
**COSPAS-SARSAT ACCEPTANCE
OF 406 MHz BEACON
TYPE APPROVAL TEST FACILITIES**

**C/S T.008
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BEACON TYPE APPROVAL TEST FACILITIES**

HISTORY

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1. INTRODUCTION

1.1 Purpose

The purpose of this document is to set the technical criteria and state the procedures to be followed when applying to become a Cospas-Sarsat accepted test facility for type approval of 406-MHz beacons compliant with documents C/S T.001, C/S T.015 and/or C/S T.018.

1.2 Scope

Section 1 states the contents of this document and references; section 2 states the Cospas-Sarsat policy and outlines the acceptance process. Section 3 describes the acceptance process in detail.

Annex A lists the required measurement uncertainties of the parameters measured at a Cospas-Sarsat accepted test facility for the type-approval testing of documents C/S T.001/T.015 – compliant beacons.

Annex B lists the required measurement uncertainties of the parameters measured at a Cospas-Sarsat accepted test facility for the type-approval testing of document C/S T.018 – compliant beacons.

Annex C is an application form which is to be completed and submitted to start the acceptance process by Cospas-Sarsat.

1.3 Reference Documents

C/S T.001	Specification for Cospas-Sarsat 406 MHz Distress Beacons
C/S T.007	Cospas-Sarsat 406 MHz Distress Beacon Type Approval Standard
C/S T.015	Cospas-Sarsat Specification and Type Approval Standard For 406 MHz Ship Security Alert (SSAS) Beacons
C/S T.018	Specification for Second-Generation Cospas-Sarsat 406-MHz Distress Beacons
C/S T.021	Cospas-Sarsat Second Generation 406-MHz Distress Beacon Type Approval Standard
ISO-17025	General requirements for the competence of calibration and testing laboratories
ISO/IEC Guide 98-3:2008	Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)

- END OF SECTION 1 -

2. COSPAS-SARSAT ACCEPTANCE OF 406 MHZ BEACON TEST FACILITIES

2.1 Policy

Test facilities may apply to become a Cospas-Sarsat accepted type approval facility by following the procedures described in this document. The test facility must be independent of any beacon manufacturer.

Test facilities that are accepted by the Cospas-Sarsat Council are entitled to perform tests on 406 MHz distress beacons for the purpose of having a Cospas-Sarsat Type Approval Certificate issued by the Cospas-Sarsat Secretariat. A list of Cospas-Sarsat accepted type approval test facilities and information on which generation (i.e., C/S T.001 or C/S T.018 – compliant) of beacon they are approved to perform beacon type-approval testing is maintained by the Secretariat.

2.2 Costs

The direct costs (i.e. travel, accommodation, laboratory testing, etc.) associated with carrying out this Cospas-Sarsat acceptance procedure will be borne by the applicant facility.

2.3 Required Capabilities of Test Facility

For test facilities seeking Cospas-Sarsat acceptance, the test facility must be capable of performing all tests on a 406 MHz beacon in accordance with the applicable issue of documents C/S T.007, C/S T.015 or C/S T.021, as appropriate. The antenna tests may be performed at a different location, but the responsibility of meeting the requirements still lies with the test facility. The term “measurement uncertainty” is defined in Annex A. The measurement uncertainty requirements of the test facility for documents C/S T.001/T.015-compliant beacons are listed in Table A-1 in Annex A, and for document C/S T.018-compliant beacons - in Table B-1 in Annex B of this document.

The Quality Assurance Programme prepared and used by the test facility must meet the requirements of ISO-17025.

