Atacama
Large
Millimeter
Array

ALMA Reviews
Definitions, Guidelines and Procedure

ALMA-80.09.00.00-001-D-PLA

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Change Record

Version	Date	Affected Section(s)	Change Request #	Reason/Initiation/Remarks
A	2003-08-14	All		First Issue
B	2003-12-15	2.1, 2.2, 3.2.1, 3.2.2, 4.2.1, 4.2.2, 5.1	ALMA-80.09.00.00-001-A-CRE	Following CCB dated 2003-12-14, "ALMA Hardware Development & Production Process Description" and "Software Engineering Practices" documents were removed from the applicable documents list. Sequential numbering of the AD is also affected. "PA Requirements" has been changed to version B. "ALMA Documentation Control Plan" has been changed to version B. "ALMA Documentation Standards" has been changed to version F.
C	2004-06-29	2, 3.2.1, 4.2.1, 5.1	ALMA-80.03.00.00-006-A-CRE	The product tree shall be removed as an applicable document in all cases. The reason for this removal is that the product tree is frequently updated and this would cause unnecessary updating of all surrounding documents if it was referenced to as an applicable document. In this document, the product tree is now mentioned as a reference document and other documents affected by this same change request in the applicable documents list have been versioned up. Changes done by Eric Pangole.
D	2006-08-31	2.2; 4.2.2; 5.2; 5.3; 5.4; 5.4.2; 6.2.1.	ALMA-80.09.00.00-004-A-CRE	The reason of this change is to mention the Safety as part of the review process

Table of Contents

1 Description

1.1 Purpose

This document defines the Preliminary Design Phase, the Detailed Design Phase and the Manufacturing Phase, the documentation to be prepared during these phases, the purpose of the reviews which conclude each phase and the applicable procedure for these reviews.

1.2 Scope

Although this document has been basically written for subsystem reviews, it is strongly recommended to use it for internal reviews too.
Deviation from these guidelines is permitted as deemed appropriate by the project management (see 6.2.2 Decision Making Authority).

For lower level product reviews or internal reviews, when reading this document, one shall replace the term *subsystem* by the lower level *product name* and modified the data package accordingly as authorized in step 5 of the procedure (see chapter 6.3).

During these phases of the project, additional reviews (post-test review, …) and meetings (progress meetings, …) shall be internally organized by each IPT when needed.

2 Related Documents and Drawings

2.1 Applicable documents

Applicable Doc. #	Document Title	ALMA Document Number
AD01	*IEEE Std 610.12-1990*	
AD02	*ALMA Product Assurance Requirements*	ALMA-80.11.00.00-001-C-SPE
AD03	*ALMA Documentation Control Plan*	ALMA-80.02.00.00-011-C-PLA
AD04	*ALMA Documentation Standards*	ALMA-80.02.00.00-003-G-STD
AD05	*ALMA General Safety Design specification*	ALMA10-08.00.00.003-G-STD
AD06	*ALMA Risk analysis procedure*	ALMA-10.08.00.00.004-A.GEN

2.2 Reference documents

The following list of documents is referenced by this document to the extent specified. Unless stated otherwise, the latest version of the document is valid.

Reference Doc. #	Document Title	ALMA Document Number
RD01	*ALMA Product Tree*	ALMA-80.03.00.00-001-L-LIS

2.3 Abbreviations and Acronyms

The list of acronyms and abbreviations used within this document are given below.

Abbreviation or Acronym	Non-abbreviated Reference
ALMA	Atacama Large Millimeter Array
CDR	Critical Design Review
DDP	Detailed Design Phase
EEE	Electrical, Electronic, Electromechanical
FMEA	Failure Mode Effects Analyses
ICD	Interface Control Document
IPT	Integrated Product Team
JAO	Joint ALMA Office
MRR	Manufacturing Readiness Review
PA	Product Assurance
PDP	Preliminary Design Phase
PDR	Preliminary Design Review
PRR	Pre-production Readiness Review
RID	Review Item Discrepancy
T0	Date when review meeting starts

The terms *level 1, 2, 3 and 4 products* refer to the breakdown-structure of the system as described in RD01.
Products are hardware and/or software realization of the functional levels 1, 2, 3 and 4 of the system.
A *Configuration Item* is an aggregation of hardware, software, or both, that is designated for configuration management and treated as a single entity in the configuration management process (from EIA/IS-731.1).
A *Configuration Item Data List* is a list of the documents (e.g. specification, ICDs, drawings, test plans and procedure, assembly procedure…) pertaining to a given baseline of a configuration item.

