	Stonex S70G RTK GPS, GLONASS (compatible BEIDOU, GALILEO)	0.50	2022	IT (Stonex)	External	Stonex Cube-a version 6.0.11	Vertex	N-RTK SmartNet Nearest (GPS+GLONASS)	PDOP 3	3 epoch/vertex	10°	n/a
108	Stonex S580 standalone	0.5	2022	IT (Stonex)	External	Stonex Cube-a version 6.0.11	Vertex	no	PDOP 3	3 epoch/vertex	10°	n/a
109	Samsung Galaxy Tab Active Pro tablet + Stonex S500	2.50 Forest	2022	LT	Internal	Field Measurement application (FMA) v1.0.2 + Stonex S500 firmware, version 1.0.20190918	Vertex	real-time correction using LitPOS base station network data	n/a	10 sec./vertex	n/a	n/a
110	Samsung Galaxy Tab Active Pro tablet + Trimble R1	2.00 Forest	2022	LT	Internal	Field Measurement application (FMA) v1.0.2 + Trimble R1 firmware version 4.96.	Vertex	real-time correction using LitPOS base station network data	n/a	10 sec./vertex	n/a	n/a
111	SOUTH X6	0.50	2022	CY	Internal	ArcGIS COLLECTOR	Continuous	no	n/a	1 meas./5 sec.	n/a	n/a
103	mobile phone Oukitel WP6 (GPS, Glonass)	0.50	2021	SI	external antenna Geode GNS2 Multi-GNSS L1	Qfield (version 1.9.6) together with the Geode Connect app (version 2.2.2)	continuous/vertex	no	n/a	1 mes. evry 2s in continuous and 1 s/vertex in vertex	n/a	n/a
104	i90 Pro version 2.1.3.2 external antenna CHCNAV-IMU (GPS, GLONASS, GALILEO, BEIDOU)	0.50	2021	HU	External	CHCNAV LandStar7 Version: 7.3.7.20210918	vertex/continuous	RTK correction	Max PDOP: 6	10 s/vertex and 1 mes./5 meters continuous	n/a	n/a
105	Getac T800 Windows tablet + Trimble R1 with internal antenna (GPS, GLONASS, GALILEO, BEIDOU)	0.50	2021	EE	Internal	ArcPad, version 10.2.4.12 + Trimble Positions, version 10.2.4.1.	continuous	ESTPOS post-processing	n/a	1 mes./second	n/a	n/a
112	Qbox20	0.50	2021	DE	Internal	Geomax X-PAD Survey	Vertex	SAPOS-BY (Bavaria) corrections	n/a	3 epochs/vertex	n/a	n/a

No	Device	Buffer width, m	Validated in	Member State	Antenna	Software/Firmware	Measurement method	Differential correction	DOP	Measurement interval	Elevation mask	Minimum number of satellites
113	proNIVO PNR21	0.50	2021	DE	Internal	Geomax X-PAD Survey	Vertex	SAPOS-BY (Bavaria) corrections	n/a	3 epochs/vertex	n/a	n/a
114	Samsung Galaxy Tab Active Pro tablet + Stonex S500	0.75	2021	LT	Internal	Field Measurement application (FMA) v.1.2.1 + Stonex S500 firmware, version 1.0.20190918	continuous	LitPOS base station network data	n/a	1 meas/2 seconds	n/a	n/a
115	Samsung Galaxy Tab Active Pro tablet + Stonex S500	0.50	2021	LT	Internal	Field Measurement application (FMA) v.1.2.1 + Stonex S500 firmware, version 1.0.20190918	vertex	LitPOS base station network data	n/a	3 seconds/vertex	n/a	n/a
116	Samsung Galaxy Tab Active Pro tablet + Trimble R1	1.00	2021	LT	Internal	Field Measurement application (FMA) v.1.2.1 + Trimble Positions, version 4.96.	continuous	LitPOS base station network data	n/a	1 meas/2 seconds	n/a	n/a
117	Samsung Galaxy Tab Active Pro tablet + Trimble R1	0.75	2021	LT	Internal	Field Measurement application (FMA) v.1.2.1 + Trimble Positions, version 4.96.	vertex	LitPOS base station network data	n/a	3 seconds/vertex	n/a	n/a
101	Spectra Precision SP20 version 3.6(GPS, Glonass, Galileo, Beidou)	0.50	2020	HU	Internal	topoXpress 1.1 (20.9.17.0925)	continuous/vertex	RTK(VRS) corrections	n/a	1 mes./5 meters continuous and 10s/vertex in vertex	n/a	n/a
102	Tablet Samsung SM-T395 Galaxy Tab Active 2 8.0 TD-LTE (GPS, Glonass)	1.00	2020	GR	Internal	QField v1.5.3.	vertex	no	n/a	6 s/vertex	n/a	n/a
95	Trimble R1 (GPS, GLONASS, Galileo, Beidou) with GPSnet.dk network RTK corrections	0.50	2019	DK	Internal	IMK Kontrol version 2.285.2.6626 and Trimble GNSS status version 3.0.2.	vertex	GPSnet.dk network RTK corrections	n/a	10 records/vertex	n/a	n/a
96	Trimble R1 (GPS, GLONASS, Galileo, Beidou) with GPSnet.dk network RTK corrections	0.50	2019	DK	Internal	IMK Kontrol version 2.285.2.6626 and Trimble GNSS status version 3.0.2.	continuous	GPSnet.dk network RTK corrections	n/a	1 record/5s	n/a	n/a
97	Septentrio Altus NR3 (GPS,	0.50	2019	DE (Josef Attenberger	Internal	Geomax X-PAD Survey and Python scripts	vertex	SAPOS-BY corrections		3 records/vertex		

