**Issue/Rev No: 01/00**

**Date of Release: 8 Feb 2025**

Template No.

 CEMILAC\_SYSGP\_ACP\_19

 **ACP
 for <LRU/SYSTEM Name>**

**for**

 **<Platform Name>**

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| <DESIGN AGENCYLOGO> | **Document No.** |  |
| **Issue No./** **Rev No. :** | <00X>/ | **Issue Date :** | <DD/MM/YYYY> |
| **Copy No. :**  | 01 of N | **No. of** **Pages :**  | < total no .of pages > |
| **Document Classification :** | 🞎 Secret 🞎 Confidential 🞎 Restricted 🞎 Unrestricted  |
| **Title:** | **Project/System :** |
| **ACP for** **<LRU/SYSTEM Name>for <Platform name>** | < Project/System Name> |
| **LRU/System Part No.**  |
| <No.> |
| **Critical Level** |
| <A/B/C/D/E> |
|  | **Name & Designation** | **Signature** |
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|  **<Design Firm Name & Address>** |

**Disclaimer:**

This document is a guidance document. Applicable section / table rows may be considered. Any additional details may be added. Any not applicable section/ table rows may be deleted. The template is very general and vary with process to process followed by Development Agency. The document may be fine-tuned with the TAA for finalization.

**Revision Record Sheet**

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| --- | --- | --- | --- | --- | --- | --- |
| Sl. No | Issue No.  | Revision No.  | Date | Revised Page Nos. | Remarks | Approved By |
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1. **INTRODUCTION**
	1. Purpose

<Purpose for making this plan. For ex. To obtain CEMILAC certification for flight trials and service use induction of xxx store on military airborne platforms like xxx, xxx, xxx (scope of the certification>

* 1. Scope

<Scope of the plan to the project i.e. whether this plan is applicable to single CSCI, set of CSCIs, whole system or system of systems.>

* 1. Document Identification

<Number, issue and release date>

* 1. Applicable Documents

<References while making this document - specifications or standards or any other document or report>

1. **SYSTEM OVERVIEW**
	1. System Description

<Top level functional description of system. Max 1-2 pages. Give overall details to understand the context of the software under certification.>

|  |  |  |  |
| --- | --- | --- | --- |
| Sl No | Software characteristic | Overall Information  | Within the scope of current SCP (Y/N) |
| 1 | Name of the System |  | -- |
| 2 | Name of the LRU |  | -- |
| 3 | Number of processing elements in the LRU (DSP, µP, µC, SoC, FPGA, CPLD etc) |  | -- |
| 4 | Number CSCIs in each processor |  | -- |
| 5 | Name of CSCIs in each processor |  | -- |
| 6 | Criticality of each CSCI |  | -- |
| 7 | Complexity of each CSCI (Low/ Medium/ High)  | <Number of top level functionalities implemented, complexity of algorithms/ computations, no. of high-impact decisions made, etc can be used to estimate the complexity of CSCI> | -- |
| 8 | Implementation Language of each CSCI |  | -- |
| 9 | COTS components that are part of each CSCI | <Libraries, RTOS, BSP, OpenGL, auto-generated code etc> |  |
| 10 | Standard compliance of each CSCI (Development, Certification, Coding etc) |  |  |
| 11 | Development agency for each CSCI |  | -- |
| 12 | IV & V agency for each CSCI |  | -- |
| 13 | Certification agency for each CSCI | <CEMILAC, DGCA, MSQAA, DGQA, NAQAS, foreign, etc may be mentioned as applicable> | -- |
| 14 | Previously Developed software components used in conjunction with newly developed CSCIs |  |  |
| 15 | Parameter Data Items | <Config files, Look up tables, Calibration data, adaptation data etc> |  |
| 16 | Field Loadable software |  |  |
| 17 | User modifiable software |  |  |
| 18 | IV&V Team constitution (as per IMTAR-21, Subpart C6) |  |  |
| 19 | Agency for integration of all the CSCIs of the LRU/ system |  | -- |

* 1. System Architecture

<Distribution of top level functionalities described in Sec 2.1, to programmable devices in the system – in software, FPGAs etc. This can be derived from SARAD.>

* 1. Processors

<Any special features that are being used by the software>

* 1. Hardware / Software Interfaces

<The types of interfaces using which software interacts with other components - like other CSCIs (Ex: shared memory, DPRAM etc), hardware (Ex: timer interrupts), external systems (Ex: MIL 1553B, ARIC, RS 422 etc), operator (Ex: touchscreen, brake pedal). All the data elements need not be listed. Top level information may be provided (For ex: health data, handshake, Air data, target data, Trigger press etc). Context diagram may also be given in place of textual description.>

* 1. System Safety Features

<Safety specific special provisions in the system, if any. For ex: Geo-lock for arming of warhead, provision for severance of dunking SONAR in case unable to retrieve, emergency hardware path for bypassing software processing, manual over-ride / take-over etc. These help in deciding importance of functions / outputs>

1. **SOFTWARE OVERVIEW**
	1. Software Description

<Brief description of software under certification and major functionalities. Max 2-3 pages>

* 1. Safety and Partitioning (Resource Sharing, Redundancy, Fault Tolerance)

<The plan to mitigate risks, implement and verify safety requirements (For ex: multiple interlocks, fail-safe logics, containment of safety critical failures etc). If any ground software (test, diagnostics, maintenance, data loading/ milking etc) resides in the same memory space, how is the separation ensured?>

* 1. Technology

<The technology used in software development – OOPS, Model based, AI/ML etc>

* 1. Timing and Task Scheduling

<Real time transactions required - Major/ minor cycles, interrupts with priorities, how asynchronous transactions are responded to, how response times to external systems is ensured etc >