3 Preliminary Design Phase

3.1 Definition

The PDP is the phase of the development where:

- *Multiple* solutions or concepts which meet the specified requirements are *identified and explored*.
- *Critical technologies* are identified and their feasibility analyzed.
- *Selected* solutions and concepts are *refined and validated* through extensive tradeoff studies and analyses. This may include simulations, calculations and/or prototype hardware development, test and evaluation. It shall be demonstrated, via one of the aforementioned techniques, that the selected design shall meet the requirements in terms of *functional and technical specifications* as well as in terms of *estimated costs and schedule*. A compliance matrix is required.
- The *top level performance requirements* for the subsystem are analyzed to ensure they are complete, documented and well understood.

The *selected* solution and concepts are defined on such a detail that:

- The subsystem *functional architecture*, external *interfaces*, the subsystem *specification* and the subsystem *description* are available (see 3.2.2 for definitions).
- All technically *critical areas are highlighted* and potential solutions are presented.
- *Project budget and schedule risks* can be evaluated with a high degree of confidence.
- The *development and pre-manufacturing* plans, test and costs (manpower, facilities, spare-parts) are clearly identifiable.

The PDP is concluded by the PDR. The PDR shall result in the definition of an updated project baseline for the subsequent detailed design phase.
Before entering the DDP, a so called “Delta PDR” may be required to cover remaining issues of the PDP if any.

At the end of the PDP:

- It shall be clear what will be realized in terms of functional and technical subsystem specifications and costs, project execution and producibility.
- All Configuration Items shall be updated accordingly.

3.2 Preliminary Design Review

3.2.1 Definition

A PDR is a review conducted to evaluate the progress, technical adequacy, and risk resolution of the selected design approach for one or more configuration items; to determine each design's compatibility with the requirements for the configuration item; to evaluate the degree of definition and assess the technical risk associated with the selected manufacturing methods and processes; to establish the existence and compatibility of the physical and functional interfaces among the configuration items and other items of equipment, facilities, software and personnel; and, as applicable, to evaluate the preliminary operational and support documents (cf. AD01).
The PDR concludes the PDP once the proposed design deliverable documentation is reviewed and approved. It shall result in the definition of an updated project baseline, named the "As Specified Baseline" which is then the basis for the detailed design work.

A detailed description of the process, tasks and responsibilities for the Preliminary Design Review milestone is presented in Chapter 6.

3.2.2 Preliminary Design Review Data Package

The Preliminary Design Review Data Package shall be provided by the contractor/ALMA partner(s) before the PDR in accordance with the timelines defined in Section 6.3. The PDR shall be conducted on the basis of the examination of these deliverables.

The PDR Data Package shall consist of, as a minimum:

- The *Preliminary Design* report of the selected design solution. It should be as detailed as specified in chapter 3.1 but also contain an executive summary of the documents, special remarks, recommendations and conclusions, deviations from the original plans and specifications and risks analyses (a critical items list shall be included).
  Here is what is understood as the subsystem *architecture*, *interfaces*, *specifications* and *description*:
  - The Subsystem Architecture Description document: as far as possible, a top-down approach dividing the system systematically into lower level functional products will be used. The subsystem will be presented by a functional structure built on functional level 1, 2, 3 and 4 products (block-diagram). The implementation of that functional architecture in the realized products and (sub) assemblies shall be described as well. This document shall be under configuration control at the conclusion of the PDR.
  - All interfaces between products of the subsystem architecture shall be defined (internal ICDs), although not necessarily detailed at this stage

of the project, as well as the interfaces with other external subsystems (external ICDs). The external ICDs shall be in the ALMA Project Format and shall be under configuration control at the conclusion of the PDR.

- The Product Specification and Product Description: all realization products have to be specified and described. The product specification contains all measurable entities of the functional box (Level 1, 2, 3 and 4 products). The product description contains the realization concepts (electrical, mechanical, thermal, software…) that will lead to the optimum result.

