Quality control for the SVT

L. Gonella

ePIC SVT meeting

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Introduction

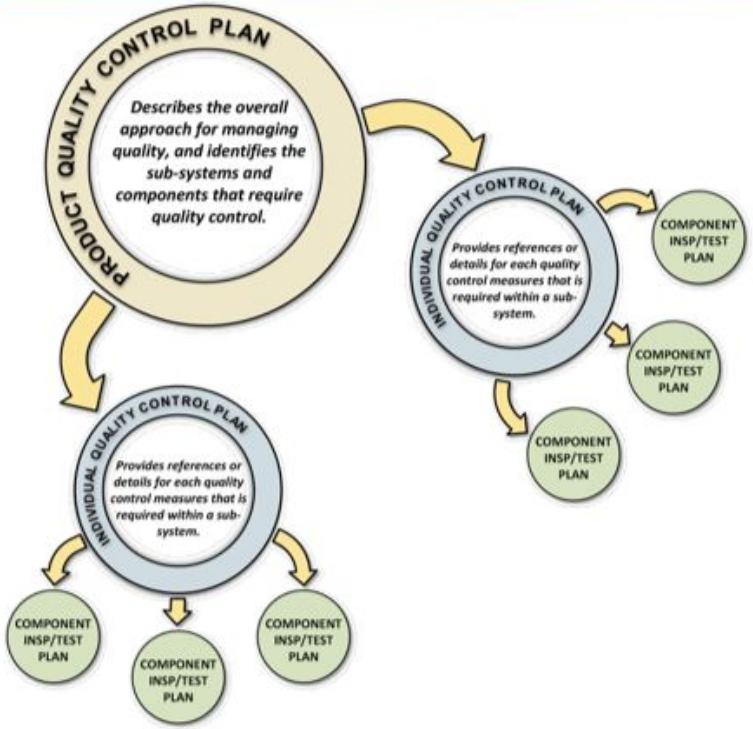
Every production component for the SVT detector will undergo Quality Control to ensure the production process delivers components matching the specifications

Within the SVT, we will need to define QC procedures for each component and document them

The EIC project has set up a framework for QC that the ePIC detectors need to adhere to
    This is based on a hierarchy of documents (see next slide)

We will work directly within the project QC framework to develop and document the QC for SVT components

Hierarchy of Quality Assurance Documentation



Quality assurance planning documents exist in a hierarchy, where the highest level documents provide general guidance and lower level documents become increasingly specific.

1. **Product Quality Control Plan**
   Describes the overall approach for managing quality assurance issues, and identifies the systems, sub-systems, and components that will require quality control measures.
2. **Individual Quality Control Plan**
   Provides references (or details) for each quality control measure that is required by within a sub-system or collection of components.
3. **Component Inspection & Test Plans**
   Provide detail methods, measures, and processes for assuring quality control for individual components throughout their development lifecycle.

Hierarchy of Quality Assurance Documentation

Product Quality Control Plan (PQCP)

Overarching document for the whole detector, **maintained by the project** (Walt Akers)

Individual Quality Control Plan (IQCP)