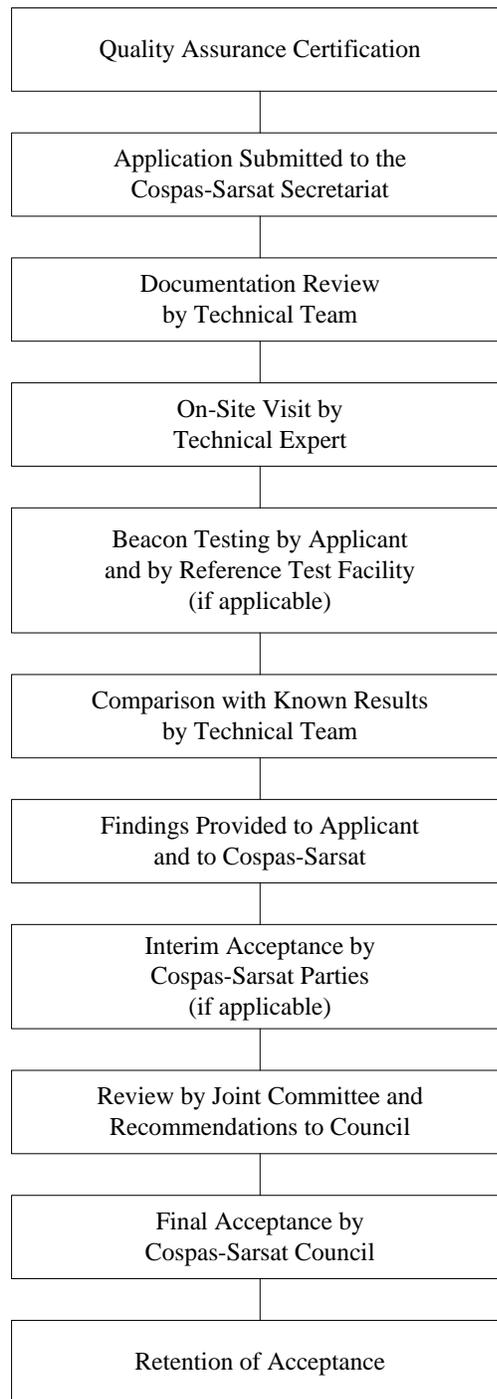
2.4 Summary of Beacon Acceptance Process for New Test Facilities

The acceptance process, illustrated in Figure 2.1 and described in detail in section 3, evaluates the applicant's test facility technical capabilities and Quality Assurance Programme.

- a) The applicant's test facility would have its Quality Assurance Programme assessed by a national accreditation organization. The test facility must meet the Cospas-Sarsat requirements which are given in Table A-1 of Annex A and/or Table B-1 of Annex B, and the requirements of ISO-17025.
- b) The test facility would submit its application form (see Annex C) plus the required technical data (see section 3.2) to the Secretariat.
- c) The submission would then be reviewed by an ad-hoc technical team consisting of the Secretariat and technical experts designated by the Cospas-Sarsat Council.
- d) An on-site technical visit would then be conducted by one of the technical team members to observe tests being performed, including antenna tests.
- e) A complete set of type approval tests are then performed according to the appropriate document listed in section 1.3 on a test beacon provided by the applicant or borrowed from Cospas-Sarsat.
- f) If the test beacon has not previously been tested, either at another already approved test facility, or at facilities designated by the Cospas-Sarsat Parties, the beacon would subsequently be tested by one of these facilities.
- g) Upon completion of the tests, a test report will be written and sent to the Secretariat by the applicant, and by the reference test facility, as applicable. The reports will be reviewed by the technical team and their findings will be provided to the applicant, to the Cospas-Sarsat Parties and to the Joint Committee for review and recommendations to the Council.
- h) If the documentation demonstrates that the test facility meets the Cospas-Sarsat requirements, the Cospas-Sarsat Parties may grant interim acceptance of the facility until the formal review by the Joint Committee and Council has been completed.

Following acceptance by the Council, the facility will need to provide, on an annual basis, a letter confirming that their Quality Assurance technical status is still maintained.

The Figure 2.1, below, illustrates the steps in initially becoming an accepted Cospas-Sarsat Test facility for either first generation beacons, second generation beacons or both.