- Design justification and tradeoffs between the different design alternatives;
- New and/or critical technology demonstration plans;
- Mathematical models (Finite elements, thermal, electrical…);
- Test Plan and Verification Matrix for the Detailed Design Phase;
- Compliance Matrix;
- PA-Program Plan for development;
- Safety Plan (preliminary hazard identification and analysis);
- Updated detailed management plans:
    - Work Breakdown structure including Work Package Description for Development identifying resource allocation (manpower, …);
    - Development Planning organized by work package;
    - Long-lead material procurement plans;
    - Development/Pre-manufacturing Cost Analysis identifying recurrent and non-recurrent costs;
    - Preliminary Manufacturing Plan;
    - Configuration Item Data List;
- Software architectural documents. They shall demonstrate:
    - The traceability of proposed software back to the originator requirements;
    - The coverage by the proposed software of all requirements;
    - The definition of performances in measurable terms.

4 Detailed Design Phase

4.1 Definition

The Detailed Design Phase is the period when the subsystem is designed and the design is verified analytically and/or by tests performed on prototypes.

The goal of the Detailed Design is to:

- Finalize the *detailed sub-level specifications and interfaces* of the subsystem and associated documentations.
- Finalize the *design* and associated documentations keeping in mind production, integration and operational phases.
- Show that *the design meets the requirements* as a result of analysis, simulation, inspection and/or tests.
  This shall be summarized in the *compliance matrix*.
- Finalize and present the *detailed specifications and interfaces* of the products and associated documentations, with the objective of supporting the procurement and/or manufacturing plans of these products.
- Finalize and present *cost-effective production plans*, including options and plans for manufacturing and/or contracting out the products production, integration and test and subsystem assembly, integration and test.
- Enable the clear identification of the *operational costs* (manpower, spare parts, etc.)

At the end of this phase, the subsystem shall be *fully documented*, realized in *prototypes*, according to the Specifications and Description and *verified* according to the Test Plan (see 3.2.2.).

4.2 Critical Design Review

4.2.1 Definition

A CDR is a review conducted to verify that the detailed design of one or more configuration items satisfy specified requirements; to establish the compatibility among the configuration items and other items of equipment, facilities, software, and personnel; to assess risk areas for each configuration item; and, as applicable, to assess the results of producibility analyses, review preliminary hardware product specifications, evaluate preliminary test planning, and evaluate the adequacy of preliminary operation and support documents (cf. AD01).
The CDR concludes the DDP once the proposed design deliverable documentation is reviewed and approved. It shall result in the definition of an updated design and project status which are then the basis for the manufacturing work.

A detailed description of the process, tasks and responsibilities for the Critical Design Review milestone is presented in Chapter 6.

4.2.2 Critical Design Review Data Package

The Critical Design Review Data Package is the deliverables to be furnished by the contractor/ALMA partner(s) before the CDR in accordance with the timelines defined in Section 6.3. The CDR will be conducted on the basis of the examination of these deliverables.

The CDR Data Package consists of:

- The *Detailed Design Report*: it is an executive summary of the documents, including special remarks, recommendations and conclusions, and including deviations from the original plans and specifications:
    - Executive summary;
    - Presentation of updated Subsystem Specification document;
    - Presentation of the design at the products level;
    - Assessment of the design to meet the subsystem specifications:
        - Reference to annexed analysis results;
        - Reference to annexed prototype qualification test results;
        - Compliance Matrix;
        - External ICDs.

- A complete set of *product engineering documentation* (hardware and/or software):
    - Subsystem detailed specifications and internal ICDs (or corresponding detailed engineering description) down to the items level;
    - Manufacturing drawings;
    - Circuits diagrams;
    - Part list (EEE and mechanical);
    - Parts drawings;
    - Assembly drawings;
    - Assembly procedures;
    - Reliability and Maintainability analysis;
    - Maintenance equipment;
    - Test plans and procedures;
    - Test equipment;
    - Transportation plan and required equipment;

- Training program;
- Prototype Models (if applicable);
- Life Cycle Costs (manpower, spare parts, etc.);
- Safety compliance assessment;
- PA plan;
- Critical items list and recommended spares.
- Safety risk analysis

5 Manufacturing Phase

The manufacturing phase begins after the completion of the Detailed Design Phase. The manufacturing phase may be a two stage effort with an initial pre-production period followed by the full production phase or it may consist only of the full production phase. The determination of whether there are one or two periods to the manufacturing phase shall be determined by the individual IPTs.

