

DIN EN 16605:2025-06 (E)

Space - Galileo Timing Receiver - Functional and Performance Requirements and associated Tests

Contents		Page
European foreword		5
Introduction		6
1	Scope	7
2	Normative references	8
3	Terms, definitions and abbreviated terms	8
3.1	Terms and definitions	8
3.2	Abbreviated terms	14
4	Galileo Timing Service	17
4.1	Introduction to timing receivers and timing references	17
4.2	Galileo Timing Service - Accuracy and Availability	19
4.3	Galileo Timing Service -Integrity capability	19
4.3.1	General	19
4.3.2	Definition of a Fault-Free Timing solution	19
4.3.3	Definition of a faulty timing solution	20
4.3.4	High-Level Architecture of Galileo Timing Service	20
4.3.5	Timing Flags processing	21
4.3.6	Galileo timing receiver Decision Logic	22
4.3.7	Time To Alert and Time To Notify	26
4.3.8	T-RAIM Processing	26
5	Requirements for Galileo timing receivers	26
5.1	Definitions	26
5.2	Minimum Equipment Characteristics	26
5.3	Functional Requirements	29
5.3.1	Constellations Processed	29
5.3.2	Frequencies Processed	29
5.3.3	Back-up Modes	29
5.3.4	Dynamics of the User	29
5.3.5	Time Scales	30
5.3.6	Processing of Timing Flags and Integrity Requirements	30
5.3.7	T-RAIM Functional Requirements and Consistency Checks	35
5.3.8	Anti-Jamming Capabilities	35
5.3.9	Galileo OS-NMA Processing	37
5.3.10	Holdover Capabilities	37
5.3.11	Multipath mitigation	38
5.3.12	Special Configuration and Output Requirements	38
5.4	Performance Requirements	38
5.4.1	General	38
5.4.2	Accuracy Requirements	39
5.4.3	Availability Requirements	39
5.4.4	Integrity Requirements	40
5.4.5	T-RAIM Performances and thresholds	42
5.4.6	Holdover Timeout	42
6	Verification of Galileo timing receivers	43
6.1	General	43

6.2	Galileo timing receiver Test Policy	43
6.3	Strategy for Galileo timing receivers Verification	44
6.3.1	Verification Methods	44
6.3.2	Galileo timing receivers Verification Strategy	44
6.3.3	Galileo timing receiver Test Suite	45
6.4	Test Environment	50
6.4.1	General	50
6.4.2	Record and Replay Test Environment	50
6.5	Antenna conditions definition	54
6.5.1	Open sky	54
6.5.2	Obstructed open sky	54
6.5.3	Light indoor	56
6.6	Error Budgets for the Tests	56
6.7	Traceability Matrix: Requirements vs Verification Method	57
6.7.1	Traceability	57
6.7.2	Receiver functionalities Verified by Review Method	59
6.8	Galileo timing receiver tests	59
6.8.1	Record and Replay test configuration	59
6.8.2	Calibration of time delays	65
6.8.3	For the Verification of Galileo timing receiver Functions (TC-01)	65
6.8.4	GST Service Level 1 (TC-02)	67
6.8.5	GST Service Level 2 (TC-03)	68
6.8.6	GST Service Level 3 (TC-04)	69
6.8.7	UTC Service Level 1 (TC-05)	69
6.8.8	UTC Service Level 2 (TC-06)	70
6.8.9	UTC Service Level 3 (TC-07)	71
6.8.10	Performances in obstructed environment (TC-08)	72
6.8.11	Performances in light indoor environment (TC-09)	73
6.8.12	Test on Robustness to Interferences: Nominal Conditions (TC-10)	73
6.8.13	Test on Robustness to Interferences: Degraded Conditions (TC-11)	74
6.8.14	Test on T-RAIM Performances (TC-12)	76
6.8.15	Test on Receiver Noise (TC-13)	80
Annex A (informative) GNSS Timing Equations		82
Annex B (informative) Guidelines for Installation and Maintenance		85
B.1	Antenna, Cabling and Receiver Installation	85
B.1.1	General	85
B.1.2	Selecting a GNSS Antenna	85
B.1.3	Locating and Installing the GNSS Antenna	86
B.1.4	Connecting to the Antenna: Cabling	87
B.1.5	Antenna Installation Verification	87
B.1.6	Using Ancillary Products	87
B.1.7	Evaluating Signal Attenuation to validate cable length	87
B.1.8	Multipath Mitigation	89
B.1.9	Other Recommendations	89
B.2	Precise computation of the antenna position	90
B.2.1	General	90
B.2.2	Needed inputs for conducting a PPP to precisely compute the antenna position of the Galileo timing receiver	90
B.2.3	Available online PPP Services	90
B.3	Initial Calibration of the 1PPS receiver chain time delays	91
B.4	Periodic re-calibration	94
Annex C (informative) Record and Replay additional information		95
C.1	Clock reference sources	95
Annex D (informative) Timing Flags Definition		98
Annex E (normative) Provision of Record and Replay files		101

E.1	Requirements for collecting data for the R&R	101
E.1.1	Technical documentation	101
E.1.2	Human resources	102
E.1.3	GNSS signals digitalization	102
E.1.4	GNSS constellations simulator	103
E.2	Requirements for validating R&R data	104
E.2.1	Validation of the field test	104
E.2.2	Validation of the digitized GNSS signals	104
Annex F (informative) Justification of Nominal RFI Environment		106
Annex G (informative) Validation of Test on Receiver Noise (TC-13)		107
Bibliography		108