1. **SOFTWARE LIFECYCLE**
	1. Processes and Activities

< Activities planned as part of software development, verification, certification, post-delivery maintenance, and re-certification. (For ex: Planning, Requirements gathering, Requirement review, Software architecture design, Software detailed design, Algorithm validation, testing at various rigs/ facilities etc.) Inputs, outputs and transition criteria for each process. Verification planned for each process. How changes to artefacts are ratified and released, how it is ensured that the plans are adhered to, How the development and verification stage completion are conveyed to certification authority, what are the IV&V activities for re-certification of modified software to ensure continued standard compliance etc >

* 1. Team Responsibilities

<Define the development team, V&V team and IV&V team (by departments or designations - not by name). IV&V team composition shall be as per Subpart C6 of IMTAR-21. Identify level of involvement of each team in the development/verification processes (a table similar to that in Sec 6.0 may be used). This should cover aspects like person(s) authorised to raise/ close issues, authenticate requirement/ design changes, point of contact for certification liaison etc. >

* 1. Agencies involved

<Agencies involved and their roles and responsibilities for activities other than shown in 4.2. For ex: a/c integration, flight trials, user trials, QA coverage, any outsourced development/ verification activity, any outsourced facility like tools/testing/modelling etc.>

* 1. Future Enhancement Plan

< Planned enhancement of functionalities or Foreseeable application/deployment of this software in other systems/ platform/environment, and corresponding delta certification that may be required. >

1. **CERTIFICATION CONSIDERATIONS**

5.1 Software criticality Level Determination

5.1.1 System Safety Assessment Results

<As per the SSA, the worst case failure mode(s) resulting in safety/ mission failure and the criticality attributed to the system>

5.1.2 Critical Software Functions

<Criticality classification of the software i.e. the extent of contribution by software towards the critical failures of the system. The software criticality may be same as system criticality or a level lower – with justifications. Different CSCIs may have different criticality levels ascribed to them>

 5.2 Certification Basis

<Basis for certification of ab-initio software, COTS software, BSP, Drivers, OS, Bootloader, Tool qualification, auto generated code, previously developed software etc – For each of the categories, list the processes to be carried out and evidences to be submitted for certification (These can be referenced from Sec 4.1). Mention if any certification credits are to be read-across from similar systems based on software re-use. >

5.3 Stages of Certification

<In case stage-wise certification is sought for Software testing, integration, trials and deployment milestones. This should cover version baselining for system SOF/QT tests, rig integration clearance, a/c integration clearance, flight trial clearance, dummy drop, Carriage flight trials, open loop trials, simulated target, actual target, mission mode, safe mode, final production clearance etc. List out the IV&V activities/ certification credits (extent of reviews, analysis, testing etc) planned for each of the stages. For each stage, the proposed activities can be referenced from Section 4.1 >

Ex:

|  |  |  |  |
| --- | --- | --- | --- |
| Sl.No | Stage of Certification | Activities to be complied | Artefacts to be submitted |
|  | Rig Integration clearance | Planning reviewRequirement ReviewDesign ReviewCode WalkthroughHLR based CSCI level/ HSI testing |  |
|  | A/c Integration clearance |  |  |
|  | Development flight clearance |  |  |
|  | Production/ Service use clearance |  |  |
|  | Change/ modifications clearance |  |  |
|  |  |  |  |

For air launched weapons, the stages of clearance are - CFT, Dummy drop, instrumented store launch, RFT without warhead, RFT with warhead, Production clearance and change management.

1. **Software Lifecycle Data**

<Software Lifecycle Data planned for this project - Sample table attached. To be customised as per project requirements.

Note : The following three documents are the basis for determining Software criticality and software requirements. These shall be submitted before Plan for certification is finalised.

1. System/ Functional Requirement Document
2. System Architecture and Requirements Allocation Document (SARAD)
3. System Safety Assessment (SSA) report

|  |  |  |  |
| --- | --- | --- | --- |
| Sl No | SDLC phase | Document Name | CEMILAC level of involvement\* |
| 1 | Planning | Software certification Plan | A |
| 2 | Software Quality Assurance Plan | I |
| 3 | Software Development Plan | I |
| 4 | Software Verification Plan | A |
| 5 | Software Config Mgmt Plan | I |
| 6 | Requirements analysis | Software Requirement Document | R |
| 7 | Interface Control Document | I |
| 8 | Design | Software Design Document | I |
| 9 | Coding | Source Code | R |
|  |  | Code walkthrough report  | R |
| 10 | Testing | CSU level(unit) test plan/procedure | I |
|  | CSU/Unit Test Report (UTR) | I |
| 11 | CSCI level Test cases and Procedures | R |
| 12 | CSCI level Test Report | I |
| 13 | Hardware Software Integration Test Procedure(HSITP) | R |
| 14 | Hardware Software Integration Test Report (HSITR) | I |
|  | * Tool Verification Procedure
* Build Making & loading Procedure
* BSP Validation Procedure
* RTOS Validation Procedure
 | I |
| 15 | * Tool Verification Report
* BSP Validation Report
* RTOS Validation Report
 | I |
| 16 | All | Software Verification Report (including static and Dynamic analyses) | I |
| 17 | All | Software Quality Assurance Report | I |
| 17 | All | Bi-directional Traceability Matrix | I |
| 18 | Certification | IV&V Recommendation | I |
| 19 | Certification | Software accomplishment summary (compliance to SCP) | A |
| 19 | Certification | Version Description Document | A |
| 20 | Change Management | SPR, SCR, SCN, Impact analysis report | A (SCN) |

\* A-Approval R-Review I- for information

1. **ABBREVIATIONS**