One document per single Level-3 or Level-4 (project) WBS sub-system

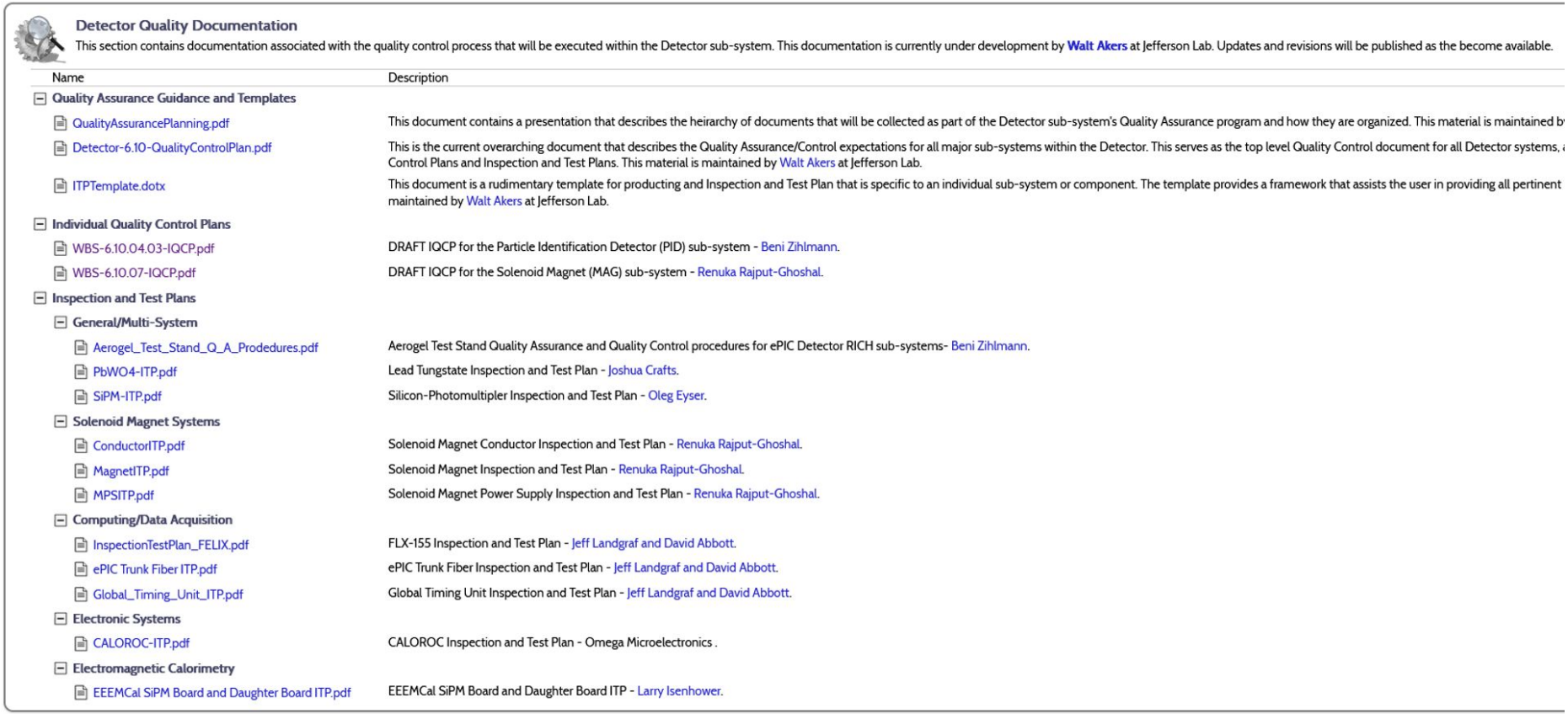
SVT - WBS 6.10.03.01 IQCP - **Vallary + Laura**

Component Inspection & Test Plans (ITP)

One document per SVT component that needs QC

To be prepared by the SVT

The EIC Detector Quality Documentation can be found at https://eic.jlab.org/Detector/



Detector Quality Documentation

This section contains documentation associated with the quality control process that will be executed within the Detector sub-system. This documentation is currently under development by **Walt Akers** at Jefferson Lab. Updates and revisions will be published as the become available.

