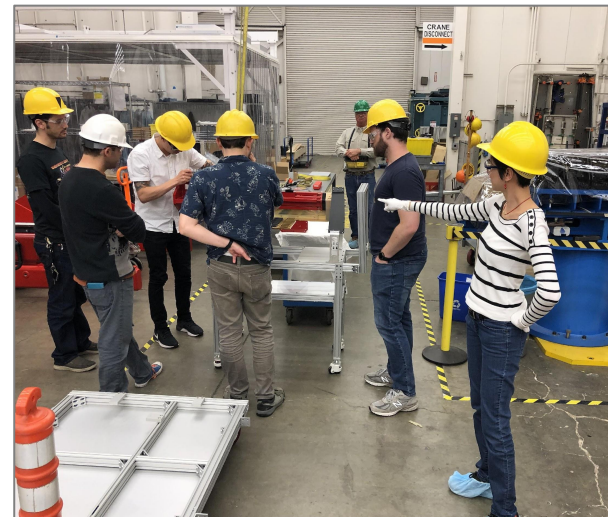


# Quality Assurance

**Jessica Aguilar (LBNL)**  
**CMB-S4 QA Manager**  
**she/her/hers**

**CMB-S4 Collaboration Meeting**  
**April 3-6, 2023**





# Quality Assurance Visits

Documents and Records  
Procurement

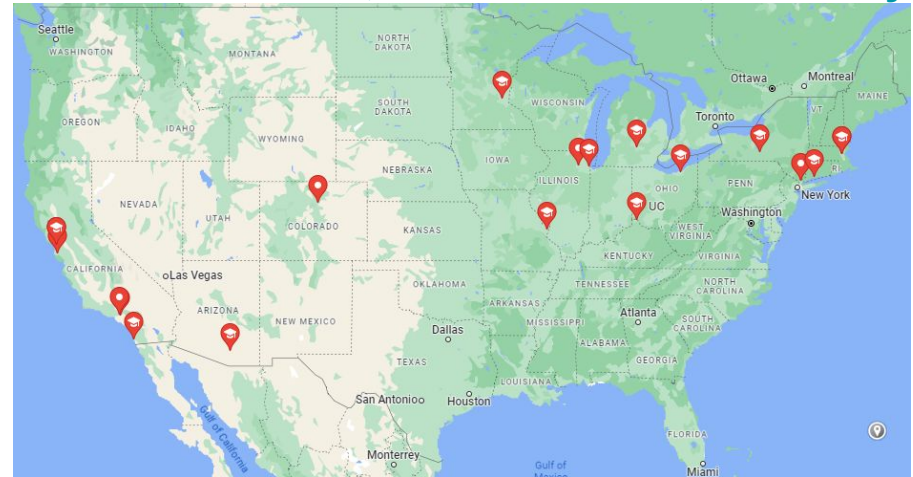
# Quality Assurance Status

- QA Plan is in place (State: Released, CMBS4-doc-602)
- Procurement Plan is near complete (State: In Work, CMBS4-doc-797)

Much is gained from simply talking together in person and seeing hardware in person.

I need to meet the people I'm working with, and see the facilities and processes in order to develop an appropriate level of QA for the project.

## CMB-S4 L1, L2 and L3 sites, USA only



# Sites Visits

Much is gained from simply talking together in person and seeing hardware in person.

Jessica & Bobby are planning to do just that at all sites. We want an informal in-person meet and greet, and to learn more about your work first hand.