The terms 'customer' and 'supplier' are used in the following sections. 'Customer' refers to the organization that supplies the funding and specifications for the manufacture of the item of interest. 'Supplier' refers to the organization responsible for the design and/or manufacture and delivery of the item of interest.

The 'customer' and 'supplier' may be distinct organizations or may be a single organization which performs the specification, design and manufacture functions. In the case where a single organization performs the specification, design and manufacture, the requirements contained in this section shall still apply regardless of the fact that the 'supplier' may be delivering the manufactured item(s) to itself.

5.1 Definition

The manufacturing phase focuses only on production regardless of whether it consists of one or two stages. It is not an 'extended' prototype effort. The item to be manufactured shall have a complete set of specifications that must be met for the product to be accepted.

It is critical that this phase is not started until the design engineering organization supplying the product specifications is completely satisfied that the design satisfies all requirements or, where the design does not satisfy requirements, this deficiency is understood and accepted. Starting production with specifications that are changing and dynamic significantly increases the risk that budget and schedule will be exceeded.

The manufacturing phase consists of the following major tasks.

1. Writing of Pre-Production Contract/Statement of Work (if applicable)
2. Pre-production Readiness Review (if applicable)
3. Manufacture of Pre-production deliverable items (if applicable)
4. Evaluation/optimization of manufacturing process
5. Writing of Production Contract/Statement of Work
6. Manufacturing Readiness Review
7. Manufacture of deliverable items
8. In-process manufacturing inspection
9. Acceptance testing

10. Packaging and shipment of deliverable items
11. Incoming inspection

Items 2 and 6 of the above list are detailed in the following subsections. Requirements applicable to items 3, 4, 7, 8, 9, 10 and 11 are detailed in AD02.

5.2 Applicable Documents

The reviews held as part of the manufacturing phase shall use the following applicable documents in descending order of precedence.

1. Contract
2. Purchase Order
3. Statement of Work
4. Product Assurance Requirements
5. Engineering Drawings
6. General Safety requirements

5.3 Pre-production Readiness Review

The purpose of the PRR is to demonstrate the overall production readiness of a supplier and assure that the items to be manufactured will meet the requirements of the Product Contract/Statement of Work and associated engineering drawings. All necessary manufacturing plans, tools, facilities and other resources shall be in place and available to ensure conformance to all quality and design requirements within the negotiated program budget and schedule.

5.3.1 General

A Pre-Production Readiness Review (PRR) provides for a formalized process of review and critique conducted jointly by representatives from project management, engineering, manufacturing, procurement and operations. The PRR assesses the overall manufacturing readiness of deliverable components, structures or other equipment per the pre-production contract prior to starting the manufacturing operation.

The objective is to ensure that all important production problems identified during the design phase have been resolved and that all prerequisite preparation and planning for production has been identified and accomplished or is scheduled to be accomplished in a timely manner not to adversely affect the quality, cost or schedule.

5.3.2 Scope

These requirements shall apply to all in-house production and outside suppliers that fabricate and/or assemble deliverable hardware. PRRs shall be identified during the proposal phase of a program and shall be specified in the negotiated contract, purchase order or Statement of Work (SOW).

This review shall address, at a minimum, the following items:

1. Review final test reports for engineering prototype item(s);
2. Review Failure Mode Effects Analyses (FMEA);
3. Review design engineering documentation to ensure agreement with manufacturing product specifications;
4. Specify required manufacturing documentation;
5. Specify required product acceptance criteria and methods;
6. Review supplier's Product Assurance/Quality Assurance procedures, and
7. Review supplier's manufacturing procedures and processes;
8. Safety risk analysis

5.3.3 Pre-production Readiness Review Data Package

The complete PRR data package is comprised of elements that are delivered by multiple organizations of the customer and the manufacturer. This document does not attempt to identify the responsible group within the customer's or manufacturer's organizations.

If the Supplier is unable to provide any element of the required data package, they must submit for approval a request for waiver (RFW) to the Customer's project management.