Name	Description
Quality Assurance Guidance and Templates	
QualityAssurancePlanning.pdf	This document contains a presentation that describes the heirarchy of documents that will be collected as part of the Detector sub-system's Quality Assurance program and how they are organized. This material is maintained b
Detector-6.10-QualityControlPlan.pdf	This is the current overarching document that describes the Quality Assurance/Control expectations for all major sub-systems within the Detector. This serves as the top level Quality Control document for all Detector systems, Control Plans and Inspection and Test Plans. This material is maintained by Walt Akers at Jefferson Lab.
ITPTemplate.dotx	This document is a rudimentary template for producting and Inspection and Test Plan that is specific to an individual sub-system or component. The template provides a framework that assists the user in providing all pertinent maintained by Walt Akers at Jefferson Lab.
Individual Quality Control Plans	
WBS-6.10.04.03-IQCP.pdf	DRAFT IQCP for the Particle Identification Detector (PID) sub-system - Beni Zihlmann.
WBS-6.10.07-IQCP.pdf	DRAFT IQCP for the Solenoid Magnet (MAG) sub-system - Renuka Rajput-Ghoshal.
Inspection and Test Plans	
General/Multi-System	
Aerogel_Test_Stand_Q_A_Prodedures.pdf	Aerogel Test Stand Quality Assurance and Quality Control procedures for ePIC Detector RICH sub-systems- Beni Zihlmann.
PbWO4-ITP.pdf	Lead Tungstate Inspection and Test Plan - Joshua Crafts.
SiPM-ITP.pdf	Silicon-Photomultipler Inspection and Test Plan - Oleg Eyser.
Solenoid Magnet Systems	
ConductorITP.pdf	Solenoid Magnet Conductor Inspection and Test Plan - Renuka Rajput-Ghoshal.
MagnetITP.pdf	Solenoid Magnet Inspection and Test Plan - Renuka Rajput-Ghoshal.
MPSITP.pdf	Solenoid Magnet Power Supply Inspection and Test Plan - Renuka Rajput-Ghoshal.
Computing/Data Acquisition	
InspectionTestPlan_FELIX.pdf	FLX-155 Inspection and Test Plan - Jeff Landgraf and David Abbott.
ePIC Trunk Fiber ITP.pdf	ePIC Trunk Fiber Inspection and Test Plan - Jeff Landgraf and David Abbott.
Global_Timing_Unit_ITP.pdf	Global Timing Unit Inspection and Test Plan - Jeff Landgraf and David Abbott.
Electronic Systems	
CALOROC-ITP.pdf	CALOROC Inspection and Test Plan - Omega Microelectronics .
Electromagnetic Calorimetry	
EEEMCal SiPM Board and Daughter Board ITP.pdf	EEEMCal SiPM Board and Daughter Board ITP - Larry Isenhower.

SVT components that undergo QC

List provided by the SVT for the Product Quality Control Plan (PQCP)

The following components are subject to quality control

- Sensors: wafer probing of sensors (wafer-scale and EIC-LAS) prior to thinning and dicing,
- Ancillary ASICs: wafer probing prior to thinning (if any) and dicing,
- Flexible Printed Circuits (FPCs): electrical tests for the inner barrel, outer barrel, and disks.
- Assembled inner-barrel (half-)layers and shells (at a minimum electrical functionality) at assembly sites.
- Outer barrel modules (assemblies each consisting of two EIC-LAS, two ancillary ASICs, a bridge FPC).
- Outer barrel staves (electrical functionality, possibly mechanical and thermal) at assembly sites.
- Disk modules (assemblies each consisting of an EIC-LAS, an ancillary ASIC, and a bridge FPC),
- Half-disks (electrical functionality, possibly mechanical and thermal) at assembly sites.
- Readout boards - interface boards, control boards, power boards, (fiber) aggregator boards - following assembly and prior to shipping to BNL.
- Support cylinder and cones following production at production sites,
- Reception tests of IB, OB staves, half disks at BNL prior to installation (electrical).
- Global integration tests.

Component Inspection & Test Plans (ITP)

This is where we define our QC procedures

The inspection and test plans (loosely speaking) first order just go over the **specifications/requirements**, the **process** to measure those, the **setups** with pictures/photos, what **EH&S** considerations are applicable for the inspections, and how we **document/keep records**.

They are written from the "scientist view"

ITP documents are a case of “less is more”, keep it brief and to the point, no need for many details

Steps for release of QC procedures & ITP documents

WPCo + people in their WP + Laura draft QC procedures for component(s) in their WP and describe them in the ITP document(s)

Drafts of ITP documents are reviewed internally by the SVT DSC

> This is an important step to make sure that each item is QC-ed as needed, not less but also not more

Feedback → rework → approval

Release of ITP document to project

Current status and next step

Development of **sensor QC** (i.e. wafer probing of MOSAIX and EIC-LAS) and **module QC** procedures and ITP documents is ongoing

- Current draft presented today

The aim is to have most QC procedures and ITP documents ready by the SVT Preliminary Design Review 2 (PDR2) at the end of January 2026