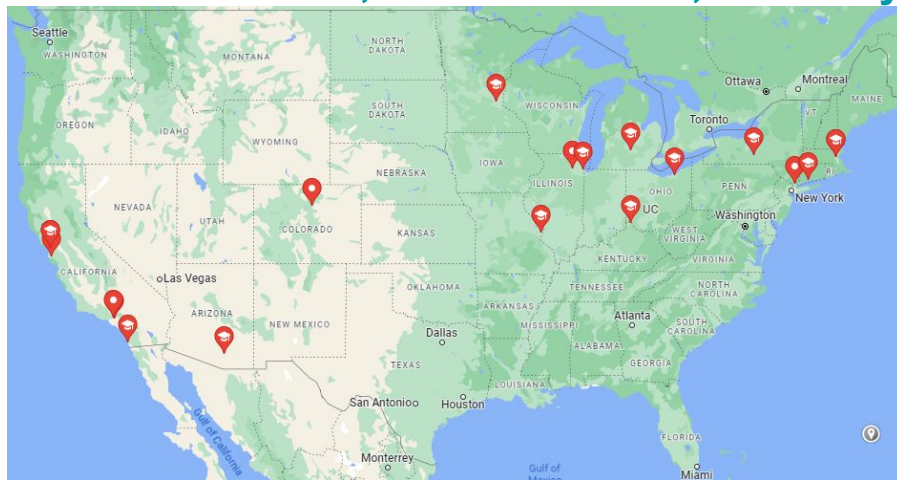
Planned trips:

- Modules Testing - May
  - FNAL
  - UIUC
  - WashU
- SAT Optics Development - June
  - SAO
  - Harvard

Future, not yet planned:

- SAT Telescope Mount Assembly
  - UMN
- South Pole Infrastructure I&C
  - ANL
  - UChicago