The PRR data package shall be furnished by the supplier before the review in accordance with the timelines defined in Section 6.3.

5.3.3.1 Customer Supplied Data Package

1. Statement of Work
2. Product Assurance Requirements

3. Engineering Drawings
    - Schematic diagrams
    - Wire lists
    - Wining and cable harness drawings
    - Piping diagrams;
    - Numerical control drawings
    - Logic Diagrams;
    - Installation drawings
    - Elevation drawings
    - Construction drawings
    - Connection drawings
    - Assembly drawings
    - Functional block diagrams

5.3.3.2 Manufacturer Supplied Data Package

1. Organization chart
2. Manufacturing plan
3. Acceptance test plans & procedures
4. Shipping/Packaging container design
5. Material Review Board Process/Procedures
6. Quality Assurance Plan
7. Updated product engineering documentation (see 4.2.2).

5.4 Manufacturing Readiness Review

The purpose of the MRR is to demonstrate the overall production readiness of a supplier and assure that the items to be manufactured will meet the requirements of the Product Contract/Statement of Work and associated engineering drawings. All necessary manufacturing plans, tools, facilities and other resources shall be in place and available to ensure conformance to all quality, Safety and design requirements within the negotiated program budget and schedule.

If a pre-production phase was executed, then the results of that work shall also be reviewed during the MRR to further optimize the full production manufacturing process.

5.4.1 General

A Manufacturing Readiness Review (MRR) provides for a formalized process of review and critique conducted jointly by representatives from project management, engineering, manufacturing, procurement and operations. The MRR assesses the overall manufacturing readiness of deliverable components, structures or other equipment per the production contract prior to starting the production operation.

The objective is to ensure that all important production problems identified during the design phase or pre-production phase have been resolved and that all prerequisite preparation and planning for production has been identified and accomplished or is scheduled to be accomplished in a timely manner not to adversely affect the quality, cost or schedule.

5.4.2 Scope

These requirements shall apply to all in-house production and outside subcontractors/suppliers that fabricate and/or assemble deliverable hardware. MRRs shall be identified during the proposal phase of a program and shall be specified in the negotiated contract, purchase order or Statement of Work (SOW).

The MRR review shall be conducted at a location mutually agreed upon by the parties whose attendance is required. This review shall address, at a minimum, the following items:

1. Review final test reports for engineering prototype item(s);
2. Review Failure Mode Effects analyses (FMEA);
3. Verify design engineering documentation to ensure agreement with manufacturing product specifications;
4. Review pre-production manufacturing processes;
5. Specify required manufacturing documentation;
6. Specify required product acceptance criteria and methods;
7. Review supplier's Product Assurance/Quality Assurance procedures, and
8. Review manufacturing procedures and processes.
9. Review Safety risk analysis

5.4.3 Manufacturing Readiness Review Data Package

The complete MRR data package is comprised of elements that are delivered by multiple organizations of the customer and the supplier. This document does not attempt to identify the responsible group within the customer's or supplier's organizations.

If the Supplier is unable to provide any element of the required data package, they must submit for approval a request for waiver (RFW) to the Customer's project management.

The MRR data package is identical to the PRR data package detailed in Section 5.3.3. This data package shall be furnished by the supplier before the review in accordance with the timelines defined in Section 6.3.

6 Review Procedure

This chapter gives the procedures applicable for ALMA Design and Pre-production Reviews, all of which are milestones in the ALMA project.

6.1 Location of the Review

The review shall be conducted at a location mutually agreed upon by the parties whose attendance is required.

6.2 Participants, Roles and Tasks

6.2.1 Review Participants

The Review Board should consist of representatives from:

1) project management and/or project engineering,
2) systems engineering,
3) all affected IPTs,
4) product assurance,
5) procurement (if a major contract is involved),

plus,

6) at least two experts external to the ALMA project.
7) Safety manager

From the contractor or supplier, the review requires the participation of representatives of:

1) project management
2) design & system engineering
3) product assurance
4) procurement (if needed)
5) safety

For IPT reviews, the participation may be adjusted.

Observers may attend a review with the permission of the Review Chairman

6.2.2 Decision making authority

For a subsystem review, the decision making authority will be the JAO and management IPT. For a lower level product review, the decision making authority will be the concerned IPT leads and management IPT.