No	Device	Buffer width, m	Validated in	Member State	Antenna	Software/Firmware	Measurement method	Differential correction	DOP	Measurement interval	Elevation mask	Minimum number of satellites
	Glonass, Galileo, Beidou) with SAPOS-BY corrections			GmbH)								
98	Leica Zeno 20 (GPS, Glonass) with Slovak Real-Time Positioning Service – SKPOS	0.50	2019	SK	Internal	zeno field 3.5	vertex	Slovak Real-Time Positioning Service – SKPOS corrections	n/a	1 record/vertex	n/a	n/a
99	Leica Zeno 20 (GPS, Glonass) with Slovak Real-Time Positioning Service – SKPOS	0.50	2019	SK	Internal	zeno field 3.5	continuous	Slovak Real-Time Positioning Service – SKPOS corrections	n/a	1 record/2s	n/a	n/a
100	Spectral Precision SP 20 (GPS, Glonass)	0.50	2019	BG	Internal	Survey Mobile v2.5.	vertex	RTK(VRS) corrections	n/a	5 s/vertex	n/a	n/a
93	Spectra Precision SP20 (GPS, GLONASS) with RTK correction	0.50	2018	BG (Solitech)	Internal	Mobile Mapper V 3.1.9	vertex	RTK correction	Max PDOP: 5	5 records/vertex	10°	n/a
94	Trimble Geo7X (GPS and GLONASS) IN AFFORESTED AREA with ESTPos network RTK corrections	1.00	2018	EE	Internal	ArcPad v. 10.2.4.12 and Trimble Positions v. 10.2.4.1	vertex	ESTPos network RTK corrections	Max PDOP: 5	30 records/vertex	15°	n/a
79	Spectra Precision MobileMapper 120	0.50	2017	BG	Internal	PDA BG MAPS	vertex	n/a	Max HDOP: 5	1 record/vertex	n/a	n/a
80	Spectra Precision MobileMapper 120	0.50	2017	BG	Internal	PDA BG MAPS	continuous	n/a	Max HDOP: 5	1 record/s or 1 record/m	n/a	n/a
81	Leica Zeno 20 - RTK	0.50	2017	MK	Internal	Zeno Mobile	vertex	RTK correction	Max PDOP: 5	5 records/vertex	n/a	n/a
82	Leica Zeno 20 - RTK	0.50	2017	MK	Internal	Zeno Mobile	continuous	RTK correction	Max PDOP: 5	1 record every 2 seconds or every 3 meters	n/a	n/a
83	Qpad X5 Hi-Target (GPS, GLONASS and BEIDOU) with NAVITEQ RTK real time correction	0.50	2017	BG (GeoVara)	Internal	Hi-Q II version 1.3	vertex	RTK correction	Max PDOP: 1.5	1 record/vertex	10°	n/a

No	Device	Buffer width, m	Validated in	Member State	Antenna	Software/Firmware	Measurement method	Differential correction	DOP	Measurement interval	Elevation mask	Minimum number of satellites
84	ppm10xx standalone (GPS, GLONASS, GALILEO and BEIDOU)	0.50	2017	DE (ppm GmbH)	Internal	QGIS version 2.18.5	vertex	n/a	n/a	1 record/vertex	10°	n/a
85	ppm10xx with SAPOS differential correction (GPS and GLONASS)	0.50	2017	DE (ppm GmbH)	Internal	Carlson SurvCE version 5.06 and Cremer CAPLAN version 4.0	vertex	SAPOS differential correction	n/a	1 record/vertex	10°	n/a
86	Stonex S5 (GPS and GLONASS)	0.50	2017	IT (Stonex)	Internal	CUBE A version 4.0	vertex	n/a	n/a	10 records/vertex	n/a	n/a
87	Qmini A7 (Hi-Target) (GPS, GLONASS, BEIDOU and GALILEO) with external Bluetooth Qbox8 (Hi-Target) and 1Yocto (RTK) real time correction	0.50	2017	BG (GeoVara)	Smart antenna Qbox	Hi-Survey Road V 1.3.3	vertex	RTK correction	Max PDOP: 1.5	1 record/vertex	10°	n/a
88	Garmin Glo (GPS, GLONASS) with EGNOS correction	0.75	2017	ES (Catalunya)	Internal	CRAC version 1.0.11	continuous	EGNOS correction	Max HDOP: 1	1 record/s	n/a	n/a
89	Topcon Hiper SR (GPS, GLONASS) with FinnRef network RTK correction	0.50	2017	FI	Internal	Magnet field version 4.2	vertex	RTK correction	n/a	5 records/vertex	13°	n/a
90	Topcon Hiper SR (GPS, GLONASS) with FinnRef network DGNSS correction	0.50	2017	FI	Internal	Magnet field version 4.2	vertex	DGNSS correction	n/a	5 records/vertex	13°	n/a
91	Trimble R1 (GPS, GLONASS) with FinnRef network RTK correction	0.50	2017	FI	Internal	Terrasync 5.8.6	vertex	RTK correction	n/a	5 records/vertex	n/a	n/a
92	Trimble R2 (GPS, GLONASS) with FinnRef network RTK correction	0.50	2017	FI	Internal	Terrasync 5.8.6	vertex	RTK correction	n/a	5 records/vertex	n/a	n/a
75	South S 750 (GPS and GLONASS)	0.75	2016	BG	Internal	PDA BG MAPS	vertex	n/a	n/a	1 record/vertex	n/a	n/a