**Figure 2.1: Process to Become a Cospas-Sarsat Accepted
406 MHz Beacon Type Approval Test Facility**

2.5 Acceptance Process for Approved Test Facilities Wishing to Extend their Test Capabilities

Extended capabilities are the ability to test either different generations of beacon or new features and capabilities added to beacons. These extended capabilities are reflected in new type approval standards or changes to existing type approval standards that are determined by the Council to be significant enough that a recertification of the test facility is required to ensure that they can satisfactorily perform the necessary additional testing requirements.

For those accepted Cospas-Sarsat test facilities already holding an accreditation to perform type-approval testing of documents C/S T.001/T.015/T.018-compliant beacons and wishing to extend type-approval testing capabilities the acceptance process shall be as follows:

- a) the test facility would submit its application form (see Annex D) specifying what capabilities are to be added plus any relevant technical data (see section 3.2) needed to extend test capabilities to the Secretariat;
- b) the submission would then be reviewed by the Secretariat and Parties' technical experts (technical team). This technical team will determine which, if any, type approval tests from the appropriate document listed in section 1.3 need to be conducted based on the desired capabilities to be added to the currently approved capabilities of the test facility;
- c) the type approval tests determined by the technical team are then performed on a test beacon provided by the applicant or borrowed from Cospas-Sarsat;
- d) an on-site technical visit may be conducted by one or more of the technical team members to observe tests being performed, including antenna tests;
- e) if the test beacon has not previously been tested, either at another already approved test facility, or at facilities designated by the Cospas-Sarsat Parties, the beacon would subsequently be tested by one of these facilities;
- f) upon completion of the tests, test reports will be written and sent to the Secretariat by the applicant, and by the approved test facility or facilities designated by the Cospas-Sarsat Parties, as applicable. The reports will be reviewed by the technical team and their findings will be provided to the applicant, to the Cospas-Sarsat Parties and to the Joint Committee for review and recommendations to the Council;
- g) if anomalies are detected in the test data, and the technical team identifies specific necessary modifications to the facility's testing procedures during the review, the test facility may be asked to perform modified tests;
- h) The technical team may also propose corresponding clarifications to the applicable Cospas-Sarsat document listed in section 1.3 to the next Joint Committee meeting for review and recommendation to the Council; and
- i) if the documentation demonstrates that the test facility meets the Cospas-Sarsat requirements, the Cospas-Sarsat Parties may grant interim acceptance of the facility until the formal review by the Joint Committee and Council has been completed.

2.6 Cospas-Sarsat Acceptance

When the procedure has been successfully completed and the test facility has been accepted by the Cospas-Sarsat Council, the name of the facility and information on which generation of beacon it is approved to perform type-approval testing of, will be included in the list of accepted test facilities which is maintained by the Cospas-Sarsat Secretariat.

2.7 Other Capabilities

The applicant test facility may also wish to provide Cospas-Sarsat with a description of its capabilities for testing 406 MHz beacons to national or other international standards.

- END OF SECTION 2 -

3. 406 MHZ BEACON TEST FACILITY ACCEPTANCE PROCESS

3.1 Quality Assurance

The applicant must obtain certification from a national accreditation organization that its test facility meets the quality assurance requirements defined in ISO-17025.

3.2 Application Package

The application form provided in Annex C of this document is to be completed and submitted to the Cospas-Sarsat Secretariat.

The application package must include a letter or certificate from a national accreditation organization in the applicant's country confirming that the applicant's Quality Assurance Programme meets the requirements defined in ISO-17025. The name and address of this accreditation organization must also be given.

Further, the application package must also include the following technical data:

- a) a list of test equipment required to perform Cospas-Sarsat testing, serial number and model number;
- b) test equipment calibration reports;
- c) test equipment traceability to National Standards;
- d) a description of software to be used (if applicable);
- e) calibration reports and traceability of environmental chambers (if applicable);
- f) a copy of technical procedures they intend to use during approval testing; and
- g) a list of the actual test facility measurement uncertainties.