The decision making authority shall

a. Define the objectives of the review;
b. Approve the review plan;

c. Appoint the review chairman;
d. Approve the Review Board membership in consultation with review chairman;
e. Examine the Review Board report presented by the review chairman;
f. Consider the recommendations and required actions resulting from the review and
g. Generate the relevant decision as required.

6.2.3 Chairman

The review chairman shall:

a. Chair the review;
b. Propose a review plan with the concerned IPT(s) lead(s) and submit it to the decision making authority;
c. Select the Review Board members and propose the membership to the decision making authority;
d. Manage the activities of the Review Board;
e. Verify the status of actions from the previous review of the project;
f. Verify that the submitted documentation corresponds to the objectives of the review;
g. Approve the RID statements, and
h. Request supplier responses to RIDs;

6.2.4 Review Board members

The Review Board members shall, under the authority of the Review Board chairman:

a. Review the submitted documentation;
b. Identify problems or request explanations by means of RIDs;
c. Participate in RID close-out activities, including classification of unresolved problems as being major or minor;
d. Prepare recommendations when the supplier response to RID is not considered satisfactory, and
e. Prepare the final review report, including recommendations.

6.2.5 Contractor/ALMA partner/supplier

The contractor/ALMA partner/supplier shall:

a. Provide all facilities and logistics for the review meetings and sessions, if required by the ALMA program manager;
b. Ensure that all necessary means, information and documentation are available and current for the review, and
c. Prepare responses to RIDs and propose a schedule for the identified actions.

6.2.6 Review Plan

A review plan shall be prepared to define:

a. Responsibilities of the participants in review, their names and organizational affiliations;
b. A schedule for the preparation of the review;

c. Scope of the work assigned to the Review Board and its panels (if any);
d. List of documents to be distributed to Review Board members and all documents to be available during the review;
e. Procedure to be followed during the review meetings including RID numbering, submission and processing;
f. Schedule of the meeting and draft agenda;
g. Status of actions from previous review, and
h. Forms to be used.

6.3 A suggested sequence of activities

No	Time	Activity	Responsible
1	-	Definition of ALMA subsystem to be reviewed and type of review: *this task is generally performed during the initial planning phase.*	JAO or ALMA project executives
2	T0-8 weeks	Appointment of review chairman including one or two assistants.	JAO or ALMA project executives
3	T0-7 weeks	Selection of the Review Board Members: *(see 6.2.1)*	Chairman
4	T0-7 weeks	Definition of a global review schedule and the location where the review will take place. *The review shall be conducted at a location mutually agreed upon by the parties whose attendance is required.*	Chairman
5	T0-6 weeks	Definition of review data package: - The basic data package is described in 3.2.2, 4.2.2, 5.3.3 and 5.4.3. Additional documents specific to the reviewed subsystem or product may be required.	System Engineering IPT in cooperation with subsystem IPT and contractor/ALMA partner(s)
6	T0-3 weeks	Collection and distribution of review data package to Review Board Members and briefing of the Board Members on the current status.	System Engineering IPT in cooperation with subsystem IPT and contractor/ALMA partner(s)/supplier
7	T0-3 weeks	Review of data package starts	Board Members
8	T0-3 weeks	Preparation and submittal to the chairman of queries (RID) on areas requiring further clarification. *The RID form is given in annex.*	Board members
10	T0-2 week	Preparation of RID answers *The answers shall be given in written form at the beginning of the review meeting to participants.*	contractor/ALMA partner(s)/supplier
11	T0-1 week	Delivery of the RID answers to the chairman (Alternatively, the RID answers can be presented	contractor/ALMA partner(s)/supplier