No	Device	Buffer width, m	Validated in	Member State	Antenna	Software/Firmware	Measurement method	Differential correction	DOP	Measurement interval	Elevation mask	Minimum number of satellites
76	South S 750 (GPS and GLONASS)	0.75	2016	BG	Internal	PDA BG MAPS	continuous	n/a	n/a	1 record every 3 seconds or every 3 meters	n/a	n/a
77	Trimble Geo7X (GPS and GLONASS)	0.50	2016	CZ	Internal	AGCa	continuous	n/a	n/a	1 record every 3 seconds	n/a	n/a
78	Trimble Geo7X (GPS and GLONASS)	0.50	2016	CZ	Internal	AGCa	vertex	n/a	n/a	3 records/vertex	n/a	n/a
72	Trimble GeoXH 6000 (GPS and GLONASS)	0.50	2015	EE	Internal	ArcPad 10	continuous	Estonian Land Board Tõravere base station data (post-processing)	Max PDOP:4	1s	5º	n/a
73	Trimble Geo7X (GPS and GLONASS)	0.50	2015	EE	Internal	ArcPad 10	continuous	Estonian Land Board Tõravere base station data (post-processing)	Max PDOP:4	1s	5º	n/a
74	Trimble Geo7X (GPS and GLONASS) with Trimble Tempest L1 antenna and ATV (All-terrain vehicle)	0.50	2015	EE	External Trimble Tempest L1	ArcPad 10	continuous	Estonian Land Board Tõravere base station data (post-processing)	Max PDOP:4	1s	5º	n/a
1	Arrow 100 (EOS) with an external Bluetooth Trimble Nomad 900GXC handheld	0.50	2014	NL	Internal	ArcPad 10.0 R4	vertex	EGNOS	n/a	1s/vertex	n/a	n/a
2	SX Blue II (Geneq) with an external Bluetooth	0.50	2014	NL	Internal	ArcPad 10.0 R4	vertex/continuous (1 sec/mes/vertex)	EGNOS	n/a	1s/vertex, 1mes/0.5m	n/a	n/a
3	Trimble Geo 5	0.50	2014	IT	Internal	Terrasync 5.6.1.	vertex	EGNOS	n/a	5 mes/vertex	n/a	n/a
4	Trimble Geo 7	0.50	2014	IT	Internal	Terrasync 5.6.1.	vertex	EGNOS	n/a	5 mes/vertex	n/a	n/a
5	Trimble Geo 7	0.50	2014	IT	Internal	Terrasync 5.6.1.	continuous	EGNOS	n/a	1 mes/sec	n/a	n/a
6	Trimble Geo 7X GPS + GLONASS with an external Bluetooth Trimble Nomad 900GXC handheld	0.50	2014	NL	Internal	ArcPad 10.0 R4	vertex	EGNOS	n/a	1 mes/vertex	n/a	n/a

No	Device	Buffer width, m	Validated in	Member State	Antenna	Software/Firmware	Measurement method	Differential correction	DOP	Measurement interval	Elevation mask	Minimum number of satellites
7	Trimble Geo 7X GPS + GLONASS with an external BluetoothTrimble Nomad 900GXC handheld	0.50	2014	NL	External	ArcPad 10.0 R4	vertex	EGNOS	n/a	1 mes/vertex	n/a	n/a
8	Trimble GeoXH 6000 series GPS+GLONASS	0.50	2014	DE	Internal	Microsoft Windows Mobile 6.5.10 and VOK Mobil 1.2.217.110	vertex	SAPOS real time	n/a	1 mes/vertex	5°	n/a
9	Trimble GeoXT 3000 series	0.50	2014	FR	Internal	ArpentGIS v. 6.2	vertex (5 mes/vertex)	no	n/a	1s	n/a	n/a
10	Trimble GeoXT 3000 series	0.50	2014	FR	Internal	ArpentGIS v. 6.2 and Pathfinder Office 5.7	vertex (5 mes/vertex)	DGPS (post-processing)	n/a	1s	n/a	n/a
11	STONEX S9 III with GETAC PS236 controller with SAPOS/EGNOS correction	1.00	2014	DE	Internal	ArcPad 7	vertex (5 mes/rec)	SAPOS/EGNOS	n/a	5s	n/a	n/a
12	Trimble Juno 5	1.00	2014	IT	Internal	Terrasync 5.6.1.	continuous	EGNOS	n/a	1 mes/sec	n/a	n/a
13	Spectra ProMark 120 GPS+GLONASS	0.50	2014	EE	external antenna ASH 111660 L1 GPS + GLONASS	Mobile Mapper Field 4.0.5 and EAGISNET	continuous(1 mes/sec)	DGPS (post processing)	n/a	1s	n/a	n/a
69	Trimble Geo 5T	0.50	2014	HU	Internal	DigiTerra Explorer 6 v6.12.9.21	continuous	EGNOS real time corrections (if available)	Max PDOP:6	1 record/5m	10º	n/a
70	Trimble GeoExplorer 6000 series	0.75	2014	SI	Internal	ArcPad 10.2 (Build 99)	continuous	EGNOS real time corrections	Max PDOP:5	1s	10º	n/a
71	Trimble GeoExplorer 6000 series	0.75	2014	SI	Internal	ArcPad 10.2 (Build 99)	vertex	EGNOS real time corrections	Max PDOP:5	6 s/vertex	10º	n/a
14	Ashtec Mobile Mapper 100 with EGNOS correction if available (!)	0.50	2012	HU	Internal	DigiTerra Explorer 5.11.8.26, MVH-2010	continuous	EGNOS if available (!)	n/a	1/5m (!)	n/a	n/a
15	Ashtec ProMark 100	0.50	2012	EE	Internal	ProMark Field 2.0.5	continuous	DGPS post processing (GNSS Solutions v 3.60.1)	n/a	1/1s	n/a	n/a