## CMB-S4 L1, L2 and L3 sites, USA only



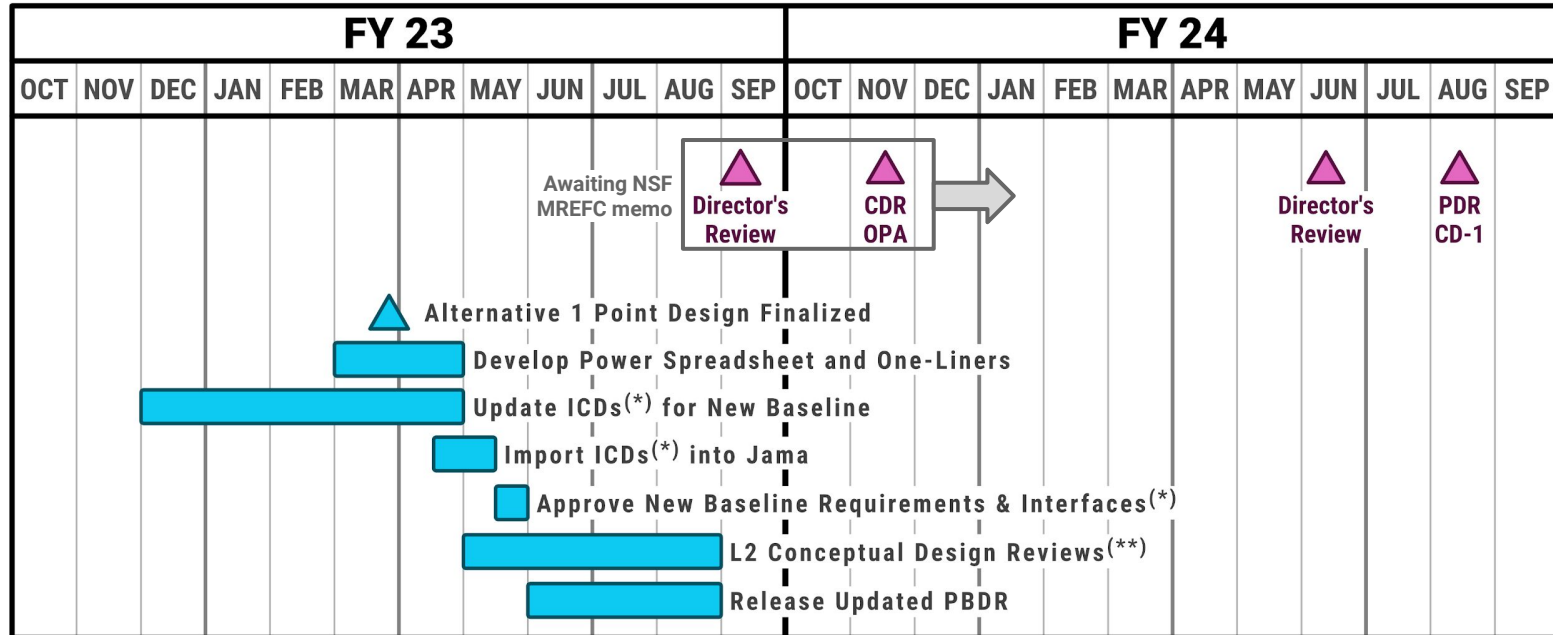


# Quality Assurance Visits

# **Documents and Records**

## Procurement

## Near-Term Systems Engineering Activities



(\*) **Level-2 ICDs and Requirements plus Level-3 CH-LAT, SP-LAT, and LATR ICDs and Requirements**

(\*\*) ~May: LAT, LATR, Sites / Summer: remaining WBS areas

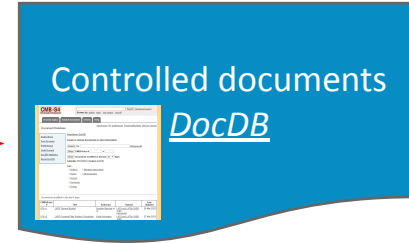


# CMB-S4 Uses Graded Approach To Determine Level Of Document Control Management

*Graded approach is applied in document control*

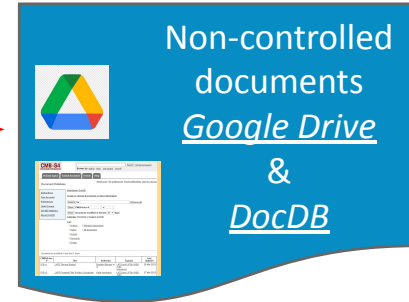
## Controlled Documents

Project Quality Assurance Plan  
Requirements Document  
Mechanical CAD models and drawings  
Engineering specification  
Statement of Work

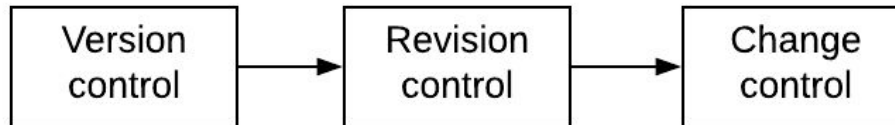


## Informal Documents

Meeting minutes  
Development of procedures



**For controlled documents, the control rigor increases with the progress of the project**



# Configuration Management Plan

Section 2 ... “Configuration management for the CMB-S4 Project is the process of creating, controlling, and maintaining project documents that detail and define the project’s approved scope, budget, and schedule baselines.”

	Doc: CMB-S4-doc-238-v5 Date: 08/11/2022 Status: Draft Page 4 of 10
Configuration Management Plan	

## 1. General Overview

This Configuration Management (CM) Plan describes the configuration management (CM) responsibilities and processes that support the design and implementation of the CMB-S4 Project. This plan will be revised as necessary to address additional levels of detail and rigor as the Project moves through the design, construction, and operations stages.

## 2. Purpose

The purpose of this CM Plan is to describe the method for controlling and maintaining the CMB-S4 Project technical scope, cost and schedule baselines. This includes identifying the individuals responsible for providing the configuration control, defining the set of configuration-controlled items, describing the change control process, and identifying the plan for configuration status accounting and verification.

Configuration management for the CMB-S4 Project is the process of creating, controlling, and maintaining project documents that detail and define the project’s approved scope, budget, and schedule baselines. Over the course of a project, revisions to requirements, specifications, cost and schedule, and other project components is natural. Configuration management helps to ensure that any changes or modifications to these items are properly analyzed, decided upon, recorded, controlled, and communicated.