The completed application package is to be submitted to the Cospas-Sarsat Secretariat who will verify that the necessary information is included in the package.

3.3 Technical Review

Upon submission of the completed application package, the Cospas-Sarsat Secretariat will send a copy to the technical experts appointed by the Cospas-Sarsat Council to work with the Secretariat. These experts will review the technical material and provide recommendations on whether or not to proceed to the next step.

Once the recommendations indicate that the applicant test facility meets the basic requirements, an on-site technical visit is arranged.

3.4 On-Site Technical Visit

One or more technical experts on beacon testing then visits the applicant test facility. Some tests, including antenna tests, are to be performed on a beacon to demonstrate to the technical expert the capabilities of the test facility. The technical experts will verify the following, noting any existing certifications for those facilities that have been certified for type approval of the document C/S T.001/T.015-compliant beacons:

- a) the availability of the required test equipment;
- b) witness the operation of the test equipment and antenna test range;
- c) the test equipment and environmental chambers are calibrated and traceable to national standards;
- d) assess the use of applicable procedures; and
- e) evaluate the procedures, measurement uncertainties, data sheets and results for completeness and accuracy.

A report will be made by the technical experts to Cospas-Sarsat confirming that the test facility is now ready to proceed to the next step.

3.5 Beacon Test

The test facility will perform a full set of Cospas-Sarsat tests that include antenna tests on a 406 MHz beacon, which may be operated from an external power supply, and subsequently provides the test report to Cospas-Sarsat for review and analysis. The test report is to be written in the format described in documents C/S T.007 and C/S T.021.

The beacon testing can be performed in either of two ways:

- a) the test facility can acquire its own beacon, on which it conducts the tests and then provides the beacon to one of the designated Cospas-Sarsat test facilities for a subsequent verification test, which the applicant would pay for; or
- b) alternatively, the applicant could arrange, on a bilateral basis, to borrow from one of the other accepted test facilities a test beacon having known, previously measured, characteristics. The applicant would then perform the full set of tests on this beacon and prepare a test report.

If the test beacon has not previously been tested, either at another already approved test facility, or at facilities designated by the Cospas-Sarsat Parties, the beacon would subsequently be tested by one of these facilities.

- c)

3.6 Review of Beacon Test Report

The test report, duly signed by the test facility's authorized official should then be submitted to the Cospas-Sarsat Secretariat.

The Cospas-Sarsat Secretariat and the technical experts will review the test report and compare the results generated by the applicant's test facility with those of the verification test facility, taking into account the measurement accuracies of the two test facilities.

If there is a significant difference between the two sets of test results, some additional tests may be requested.

3.7 Report and Recommendations to Cospas-Sarsat

A report is prepared jointly by the Secretariat and the technical experts. Their findings will be provided to the Applicant, to the Cospas-Sarsat Parties and to the Joint Committee for its review and recommendation as appropriate to the Cospas-Sarsat Council.

If the documentation demonstrates that the test facility meets the Cospas-Sarsat requirements, the Cospas-Sarsat Parties may grant interim acceptance of the facility until the formal review by the Joint Committee and Council has been completed.

Following acceptance of the test facility by the Cospas-Sarsat Council, the Secretariat will notify the applicant of the Council decision. If the process is successful, the applicant's name will then be included in the list of Cospas-Sarsat accepted type approval test facilities maintained by the Secretariat.

3.8 Retention of Test Facility Acceptance

The retention of test facility acceptance is the responsibility of the test facility. This will be accomplished by supplying to the Cospas-Sarsat Secretariat:

- a letter submitted annually by May stating their intention to retain their Cospas-Sarsat acceptance and confirming that their test facility continues to meet the Cospas-Sarsat requirements for which they were previously accepted;
- a list attached to the letter that would include the following technical data:
 - a) a list of any additional test equipment required including, serial number and model number;
 - b) test equipment calibration reports for any additional test equipment showing traceability to National Standards;
 - c) a description of any new software to be used;
 - d) a copy of any new technical procedures they intend to use during approval testing; and
 - e) a list of the actual test facility measurement uncertainties for the new procedures / equipment; and
- a reassessment of the facility's Quality Assurance Programme by a national accreditation organization every five years.