No	Device	Buffer width, m	Validated in	Member State	Antenna	Software/Firmware	Measurement method	Differential correction	DOP	Measurement interval	Elevation mask	Minimum number of satellites
16	Geneq SXBlue II	0.50	2012	PL	External	Digiterra Explorer 6.12.6.14; 1.2Qd_V1x	vertex	EGNOS	Max. 5	5s per vertex	10	5
17	Geneq SXBlue II	0.50	2012	PL	External	Digiterra Explorer 6.12.6.14; 1.2Qd_V1x	vertex	no	Max. 5	5s per vertex	10	5
18	Geneq SXBlue II	0.50	2012	FR	External	Digiterra Explorer 6.12.7.10; 1.2Qd_V1x	vertex	EGNOS	Max. 5	5s per vertex	10	5
19	Geneq SXBlue II	0.50	2012	FR	External	Digiterra Explorer 6.12.7.10; 1.2Qd_V1x	vertex	no	Max. 5	5s per vertex	10	5
20	Topcon GRS-1 - EGNOS correction	0.50	2012	PL	Internal	eGIS RTK 1.12.4566; 3.6 Feb,28,2012 p1	vertex	EGNOS	Max 5	5sec/vertex	10	5
21	ROYALTEK RBT-2210 - standalone	0.75	2012	ES (Catalunya)	Internal	Compe POcket Pro 2.61d	continuous	no	n/a	1s	n/a	n/a
22	Topcon GRS-1 - EGNOS correction	0.75	2012	FR	Internal	eGIS RTK 1.12.4566; 3.6 Feb,28,2012 p1	vertex	EGNOS	Max 5	5sec/vertex	10	5
23	Topcon GRS-1 - Standalone	0.75	2012	PL	Internal	eGIS RTK 1.12.4566; 3.6 Feb,28,2012 p1	vertex	-	Max 5	5sec/vertex	10	5
24	Topcon GRS-1 with EGNOS correction	0.75	2012	LT	Internal	cGeo2.6.0.9.	continuous	EGNOS	n/a	1mes/2s	n/a	n/a
25	Trimble GeoXH 6000 series standalone code measurements	0.75	2012	CY	Internal	ArcPad 10	vertex	no	6	6s per each vertex	n/a	4
26	Trimble GeoXH 6000 series standalone code measurements	0.75	2012	CY	Internal	ArcPad 10	continuous	no	6	1 mes/2m	n/a	4
27	Topcon GRS-1 - Standalone	1.00	2012	FR	Internal	eGIS RTK 1.12.4566; 3.6 Feb,28,2012 p1	Vertex	-	Max 5	5sec/vertex	10	5
28	Ashtec Mobile Mapper 100 with EGNOS correction	0.50	2011	IT	Internal	Mobile Mapper Field v.1.23	continuous	EGNOS	Max PDOP:7	1s	15º	n/a
29	Leica GS20 with Beacon correction in real time	0.50	2011	DE (Baden-Württemberg)	Internal	Leica GIS DataPRO 3.0	vertex	yes	n/a	10s per each vertex	n/a	n/a
30	Leica Zeno 10 with SKPOS correction in real time	0.50	2011	SK	Internal	Leica Zeno office basic	continuous/vertex	yes	n/a	2s in continuous mode/1s per point in vertex mode	n/a	n/a

No	Device	Buffer width, m	Validated in	Member State	Antenna	Software/Firmware	Measurement method	Differential correction	DOP	Measurement interval	Elevation mask	Minimum number of satellites
31	Topcon GRS-1 with EGNOS correction	0.50	2011	IT	Internal	Mercurio GPS v.1	continuous	EGNOS	Max PDOP:7	1s	15º	n/a
32	Trimble Geo XT with EGNOS correction	0.50	2011	IT	Internal	Terrasync v.5.0	continuous	EGNOS	Max PDOP:7	1s	15º	n/a
33	Leica Zeno 10 with EGNOS correction	0.75	2011	IT	Internal	Zeno Field	continuous	EGNOS	Max PDOP:7	1s	15º	n/a
34	Thales Mobile Mapper CE with EGNOS correction if available	0.75	2011	HU	Internal	DigiTerra Explorer 6	continuous	EGNOS	Max PDOP:6	5m distance interval	10º	n/a
35	TOPCON GMS-2 with ASCOS real time correction	0.75	2011	DE (Brandenburg)	Internal	TopSURV Version 7.1	vertex	yes	Max PDOP:5	1s per each vertex	15º	6
36	Trimble Pro XR - standalone	0.75	2011	ES (Castilla and Leon)	external	Asset Surveyor v.5	continuous	no	Max DOP:6	2s	10º	n/a
37	Trimble Pro XR with DGPS correction	0.75	2011	ES (Castilla and Leon)	external	Asset Surveyor v.5	continuous	post processing	Max DOP:6	2s	10º	n/a
38	Holux GPSLim236 with EGNOS correction	1.00	2011	ES (Castilla and Leon)	Internal	Cartosat	continuous	EGNOS	n/a	2s	n/a	n/a
39	Magellan Mobile Mapper CX with EGNOS correction if available	1.00	2011	HU	Internal	DigiTerra Explorer 6	continuous	EGNOS	Max PDOP:6	5m distance interval	10º	n/a
40	Satcon System with Palm Tungsten E2 PDA - standalone	1.00	2011	NL	Internal	AreaControl version 1.76	continuous	no	Max DOP:4	3s	n/a	n/a
41	Thales ProMark3 with differential correction	0.50	2010	EE	L1 Antenna NAP 100	Surveying Rev 2.14	continuous	post processing	Max HDOP:4	1s	10º	n/a
42	Trimble GeoXH Trimble VRS DGPS real time correction	0.50	2010	FI	Internal	Terrasync	vertex	yes	Max PDOP:6	3s per each vertex	15º	4
43	Trimble GeoXT - standalone	0.50	2010	FR	Internal	ArpentGIS v. 4.7	continuous	no	n/a	2s	n/a	n/a
44	Trimble GeoXT with EGNOS	0.50	2010	FR	Internal	ArpentGIS v. 4.7	continuous	EGNOS	n/a	2s	n/a	n/a