The main goal of the CMB-S4 CM Plan is to ensure the successful development and delivery of the CMB-S4 approved project scope within the authorized budget and schedule. A CM Plan identifies and controls relationships with respect to design, fabrication, construction, installation, and testing of project-supplied systems, subsystems, and components. The Project recognizes the importance of maintaining clear, concise, and accurate records in order to maintain schedule, control costs, and provide as-built information for future operation, maintenance, and decommissioning activities. This CM Plan has been established to ensure that key functional organizations, both internal and external to the Project, are aware of the approved Project scope and their roles and responsibilities during the various project phases.

As a project evolves, the configuration management system will also evolve and encompass a wide range of controlled documents covering not just the scope, budget, and schedule, but also management and implementation plans and procedures that define how the project is executed.

This CM Plan is designed to ensure that:

- A Change Control Board (CCB) is established and functions according to the CM Plan guidelines;
- The project scope, cost, schedule, and risk documents are under version control and are self-consistent;
- Documentation is identified, released, and controlled;
- Changes to the baseline are evaluated and controlled; and
- Approved configuration changes are implemented and tracked.

## 3. Cost, Schedule, Risk, and Technical Scope Baseline Documents

The following set of documents describe the CMB-S4 scope, budget, and schedule baseline and are controlled using the CM processes defined in this document. This list is not exclusive or exhaustive and can be updated as the Project evolves.

Configuration Management Plan,  
[CMB-S4-doc-238](#).



# Configuration Management Plan

## Change Control Board (CCB)

Section 3 ... “**Documents** that impact any aspect of the Project’s approved **scope, budget, or schedule, require approval by the CMB-S4 Change Control Board.** However, control of project documents may be delegated depending on the magnitude of the change and the affected parties. **Appendix A identifies the required approvals for a range of documents or change impacts.** Release of project documents are announced at L1 meetings, CCB meetings, and the Project Technical Meeting to ensure all project members are notified.”

## CCB Voting Members

Title	Name
Project Director	<del>James Strait</del> John Corlett
Deputy Project Director	<del>Gil Gilchrist</del>
NSF Principal Investigator	John Carlstrom
DOE Project Manager (co-chair)	Matthaeus Leitner
NSF Project Manager (co-chair)	Jeff Zivick
Project Engineer	<del>Robert Bobby</del> Besuner
Technical Integration Scientist	Brenna Flaughner
Project Scientist	John Carlstrom
Instrument Scientist	John Ruhl
Data Scientist	Julian Borrill

# Project Baseline Definition Documents

## Appendix A items that list the Approval Authority as requiring the CCB approval

### Upcoming documents to Release that require CCB approval:

- WBS Level 1 Technical Requirements
- WBS Level 2 Technical Requirements
  - (not required for L3 and lower)
- Interfaces between WBS Level 2 Subsystems (ICDs)



Other individuals will be invited to participate in CCB meetings as necessary for their technical or programmatic expertise.

