The latest successful heritage are the AVIM connectors present on Curiosity, landed on Mars on 06-aug-2012 on the ChemCam [6] instrument.

To be noted, the presence on ELC [4], Atlid, Exomars, James Webb telescope and hopefully on many other mission.

The Mini-AVIM has been developed for space applications using the same anti-vibration system as the AVIM and using the same ferrule technology. It passed the evaluation and will be qualified and specified later this year. No heritage can be tied to this connector yet, but other evaluation have already been done[6].

fig. 3 Mini-AVIM connection

Updated information on public space application can be found on Diamond website at http://www.diamond-fo.com/en/markets_space_application.asp .

III. ESCC Connectors Standards

The work presented here is part of a larger scheme by ESCC to write specifications allowing project manager to properly implement fiber optic technology for their project. For more information on these standards, please refer to the ESCC website at https://spacecomponents.org/ and for the specification details to https://escies.org/ .

The scope of the present work is the specification of optical fiber connector sets. If possible complete assemblies (patchcords and pigtails) built with fiber and cable should be tested too. As fiber and cable do not dispose of specification and qualification method as present in IEC standard, only the connector set should be qualified here.

The following figure corresponds to the IEC telecom standards for optical fibers and connectors.

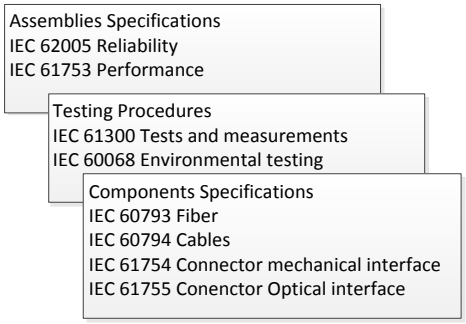

fig. 4 IEC commercial standards overview

A. ESCC Connectors standards

The ESCC specification follow three levels consisting of Basic, Generic and Detail specifications that differs from IEC as shown below.

Basic specifications are applicable to components or groups of components and provide common processes and rules.

Generic specifications provide requirements and test methods applicable to components or groups of components.

Detail specifications provide a description of specific components or ranges of structurally similar components and give performance requirements, conditions of test, and approval, quality conformance and inspection requirements.

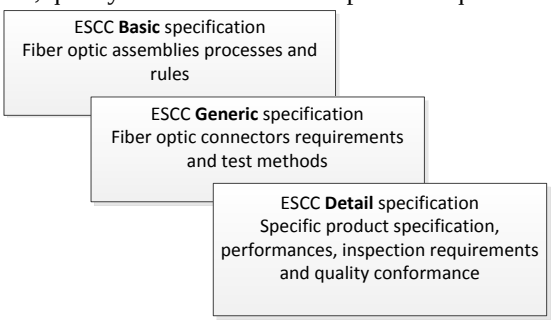

fig. 5 ESCC Level 2, 3 and 4 documents

Diamond interpretation in the range of optical connector set and optical fiber assemblies is as follow:

1) Basic specification: 2263010:

The Basic specification serves to define the evaluation test plan for **optic fiber assemblies** and the connector set. We evaluate that this corresponds to a reliability study in the IEC sense (62005). It is normally performed to evaluate failure modes and level and to fix the operational environment.

2) Generic:TBD

The Generic specification defines the qualification test plan and tests procedures. It corresponds to IEC Tests and measurements (61300) standards and the IEC performance (61753) standards for **optic fiber assemblies**.

3) Detail: AVIM (TBD), Mini-AVIM (TBD)

The Detail specifications defines the **connector sets** performance, geometry and include an annex with various performance obtainable depending on fiber/cable configuration. Diamond propose a fiber/cable structure to help standardize these assemblies.

The standard draft will be closed with this activity end 2012 and will be published early 2013 according to ESCC procedure.

IV. Evaluation Results

A. Tested configuration

As testing an optical fiber connector requires the use of a fiber and a cable, a study was performed to define which ones should be used.

A polarization maintaining (PM) fiber shows the optical requirement of a SM fiber and the sensitivity to stress similar to MM fibers and was picked for these tests. A good portion of the optical connectors for space are required with PM fibers. The Fujikura SM.15-P-8/125-UV/UV-400 was chosen due to the availability in large enough quantities.

A loose tube, OD=1mm in PEEK Victrex 450G was used as cable. Assemblies using this solution had been already qualified for space applications.