No	Device	Buffer width, m	Validated in	Member State	Antenna	Software/Firmware	Measurement method	Differential correction	DOP	Measurement interval	Elevation mask	Minimum number of satellites
	correction											
45	Trimble GeoXT with LATPOS correction	0.50	2010	LV	Internal	Trimble TerraSync v. 3.21	continuous	post processing	Max PDOP:12	5s	10º	n/a
46	Trimble GeoXT with Trimble VRS DGPS real time correction	0.50	2010	FI	Internal	Terrasync	vertex	yes	Max PDOP:6	3s per each vertex	15º	4
47	Trimble Pro XRS - standalone	0.50	2010	CY	external	Arc Pad 7.0	continuous	no	Max PDOP:6	2s	n/a	n/a
48	Leica GS20 with SKPOS correction in real time	0.75	2010	SK	Internal	Leica GIS DataPRO	continuous/vertex	yes	n/a	5s in continuous method/1s per point in vertex method	n/a	n/a
49	Thales ProMark3 - standalone	0.75	2010	LT	n/a	Promark3EUV214	continuous	no	Max DOP:6	1s	10º	n/a
50	Trimble GeoXT - standalone	0.75	2010	LV	Internal	Trimble TerraSync v. 3.21	continuous	no	Max PDOP:12	5s	10º	n/a
51	TOPCON GMS-2 - standalone	1.00	2010	LT	Internal	ArcPad 7.1.1	continuous	no	Max DOP:6	1s	10º	n/a
52	TOPCON GMS-2 with Topnet VRS DGPS real time correction	1.00	2010	FI	Internal	Topsurv 7.2.2	vertex	yes	n/a	3s per each vertex	10º	4
53	Leica GS50 with Beacon correction	0.50	2009	DK	n/a	n/a	vertex	yes	n/a	n/a	n/a	n/a
54	Leica SR530 with Leica Smart Net correction	0.50	2009	DK	n/a	n/a	vertex	yes	n/a	n/a	n/a	n/a
55	Trimble Pro XRS with Beacon correction	0.50	2009	EN	n/a	Korec Fastmap software on a Panasonic Toughbook Tablet, Trimble GPS Firmware Version 1.96	vertex	yes	Max PDOP:6	n/a	15º	n/a
56	Trimble Pro XRS with Omnistar correction	0.50	2009	EN	n/a	Korec Fastmap software on a Panasonic Toughbook Tablet, Trimble GPS Firmware Version 1.96	vertex	yes	Max PDOP:6	n/a	15º	n/a
57	Asus PDA	0.75	2009	DK	External Haicom	n/a	continuous	no	n/a	n/a	n/a	n/a

No	Device	Buffer width, m	Validated in	Member State	Antenna	Software/Firmware	Measurement method	Differential correction	DOP	Measurement interval	Elevation mask	Minimum number of satellites
58	Hemisphere A100 with EGNOS correction	0.75	2009	SI	External Crescent A100 L1	n/a	vertex/continuous	EGNOS	Max PDOP:5	8s per each vertex	n/a	4
59	Magellan Mobile Mapper CX + voice application	0.75	2009	BG	Internal	Voice application	vertex/continuous	n/a	Max HDOP:4	1s	15º	n/a
60	TOPCON GMS-2 with Beacon correction	0.75	2009	DE (Rheinlandpfalz)	n/a	n/a	vertex	yes	n/a	n/a	n/a	n/a
61	Topcon GMS-2 with CZEPOS correction	0.75	2009	CZ	Internal	GPS Explorer	continuous	yes	n/a	3s	n/a	n/a
62	Topcon GMS-2 with TOPNET correction	0.75	2009	CZ	Internal	GPS Explorer	continuous	yes	n/a	3s	n/a	n/a
63	Trimble GeoXH - standalone	0.75	2009	JRC (PL)	Internal	Terrasync version 3.30 Professional edition	continuous	no	Max PDOP:10	1s	10º	n/a
64	Trimble GeoXT - standalone	0.75	2009	JRC (PL)	Internal	Terrasync version 2.53 Professional edition	continuous	no	Max PDOP:10	1s	10º	n/a
65	Trimble GeoXT with EGNOS correction	0.75	2009	SI	Hurricane external	ArcPAD version 7.0 with GPS CORRECT 2.20	vertex/continuous	EGNOS	Max PDOP:5	8s per each vertex	n/a	4
66	Magellan Mobile Mapper CE - standalone	1.00	2009	BG	Internal	Locally developed Field Software	vertex/continuous	n/a	Max HDOP:5	1s	n/a	n/a
67	Magellan Mobile Mapper CX - standalone	1.00	2009	BG	Internal	Locally developed Field Software	vertex/continuous	n/a	Max HDOP:5	1s	n/a	n/a
68	Topcon DGPS receiver Legacy H	0.75	2007	CZ	MG A1	Microsoft Windows CE, GPS Explorer created by Geodis Brno, Ltd	continuous	EGNOS on (but no EGNOS corrections available)	Not adjustable	n/a	5º	n/a

GNSS devices validated by Reference Laboratories

Please note that the name of **Geo Explorer 2008 series** (GeoXT) has changed to **Geo Explorer 3000 series**; the software and the hardware remain the same.