#### 8. Appendix A

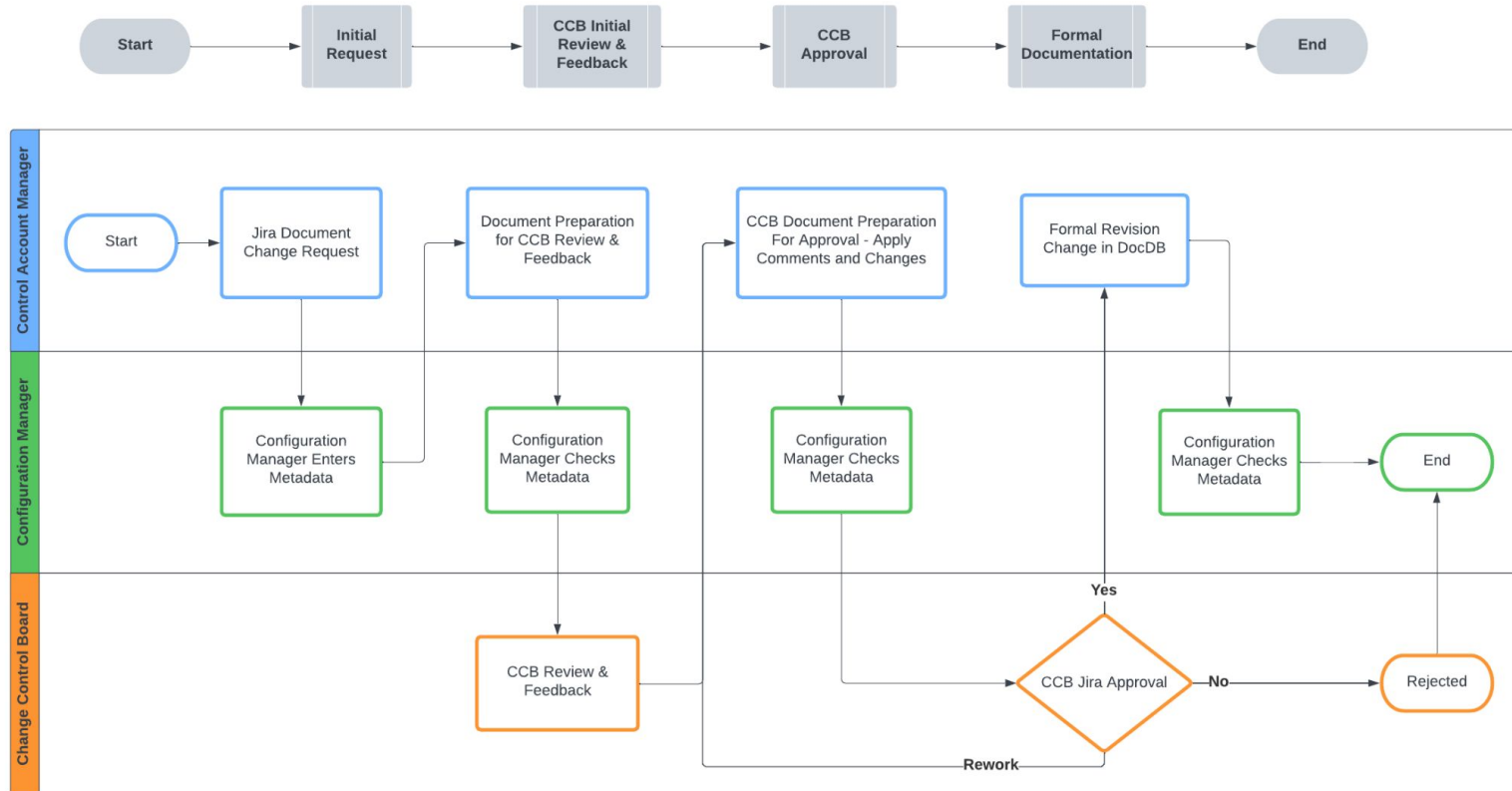
CMB-S4 implements a graded approval approach. Approval of project documents may be delegated depending on the impact of potential changes in the document and the affected parties. The following table identifies the required approvals for a range of documents or change impacts. Release of project documents are announced at L1 meetings, CCB meetings, and the Project Technical Meeting to ensure all project members are notified.

Changes to WBS Level 2 and below requirements or interfaces are managed by the individual L2 Science Leads and Control Account Managers together with the Project Engineer and the Lead System Engineer as long as the project scope, cost, and schedule for defined work packages are not impacted. If scope, cost, or schedule of the project or other L2 subsystem are impacted CCB approval is required.