In addition, the Cospas-Sarsat Council reserves the right to request:

- that a technical expert (designated by the Council) be entitled to visit the test facility periodically;
- that a test be conducted every two years (at no cost to Cospas-Sarsat) on a beacon provided by Cospas-Sarsat; and
- a technical audit by Cospas-Sarsat every five years.

- END OF SECTION 3 -

**ANNEXES TO
COSPAS-SARSAT ACCEPTANCE
OF 406 MHz BEACON
TYPE APPROVAL TEST FACILITIES**

**ANNEX A - MEASUREMENT UNCERTAINTY REQUIREMENTS FOR TYPE-
APPROVAL TESTING OF BEACONS COMPLIANT WITH DOCUMENTS C/S
T.001/T.015**

Introduction

Measurement Uncertainty: An uncertainty budget is a statement of a measurement uncertainty, of the components of that measurement uncertainty, and of their calculation and combination. It should include the measurement model, estimates, and measurement uncertainties associated with the quantities in the measurement model, covariance's, type of applied probability density functions, degrees of freedom, type of evaluation of measurement uncertainty, and any coverage factor. An uncertainty budget is not simply a summary table; it has to include all these factors. The actual test facility measurement uncertainty is determined considering all of the elements mentioned in this paragraph.

Table A-1: Measurement Uncertainty Requirements for Type-Approval Testing of 406-MHz Beacons Compliant with Documents C/S T.001/T.015

Parameter	Beacon Requirement	Required Test Facility Measurement Uncertainty
Repetition Time	see C/S T.001 Section 2.2.1	± 0.01 sec
Total Transmission Time	440 ms \pm 4.4 ms, or 520 ms \pm 5.2 ms	± 1.0 ms
First Burst Delay	≥ 47.5 sec (for beacons other than ELTs when activated automatically by G-switch / deformation)	± 1 sec
	≤ 15.0 sec (for ELTs when activated automatically by G-switch/deformation)	± 1 sec
	≤ 5.00 sec (for ELT(DT)s)	± 0.01 sec
CW Preamble	160 ms \pm 1.6 ms	± 1.0 ms
Bit Rate	see C/S T.001 Section 2.2.4	± 0.6 bps
Nominal Frequency	see C/S T.001 Section 2.3.1	± 100 Hz
Frequency Stability	see C/S T.001 Section 2.3.1	< 0.1 ppb
Transmitted Power	See C/S T.001 Section 2.3.2, or C/S T.015 Section 2.2	± 0.5 dB
Spurious Power Level	see Figure 2.3 in C/S T.001	± 2 dB
Power Output Rise Time	See C/S T.001 Section 2.3.2	± 0.5 ms
		± 0.2 ms (for ELT(DT))
Power Level 1 ms Before Burst	< -10 dBm	± 2 dB
Modulation Rise	See C/S T.001 Section 2.3.6	± 25 μ s
Modulation Symmetry	≤ 0.05	< 0.01
Phase Modulation	1.1 rad \pm 0.1 rad	± 0.04 rad
Internal Navigation Device Timing	All times within C/S T.001 Sections 4.5.5.2, 4.5.5.3 and 4.5.5.4	Times equal to or less than one hour: ± 1 second; Times greater than one hour: ± 10 seconds
Temperature (near beacon)	various	$\pm 2^{\circ}$ C
Antenna Measurement	see C/S T.007 Annex B	± 3 dB

**ANNEX B - MEASUREMENT UNCERTAINTY REQUIREMENTS FOR TYPE-
APPROVAL TESTING OF BEACONS COMPLIANT WITH DOCUMENT C/S T.018**

Introduction

Measurement Uncertainty: An uncertainty budget is a statement of a measurement uncertainty, of the components of that measurement uncertainty, and of their calculation and combination. It should include the measurement model, estimates, and measurement uncertainties associated with the quantities in the measurement model, covariances, type of applied probability density functions, degrees of freedom, type of evaluation of measurement uncertainty, and any coverage factor. An uncertainty budget is not simply a summary table; it has to include all these factors. The actual test facility measurement uncertainty is determined considering all of the elements mentioned in this paragraph.