No	Device	Reference lab	Buffer width, m	Year	Antenna	Software/Firmware	Measurement method	Differential correction	DOP	Measurement interval	Elevation mask	Other settings	Mean reproducibility limit (95% confidence level), m
47	Trimble DA2 device with the Catalyst service with "full GNSS" option	UWM, Olzstyn - PL test site	0.50	2022	External	QField v.2.	continuous	RTK correction from ASG-EUPOS network	n/a	1 meas.?sec.	n/a	n/a	0.08
48	Trimble DA2 device with the Catalyst service with "full GNSS" option	UWM, Olzstyn - PL test site	0.50	2022	External	QField v.2.	Vertex	RTK correction from ASG-EUPOS network	n/a	1 epoch/vertex	n/a	n/a	0.10
49	Trimble TDC600 receiver in SBAS mode	UWM, Olzstyn - PL test site	1.00	2022	Internal	QField v.2.	continuous	SBAS	n/a	1 meas./sec.	n/a	n/a	0.83
50	Trimble TDC600 receiver in SBAS mode	UWM, Olzstyn - PL test site	0.75	2022	Internal	QField v.2.	Vertex	SBAS	n/a	1 epoch/vertex	n/a	n/a	0.75
51	Leica Zeno FLX100 plus, RTK only	Leica Geosystems AG	0.50	2022	Smart antenna FLX100 plus	Zeno mobile v3.6, FLX100 FW 1.0.2022.08.10.01 release, HPG_1.32	Vertex	SBAS.L1	n/a	5 sec./vertex	10°	Min. 4 satellites	0.01
52	Leica Zeno GG04 plus, SBAS L1 only	Leica Geosystems AG	0.75	2022	Smart antenna GG04 plus	ArcGIS collector v20.0.1.0, GG04 plus FW 7.813	Vertex	SBAS L1	n/a	5 sec./vertex	10°	Min. 4 satellites	0.61
46	Leica Zeno FLX100 - RTK only	Leica Geosystems AG	<0.50	2020	Smart antenna FLX100	"Zeno Mobile V3.3 FLX100 / FW1.0.2020-09-09-1, HPG1.13"	vertex	RTK L1/L2 with DIE2 Ref. Stat.	n/a	5 seconds/vertex	10°	Min. 4 satellites	0.02
43	Leica Zeno GG04 Basic and Leica Zeno GG04 plus Basic with Post-processing	Leica Geosystems AG	0.50	2018	Smart Antenna GG04 Plus	Zeno Field v.3.6/FW v7.300 and Zeno Office 4.0	vertex	DGNSS L1 with HGB ref station	n/a	10s per vertex	10	Minimum 4 satellites	0.25
45	Trimble Pro 6T with Fieldbook i1 (GPS+GLONASS) with DGPS (SAPOS-EPS)	SSSA - DE test site	0.50	2018	Trimble Pro 6T	"OTSC-Module Niedersachsen v1.2" based on "GI Mobil RT"	vertex	DGPS (SAPOS-EPS)	Max PDOP: 4	1 record/vertex	5°	n/a	0.37
44	Sakkia GCX3 with Topcon FC-5000 tablet (GPS+GLONASS)	SSSA - PL test site	0.50	2017	Internal	eGPS/eGIS version 1.17.6472	continuous	no	Max PDOP: 7, Max HDOP: 6	1 record/3s	10°	Minimum 6 satellites	0.47

No	Device	Reference lab	Buffer width, m	Year	Antenna	Software/Firmware	Measurement method	Differential correction	DOP	Measurement interval	Elevation mask	Other settings	Mean reproducibility limit (95% confidence level), m
41	Leica Zeno GG04 Professional and Leica Zeno GG04 plus Professional	Leica Geosystems AG	0.50	2016	Smart Antenna GG04	Zeno Field v.3.3/FW v7.103	vertex	RTK L1/L2 with WDN ref station	n/a	5s per vertex	10	Minimum 4 satellites	0.02
42	Leica Zeno GG04 Basic and Leica Zeno GG04 plus Basic	Leica Geosystems AG	0.50	2016	Smart Antenna GG04	Zeno Field v.3.3/FW v7.103	vertex	RTK L1 with WDN ref station	n/a	5s per vertex	10	Minimum 4 satellites	0.43
1	Leica Zeno 20	Leica Geosystems AG	0.50	2015	Internal	Zeno Field v.3.3/FW v6.403	vertex	RTK L1/L2 with WDN ref station	n/a	5s per vertex	10	4	0.04
2	Leica Zeno 20	Leica Geosystems AG	0.50	2015	Internal	Zeno Field v.3.3/FW v6.403	vertex	RTK L1 with WDN ref station	n/a	5s per vertex	10	4	0.36
3	Trimble Geo 7x series with VRS correction	SSSA - PL test site	0.50	2014	Internal	GI Mobil Software with Floodlight	vertex (5 sec/vertex)	DGPS (real time)	n/a	1s	n/a	n/a	0.18
4	Trimble Geo 7x series	SSSA - PL test site	0.50	2014	Internal	TerraSync5.6.1	vertex (5 sec/vertex)	EGNOS	n/a	1s	n/a	n/a	0.24
5	Trimble Geo 7x series	SSSA - PL test site	0.50	2014	Internal	ArcPad 10	vertex (5 sec/vertex)	DGPS (post processing)	n/a	1s	n/a	n/a	0.06
6	Trimble Geo 7x series	SSSA - PL test site	0.50	2014	Internal	TerraSync5.6.1	continuous	EGNOS	n/a	1s	n/a	n/a	0.28
7	Trimble Geo 7x series	SSSA - PL test site	0.50	2014	Internal	ArcPad 10	vertex (5 sec/vertex)	DGPS (post processing)	n/a	1s	n/a	n/a	0.15
8	Trimble Geo 7x series with VRS correction	SSSA - PL test site	0.50	2014	Internal	GI Mobil Software with Floodlight	vertex (5 sec/vertex)	DGPS (real time)	n/a	1s	n/a	n/a	0.18
9	Trimble Pro6T with VRS correction	SSSA - PL test site	0.50	2014	External	GI Mobil Software with Floodlight	vertex (5 sec/vertex)	DGPS (real time)	n/a	1s	n/a	n/a	0.17
10	Leica CS25 GNSS + G5 Helix - RTK	Leica Geosystems AG	0.50	2013	External G5 Helix	Zeno Field v.3.11/FW v6.114S	vertex	RTK L1	n/a	15s per vertex	10	4	0.35
11	Leica CS25 GNSS + G5 Helix	Leica Geosystems AG	0.50	2013	External G5 Helix	Zeno Field v.3.11/FW v6.114S	vertex	L1, post processed (Zeno Office v3.2)	n/a	15s per vertex	15	4	0.42
12	Trimble GeoXT 6000 series with	SSSA - GE test site	0.50	2013	Internal	ArcPad v 10.0R4/GPS Pathfinder Office	vertex (5 sec/vertex)	Post processing	-	-	-	-	0.09