Impact of Change	Approval Authority
Systems Engineering	
CMB-S4 Science Goals	CCB
CMB-S4 Science Requirements	CCB
CMB-S4 Measurement Requirements	CCB
WBS Level 1 Technical Requirements	CCB
WBS Level 2 Technical Requirements	CCBPE-Instrument Scientist, Lead SE, L2 Manager, L2 SE, CAM
WBS Level 3 Technical Requirements	PE, Instrument Scientist, Lead SE, L2 Manager, L2 SE, CAM
WBS Level 4 and Lower Technical Requirements	L2 Manager, L2 SE, CAM
Interfaces between WBS Level 2 Subsystems	CCBPE-Instrument Scientist, Lead SE, L2 Managers, L2 SEs, CAMs
Interfaces between Elements at WBS Level 3	PE, Lead SE, L2 Manager, L2 SE, CAM
Interfaces between Elements at WBS Level 4 and Lower	L2 Manager, L2 SE, CAM
Physics and Engineering	
Physics and Engineering Notes	Lead Engineer, L2 Manager or CAM
Construction Drawings	Lead Engineer, L2 Manager or CAM
Technical Procurement Documents	Lead Engineer, L2 Manager or CAM
EH&S Related Notes	EH&S Site Manager, Lead Engineer, L2 Manager or CAM
QA Related Notes	QA Site Manager, Lead Engineer, L2 Manager or CAM

Configuration Management Plan,  
[CMB-S4-doc-238](#).

# Project Baseline Definition Document - Release Process



# Project Baseline Definition Document

## - Release Process

Governed by the Configuration Management Plan, [CMBS4-doc-238](#). Appendix A: Lists Impact Of Change & Approval Authority.

The upcoming document release process will be in Jira and is In Work.

This will allow CCB approval votes in JIRA, all in one place. It also meets our history and traceability requirements.

**Go Live: May**

Help Center / Test CCB General

### Test CCB General

Welcome! You can raise a request for Test CCB General using the options provided.

What can we help you with?

Document Only

Raise this request on behalf of \*

Jessica Aguilar (aguilarjessica@dir.cmb-s4.org)

Jira Ticket Name \*

DocDB#, Document Name (Example: 602, QA Plan)

DocDB Number \*

WBS Number

Ex: L2 DAQ document would be 1.08

Current DocDB Revision

DocDB Revision

web link

Editable Document(s)

web link

Detail of Changes

Describe the changes made to the document.

# Project Baseline Definition Document Have These Four Indicators

Only documents released in DocDB and released models can be shared with vendors or used in fabrication

## HelloSign Audit Trail

CMB-S4 Document 238-v3

### CMB-S4 Configuration Management Plan

**Document #:** CMB-S4-doc-238-v3  
**Document type:** Process/Procedure  
**Submitted by:** Jeff Zivick  
**Updated by:** Jeff Zivick  
**Document Created:** 27 May 2020, 15:19  
**Contents Revised:** 13 Apr 2021, 19:54  
**Metadata Revised:** 11 May 2021, 17:13

Update Document

Update Metadata

Add Files

Create Similar

Watch Document

#### Abstract:

This Configuration Management (CM) Plan describes configuration management (CM) responsibilities and that support the design and implementation of the C Project.

#### Files in Document:

- CMB-S4-doc-238-v3\_CONFIGURATION\_MANAGEMENT\_PLAN.pdf
- CMB-S4-doc-238-v3\_CONFIGURATION\_MANAGEMENT\_PLAN.docx (913.3 kB)

#### Other Files:

Get all files as tar.gz, zip.

#### Topics:

- PM:CD-1 PM Documents

**Released**

#### Authors:

- Jeff Zivick



## Approval Signatures

### CMB-S4 CONFIGURATION MANAGEMENT PLAN CMB-S4-doc-238-v3

Author	Role/Organization	Date
Jeff Zivick	NSF Project Manager (U. Chicago)	3/29/2021

#### Revision History

Version	Revision Date	Initial Version	Author/Notes
0.A	29-05-2020	Initial Version	
0.B	09-11-2020	Updated to reflect LBNL Lead DOE Laboratory	
0.C	03-03-2021	Updated with formatting, ready for CCB approval.	

