ACD Tests: General steps

• ACD tests can be divided in the following categories:

  - tests during and after the fabrication of ACD components
  - tests of all components before going into ACD assembly
  - test of ACD as a unit to check compliance with the Level III Specifications
  - functional tests of ACD in the LAT assembly
Parts and subassembly inspection and testing

• Inspection is performed on each component: mechanical, electrical and detector parts
• Mechanical components are checked for compliance with drawings and the quality of fabrication
• Electrical components are inspected for compliance with production technology, parts used for fabrication, and for output parameters meeting the specifications
• Receiving inspection of detector parts include checking of:
  - raw scintillator data sheets,
  - grooving quality and possible contamination (e.g. from oil in the environment where grooving was done),
  - quality of fiber gluing
  - scanning of PMT running sheets (100 hour burn in)
  - quality of tile assembly (wrapping, PMT attachment, etc.)
Tests of tile assemblies (scintillators through PMT with HV)

- Each component is subject for the careful tests of meeting the requirements before going into ACD assembly:
  - vibration test of assemblies for ETU
  - cold and hot tests of electronic assemblies for ETU and flight unit
  - pump down test of ETU assemblies
  - muon test of efficiency. Each flight scintillating tile will be a subject for the test of light yield. This measurement is planned to be done using naturally occurring sea level muons. A single tile test takes about 1 day, when a flight tile will be put into a test setup with independent scintillators forming the trigger
- The test procedures for different components will be developed as separate documents
Tests to prepare ACD for Assembly into LAT
(ACD functional test)

• Assume that ACD subassemblies meet all requirements given in ACD Subsystem Specification (already tested)
• Functional tests for assembly in LAT:
  - test Trigger Primitives Logic: will be implemented by using test signals in each ACD channel, simulating all possible event configurations
  - accumulate and review pulse height distributions for all tiles (both channel of electronics). The task of this test is to determine and adjust the settings of the VETO thresholds. It requires the whole ACD unit to be capable of being turned on its side to expose each ACD side to the vertical flux of muons. The electronics will be configured so that every cosmic ray becomes a “trigger”. We also require a mode in which an external trigger provided by an independent scintillator placed on the tile being tested can be used.
ACD functional testing in the LAT assembly

- The test described in previous chart can be repeated at any time during I&T as part of the functional testing procedures.
- The full set of ACD functional tests will require reorientation of ACD. For all tests the single rates from the tiles will be used as a parameter to be monitored. Deviation of these rates from nominal would provide a warning of malfunctioning or light leak.