No	Device	Reference lab	Buffer width, m	Year	Antenna	Software/Firmware	Measurement method	Differential correction	DOP	Measurement interval	Elevation mask	Other settings	Mean reproducibility limit (95% confidence level), m
	corrections					v.5.40							
13	Trimble SPS351-Nomad Controller with Beacon correction	SSSA - GE test site	0.50	2013	External Trimble SPS MSK	ArcPad version 10.0 R3 & version 7.1.1	vertex	Beacon	-	-	-	-	0.17
14	Trimble JUNO-3B with EGNOS correction	SSSA - GE test site	0.75	2013	Internal	ArcPad version 10.0 R4	vertex	EGNOS	-	-	-	-	0.72
15	Leica CS25 GNSS + G5 Helix - RTK	Leica Geosystems AG	0.50	2012	External G5 Helix	Zeno Field v.2.2/FW v6.10	vertex	RTK L1/L2	n/a	5s per vertex	10	4	0.04
16	Leica CS25 GNSS + AS10	Leica Geosystems AG	0.50	2012	External AS10	Zeno Field v.2.2/FW v6.10	vertex	RTK L1/L2	n/a	5s per vertex	10	4	0.02
17	Leica Zeno 5 + GG03	Leica Geosystems AG	0.50	2012	External GG03	Zeno Field v.3.0.0.391/FW v4.12	vertex	RTK L1	n/a	5s per vertex	10	4	0.24
18	Topcon GRS-1; GPS+GLONASS with SAPOS correction	SSSA - GE test site	0.50	2012	internal	TOPCON EGS 1.12.4533.13304	vertex	SAPOS - EPS	5 (max PDOP)	1s per vertex	n/a	GLONASS used	0.47
19	Topcon GRS-1; GPS+GLONASS with SAPOS correction	SSSA - GE test site	0.50	2012	internal	TOPCON EGS 1.12.4533.13304	continuous	SAPOS - EPS	5 (max PDOP)	1s	n/a	GLONASS used	0.49
20	Trimble GeoXT 6000 series with Beacon corrections	SSSA - GE test site	0.50	2012	Internal	TerraSync v5.41/GPS Pathfinder Office v.5.40	vertex (5 sec/vertex)	real-time	-	1s	15 deg	-	0.27
21	Trimble GeoXH 6000 series with VRS corrections (GPS + GLONASS)	SSSA - GE test site	0.50	2012	Internal	TerraSync v5.41/GPS Pathfinder Office v.5.40	vertex (5 sec/vertex)	real-time	-	1s	15 deg	-	0.06
22	Trimble Pro6T with post-processing corrections	SSSA - GE test site	0.50	2012	External	TerraSync v5.41/GPS Pathfinder Office v.5.40	vertex (5 sec/vertex)	post-processing	20 (max PDOP)	1s	15 deg	-	0.13
23	Leica GG02plus - RTK	Leica Geosystems AG	0.50	2011	Internal G02plus	Zeno Field v.2.0/FW v6.10 S20	vertex	RTK L1/L2	n/a	6s per vertex	10	4	0.01