HELLOSIGN

Audit Trail

**TITLE** SIGN CMB-S4-doc-238-v3 CONFIGURATION MANAGEMENT PLAN  
**FILE NAME** CMB-S4-doc-238-v3 ...NAGEMENT PLAN.pdf  
**DOCUMENT ID** 214c9b0a3716243ec308658701628f54cf725fe

#### APPROVALS

Name	Project Role	Signature	Date
John Corlett	Project Director	<i>John Corlett</i>	04/07/2021
Murdock Gilchriese	Deputy Project Director	<i>Murdock Gilchriese</i>	04/07/2021
John Carlstrom	NSF Principal Investigator	<i>John Carlstrom</i>	04/07/2021
Matthaeus Leitner	DOE Project Manager	<i>Matthaeus Leitner</i>	04/07/2021
Jeff Zivick	NSF Project Manager	<i>Jeff Zivick</i>	04/07/2021
Robert Bessner	Project Engineer	<i>Robert Bessner</i>	04/07/2021
Brenna Flaughner	Technical Integration Scientist	<i>Brenna Flaughner</i>	04/07/2021
John Ruhl	Instrument Scientist	<i>John Ruhl</i>	04/07/2021
Julian Borrell	Data Scientist	<i>Julian Borrell</i>	04/07/2021

Signature to John Corlett (jcorlett@lbl.gov), Gil (mgilchriese@lbl.gov), John Carlstrom (jcarlstrom@lbl.gov), Matthaeus Leitner (mleitner@lbl.gov), Jeff Zivick (jzivick@uchicago.edu), Brenna Flaughner (brenna@lbl.gov), John Ruhl (ruhl@case.edu) and Julian Borrell (jborrell@lbl.gov) from mleitner@lbl.gov 9.115

Matthaeus Leitner (mleitner@lbl.gov) 9.115

Matthaeus Leitner (mleitner@lbl.gov) 9.115

Gil Gilchriese (mgilchriese@lbl.gov) 211.137

Doc ID: 214c9b0a3716243ec308658701628f54cf725fe

Doc ID: 214c9b0a3716243ec308658701628f54cf725fe

## HelloSign Stamp

# We Are Working On Enhancements To Project Infrastructure

- AoDoc - New Document Control System (incl. document approval capabilities, supporting Google as well as Microsoft documents, automatic ownership transfer)
- Work on project infrastructure is progressing in the background and limited due to funding
- We hope to enroll first beta users after summer

CMB-S4 Document Control Center

NEW

Search in Drive

Shared with me > CMB-S4 Team Drive > Testing > Team Folder

Name	Owner	Last modified
Test Google Doc	admin AODocs	Jul 12, 2022 Anna Ho
Test.xlsx	admin AODocs	12:21PM me

New folder

- File upload
- Folder upload
- Google Docs
- Google Sheets
- Google Slides
- Google Forms
- Word
- Excel
- PowerPoint
- More

1 selected

Name	Owner	Last modified	File size
Test Google Doc	admin AODocs	Jul 12, 2022 Anna Ho	—
Test.xlsx	admin AODocs	12:21PM me	7 KB

Open File

Hidden Document Data

Category Code	Title 1	Title 2
CM0101	CMB-S4 Project Management & Systems Engineering	General

Attachments

Document with Microsoft Files	Major Revision	Minor Version
Document with Microsoft Files	A	8

1 test2.xlsx 10.77 KB

Slide 14





# Quality Assurance Visits Documents and Records **Procurement**

# Procurement Preparation

*All documents shall be released before share with vendor*

## Vendor Selection, Qualification

- Supplier quality evaluation survey
- Other bid criteria

## Procurement package

- Technical specifications
- CAD models
- Drawings
- Statement of work
- Required testing, inspection
- Acceptance criteria list
- Other special requirements (Cleanliness, Handling, Shipping)
- Hold points for approval: Manufacturing, Assembly & Shipping Reviews