Table B-1: Measurement Uncertainty Requirements for Type-Approval Testing of 406-MHz Beacons Compliant with Document C/S T.018

Parameter	Beacon Requirement	Required Test Facility Measurement Uncertainty
Repetition Time	See C/S T.018 Section 2.2.1	± 0.01 sec
Total Transmission Time	1000 ms \pm 1 ms,	$\pm [0.1]$ ms
First Burst Delay	See C/S T.018 Section 2.2.1	± 0.2 sec ± 0.01 sec (for ELT(DT))
Bit Rate	300 bps \pm 3 bps	± 0.6 bps
Chip Rate Accuracy	See C/S T.018 Section 2.3.1.2	$\pm [0.05]$ chips/sec
Chip Rate Variation	See C/S T.018 Section 2.3.1.2	$\pm [0.05]$ chips/sec ²
Nominal Frequency	406.050 MHz \pm 1200 Hz	± 100 Hz
Frequency Stability	see C/S T.018 section 2.3.1.1	< 0.7 ppb
Spurious Power Level	see mask in C/S T.018 section 2.3.2	± 2 dB
Error Vector Magnitude	$< 15\%$ from ideal	[1%]
Power Level 25 ms Before Burst	< -10 dBm	± 2 dB
Power Rise Time	< 0.5 ms	± 0.025 ms
Modulation Symmetry	See C/S T.018 Section 2.3.3 I,Q offset I,Q peak-to-peak amplitude	$\pm [0.025]$ μ s [1%]
Temperature (near beacon)	various	$\pm 2^{\circ}$ C
EIRP	see C/S T.021 Annex B	± 3 dB

- END OF ANNEX B -

**ANNEX C - APPLICATION TO BECOME A COSPAS-SARSAT ACCEPTED 406 MHZ
BEACON TYPE APPROVAL TEST FACILITY**

Applicant Test Facility:
(name, address, etc.)

National Accreditation Organization:
(name, address, etc.)

DECLARATION OF APPLICANT:

The _____ test facility
located at _____
applies to become a Cospas-Sarsat accepted test facility for type approval of beacons compliant with
documents C/S T.001/T.015 and/or C/S T.018 (strike-out as appropriate) and provides the enclosed
documentation and quality assurance certification.

I hereby agree to provide the technical information required by Cospas-Sarsat, as defined in documents
C/S T.008, C/S T.007, C/S T.015 and/or C/S T.021.

Date

Signature of Test Facility Representative

**ANNEX D - APPLICATION TO EXTEND COSPAS-SARSAT ACCEPTED 406 MHZ
BEACON TYPE APPROVAL TEST FACILITY CAPABILITES**

Applicant Test Facility:
(name, address, etc.) _____

National Accreditation Organization:
(name, address, etc.) _____

DECLARATION OF APPLICANT:

The _____ test facility
located at _____

applies to extend beacon type approval test capabilities as a Cospas-Sarsat accepted test facility. The
test facility wishes to add the following test capabilities at this time (Check all boxes as appropriate):

- C/S T.001 beacons (non ELT(DT))
- C/S T.015 beacons
- C/S T.018 beacons (non ELT(DT))
- C/S T.001 ELT(DT) beacons
- C/S T.018 ELT(DT) beacons
- Other: _____ (Specify)

I hereby agree to provide the technical information required by Cospas-Sarsat, as defined in documents
C/S T.008, C/S T.007, C/S T.015 and/or C/S T.021.

Date

Signature of Test Facility Representative

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