No	Device	Reference lab	Buffer width, m	Year	Antenna	Software/Firmware	Measurement method	Differential correction	DOP	Measurement interval	Elevation mask	Other settings	Mean reproducibility limit (95% confidence level), m
24	Leica Zeno 10 3.5G + AS05	Leica Geosystems AG	0.50	2011	External AS05	Zeno Field v.2.1/FW v1.013	vertex	DGPS L1	n/a	5s per vertex	10	4	0.21
25	Leica Zeno 15 3.5G + AS05	Leica Geosystems AG	0.50	2011	External AS05	Zeno Field v.2.1/FW v1.013	vertex	DGPS L1	n/a	5s per vertex	10	4	0.18
26	Leica Zeno 10 3.5G (shielded)	Leica Geosystems AG	0.50	2011	Internal G02plus	Zeno Field v.2.1/FW v1.013	vertex	DGPS L1	n/a	5s per vertex	10	4	0.37
27	Trimble GeoXT (GeoExplorer® 6000 series) with EGNOS correction	SSSA - PL test site	0.50	2011	Internal	TerraSync v5.10	vertex	EGNOS	99 (max PDOP)	5 records per each vertex	5 deg	Min SNR = 12	0.23
28	Trimble GeoXT (GeoExplorer® 6000 series) with post-processing	SSSA - PL test site	0.50	2011	Internal	TerraSync v5.10/GPS Pathfinder Office v.5.20	continuous	post-processing	99 (max PDOP)	1s	5 deg	Min SNR = 12	0.21
29	Trimble GeoXT (GeoExplorer® 6000 series) with post-processing	SSSA - PL test site	0.50	2011	Internal	TerraSync v5.20/GPS Pathfinder Office v.5.20	vertex (5-10 sec/vertex)	post-processing	99 (max PDOP)	1s	5 deg	Min SNR = 12	0.2
30	Leica Zeno 10	Leica Geosystems AG	0.75	2011	Internal GS05	Zeno Field v.2.1/FW v1.013	vertex	EGNOS	n/a	5s per vertex	10	4	0.6
31	Leica Zeno - standalone	UWM, Olzstyn - PL test site	0.50	2010	Internal	Zeno Field v.8.0 SP3	continuous	no	n/a	1s	n/a	n/a	0.44
32	Magellan Mobile Mapper 6 with post-processing	UWM, Olzstyn - PL test site	0.50	2010	Internal	MobileMapping 2.00	continuous	post processing	n/a	1s	n/a	n/a	0.26
33	Trimble GeoExplorer 2008 series(now GeoExplorer 3000 Series) with EGNOS correction	SSSA - UK test site	0.50	2010	n/a	GeoExplorer 2008 series (a new name is Geo Explorer 3000 series)	vertex	EGNOS (1 mn age limit)	6 (max PDOP)	5s	15 deg	Min SNR = 39.0, No velocity filter	0.44
34	Trimble ProXT with Beacon correction	SSSA - DE test site	0.50	2010	Internal	n/a	vertex	yes	6 (max PDOP)	5s per each vertex	20 deg	n/a	0.21
35	Garmin GPS Map60CX -	UWM, Olzstyn - PL	0.75	2010	External	Garmin	continuous	no	n/a	1s	n/a	n/a	0.67

No	Device	Reference lab	Buffer width, m	Year	Antenna	Software/Firmware	Measurement method	Differential correction	DOP	Measurement interval	Elevation mask	Other settings	Mean reproducibility limit (95% confidence level), m
	standalone	test site											
36	Magellan Mobile Mapper 6 - standalone	UWM, Olzstyn - PL test site	0.75	2010	Internal	MobileMapping 2.00	continuous	no	n/a	1s	n/a	n/a	0.71
37	Magellan Mobile Mapper 6 - standalone	UWM, Olzstyn - PL test site	0.75	2010	Internal	MobileMapping 1.00	continuous	no	n/a	1s	n/a	n/a	0.72
38	Garmin GPS Map60 with EGNOS correction	UWM, Olzstyn - PL test site	1.00	2010	Internal	Garmin	continuous	EGNOS	n/a	1s	n/a	n/a	0.88
39	Magellan Mobile Mapper 6 with EGNOS correction	UWM, Olzstyn - PL test site	1.00	2010	Internal	MobileMapping 2.00	continuous	EGNOS	n/a	1s	n/a	n/a	0.98
40	Trimble JUNO-ST with EGNOS correction	UWM, Olzstyn - PL test site	1.00	2010	Internal	TerraSync PL 4.01	continuous	EGNOS	Max PDOP=12	5s	10 deg	Min SNR = 12.0, No velocity filter	0.96

VHR Ortho imagery validated by Member States

No	Sat./Aerial	Name	GSD, m	Buffer width, m	Year	Member State
19	Aerial	UltraCAM XP and UltraCAM Eagle M1/M3	0.2	0.75	2019	Czech Republic
17	Aerial	UltraCAM Eagle Mark 3	0.4	1.00	2018	DE-Bayern
18	Aerial	UltraCAM Eagle Mark 2	0.5	0.75	2018	Finland
16	Sat.	Geoeye1	0.5	0.75	2017	DE-Baden-Württemberg
1	Sat.	WorldView3	0.5	1.00	2016	DE-Bayern
2	Aerial	UltraCAM Eagle 100	0.2	0.75	2016	DE-Baden-Württemberg
3	Aerial	DMC II 140	0.2	0.50	2016	DE-Baden-Württemberg
4	Aerial	UltraCAM Falcon	0.4	1.00	2016	DE-Thüringer
7	Sat.	WV2	0.5	0.75	2015	Cyprus
5	Sat.	WV2	0.5	1.00	2014	DE-Bayern
6	Aerial	DMC	0.2	0.75	2014	DE-Bayern
8	Aerial	DMC	0.5	1.00	2014	DE-Nordrhein-Westfalen

No	Sat./Aerial	Name	GSD, m	Buffer width, m	Year	Member State
9	Aerial	UCX	0.2	0.75	2014	DE-Nordrhein-Westfalen
10	Aerial	DMC	0.2	0.50	2014	DE-Nordrhein-Westfalen
11	Aerial	UltraCam XP	0.2	0.75	2014	DE-Nordrhein-Westfalen
12	Aerial	UCEagle80	0.2	0.50	2014	DE-Nordrhein-Westfalen
13	Sat.	Geoeye1	0.5	0.75	2014	Netherlands
14	Sat.	Geoeye1	0.5	0.75	2014	Cyprus
15	Sat.	WV2	0.5	0.75	2014	Cyprus

VHR Ortho imagery Exceeding 1 m Buffer width

No	Sat./Aerial	Name	GSD, m	Buffer width, m	Year	Member State
1	Aerial	DMC1-122	0.5	1.5	2013	DE-Brandenburg

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