		at the Review Meeting)	
12	T0-1 week	Preparation of presentation material *The design results shall be presented in a comprehensive way. Copies of the presentation material shall be available for the Board Members.*	contractor/ALMA partner(s)/supplier
13	T0	Review Meeting *The results of the design and the answers to the RIDs shall be presented in a comprehensive way leaving enough time for discussion of details and answering of all questions.*	Chairman
		In order to save time, side sessions may be held on detailed questions, problems or subjects.	Chairman
		For questions which cannot be answered during the meeting 'Action Items' shall be defined and listed in an Action Item List including the due date and organization responsible for the performance of the action. Any Action Item shall be identified as critical or not. *Each working session (or day) shall end with a restricted meeting of the Review Board during which each member shall debrief on the status of the problems identified.* *Action items and RIDs shall be reviewed prior to the end of the meeting.* *At the end of the review meeting, the Chairman shall give a clear statement whether the review was passed successfully (with the exception of the listed action items) or whether the remaining unsolved problems/unanswered questions are too eminent for granting the approval.* *An overall readiness rating shall be assigned from the following three categories.* 1. *<u>Satisfactory</u>: No evidence of apparent or hidden risk has been identified. Normal, timely management activity will correct any identified or anticipated problems. No quality, cost or schedule compromises are expected. Manufacturing of deliverable hardware can begin.*	

2. *<u>Conditional</u>: Increased management attention is required to prevent or mitigate cost or schedule impact. Special teams and reviews are needed. Identified critical items must be addressed and completed before rating can be upgraded to "Satisfactory."*

<u>Unsatisfactory</u>: Substantial negative impact likely even with intensive management activity. Need immediate management action on both sides to determine the future course of action.

A general Minutes of Meeting shall be prepared including a list of participants.

14	T0+2 weeks	Distribution of the minutes of Meeting to the Board Members, design/development responsible and decision making authority. *The Final Review Report, the Action Item list and other relevant documents shall be attached to the Minutes of Meeting.*	Chairman
15		The Action Item list and recommendations shall be followed-up. *This follow-up includes distribution of action item reports to Board Members where expertise is required, the close-out of action items once they have been finished successfully and replies to the recommendations from the IPT to the decision making authority.* *The <u>completion</u> of any review is defined as resolution of <u>all major RIDs and critical action items</u> as per minutes of meeting of the actual review meeting.*	System Engineering IPT in cooperation with subsystem IPT

6.4 Review output and follow-up

6.4.1 Final Review Report

The final report issued by the Review Board should contain:

a. A detailed response to each review objectives and question identified in the review plan;
b. The Review Board assessment of the quality of the documentation submitted for approval;
c. A summary of major problems identified during the review (including references to the applicable RID number(s) and identified solutions);
d. A summary of the review group's recommendations for issues for which no agreement or solution has been found;
e. An annex containing all RIDs, including the supplier's response, and
f. A statement saying whether the review has achieved its overall objectives. If this is not the case, the report should contain recommendations on how to correct the situation.

6.4.2 Actions follow-up

The review objectives are achieved if the recommendations and related actions are satisfactorily closed or under control through normal work procedures. To ensure this, the following arrangements shall be made:

a. An entity inside the ALMA project team is designated to manage the actions arising from the review;
b. All actions, whether they arise directly from an agreement given by the contractor/ALMA partner/supplier project team or from recommendations accepted by the ALMA decision making authority, shall be managed in the same manner;
c. The persons responsible for actions should be duly informed and their agreement sought;
d. All action closures should be supported by documented evidence, and
e. The *major* RIDs and *critical* Action Items shall be closed to close the review.

Annex 1

RID template

Review Item Discrepancy

RID No.:

Level 1/2/3/4 Product:

Document title, volume, section, paragraph:

Document No.:

Originator, date, signature:

RID classification: **Major** □ **Minor** □

Discrepancy:

Suggested solution by initiator:

Contractor/ALMA partner response/corrective action:

Date:
Contractor/ALMA partner/supplier signature:

Board disposition: RID closed □ Date:

RID closed with actions □
Action Item reference: Date:

Annex 2

Guideline for Review Plan

A typical review plan contains the following information:

1. Review title and project
1.1 Exact name
1.2 Subsystem subject to review

2. Reference documents
List of project documentation applicable to the review

3. Review objectives
3.1 Purpose of review
3.2 Expected results

4. Review organization
4.1 Review process
4.2 Review participants
4.3 Review administration
4.4 Review Board organization

5. Review schedule
Description of activity flow from data package delivery up to and including review meeting and sequential dates

6. Documentation subject to review
6.1 Documents to be provided and examined for the review
6.2 Available reference documents
6.3 Summary description of item under review

7. Agenda for the presentation session
8. Logistics
8.1 Address and map
8.2 Suggested accommodation
8.3 Local contact

9. Annexes
9.1 RID form