AL-1000-1700 Rev. A Doc. Status: Working Page 38 of 48

VERIFICATION POINT	ASSEMBLY TECHNICIAN (Sign & Date)	RECORDED INFORMATION	CAL. INFO	VERIFICATION BY (Sign & Date)
1		Verify all pole and magnet data has been provided	NO	
2		Torque Spec for M6x5 screws holding each of the six (6) keeper assemblies together	TOOL: B	
3		Verify data showing Z-alignment of Keeper Assembly has been provided	LAST CAL DATE	
4		Verify data showing Keeper bottom surface flatness & height, over part C does not protrude	NO	
5		Verify Magnet		

AL-1000-1700 Rev. A Doc. Status: Working Page 39 of 48

### 7 WORK INSTRUCTIONS

#### 7.1 Setup and Overview

Completion of this procedure will provide six (6) assembled, magnet system keepers alternatively referred to as magnetic modules.

7.1.1 Enter the following information on the Verification Signoff Sheet:

7.1.1.1 Work instructions number and revision

7.1.1.2 Start date

7.1.1.3 Ambient temperature at assembly start

7.1.1.4 Serial numbers for all component parts to be used in the assembly

7.1.1.5 Calibration date for all calibrated tools used during assembly

7.1.2 Ensure magnet and pole pieces have been measured as required by the HE Magnetic System ACL (LC-1000-1707) prior to installation.

#### 7.2 Special Machining Instructions for Keeper Components

The precise alignment of the tabs on the left keeper versus the right keeper is absolutely critical to the final assembly process. Thus, to ensure that the spacing between the left and right magnet tabs are consistent, they are machined simultaneously. The design of the Keeper Stock components (29L400, 29L400 & 29L410) is not accident, it is an effort to be made simultaneously on the left and right sides of the keeper. See: **VERIFICATION POINT 1**

**VERIFICATION POINT 1**

The precise alignment of the tabs on the left keeper versus the right keeper is absolutely critical to the final assembly process. Thus, to ensure that the spacing between the left and right magnet tabs are consistent, they are machined simultaneously. The design of the Keeper Stock components (29L400, 29L400 & 29L410) is not accident, it is an effort to be made simultaneously on the left and right sides of the keeper. See: **VERIFICATION POINT 1**

**Figure 6:** Picture to keep 3 keeper parts flat (old design). 50 µm shim should now be included under part C. Attach the keeper sides to keeper base using the figure below for tightening order. Tighten all screws to 36.6 Nm (27 ft-lb).

7.3.2 7.3.2.1 Using the figure below for tightening order, tighten all screws to 36.6 Nm (27 ft-lb).

AL-1000-1700 Rev. A Doc. Status: Working Page 3 of 18

## 2 ACCEPTANCE CRITERIA LISTING FORM

Level of Crg.	High	Medium	Low
Prepared by:			
Email:			
Phone:			
Location:			
Date:			
Part Name:	HE SXR Upper Entrance Module Assy	Quantity:	1
Part Number:	29L377	SN (if applicable):	29L377
SLAC NCR Reviewer:	ACL Verification Plan #	LC-1000-1998	
Additional Remarks:	29L377 is comprised of: 29L395 - HE SXR Magnet 29L387 - HE SXR Entrance Keeper C 29L394 - HE SXR Pole 29L382 - HE SXR Entrance Keeper Assy 29L385 - HE SXR Entrance Keeper A 29L396 - HE SXR End Assy 1 (Small) 29L399 - HE SXR End Assy 2 (Medium) 29L402 - HE SXR End Assy 3 (Large) 29L412 - HE SXR Magnet Clamp Block 29L411 - HE SXR Keeper End Plate 29L413 - HE SXR End Pole		



# Questions?