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**Esterline Connection Technologies**  
SOURIAU and SUNBANK

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May, 20th 2015

**Reference:** HD-15-L-009

**Subject:** Contact Retainer Test on D-Sub rectangular connector

Dear Mr Sauveplane,

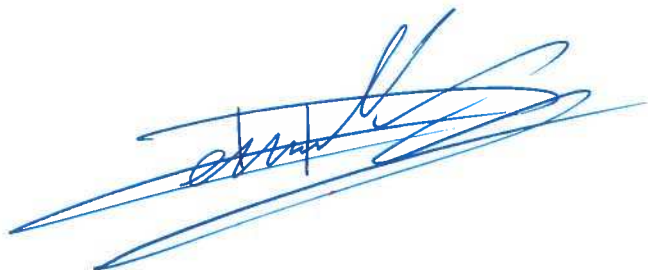
Please find herewith the file arguing for our derogation request regarding the subject operation.

We remain at your disposal should you need any additional information.

Yours Sincerely,



P. GERARD  
ESCC Chief Inspector



H. DEMAILLY  
Product Manager

## 1. SUBJECT

Change in the process of controlling the ability of the clips to retain the contacts.

## 2. PERIMETER

### a. Product

The following products are concerned by the subject request:

- Type D\*MA connectors, specification ESA/ESCC 3401/002
- Type D\*BMA connectors, specification ESA/ESCC 3401/020
- Indirectly, Type D\*M high density connectors, specification ESA/ESCC 3401/001 variante 02

### b. Operation

The subject operation is the *Contact Retainer Test*, mentioned in the specification ESA/ESCC 3401 §9.3, which role is to check the presence of the clips inside the insert and their ability to retain the contacts. The operation has also tacitly been used to check the non-obstruction of the contact cavity by glue and the unrestrained functioning of the clip.

## 3. BACKGROUND

### a. Situation

Required by the ESA/ESCC specification:

- ESA/ESCC 3401 specification, §9.3: "A contact or special gauge shall be inserted successively into each contact cavity, verified manually for positive retention, then released and removed. If the contact or gauge cannot be inserted manually, or if there is no retention, the connector shall be rejected."
- ESA/ESCC 3401 specification, §5.2.1 and ESA/ESCC basic specification 2053400: 100% naked eye visual inspection + sample inspection with binocular microscope.

Carried out by SOURIAU:

- A contact is inserted successively into each contact cavity, verified manually for positive retention, then released and removed, any insertion or retention defect resulting in the rejection of the connector. This operation is also carried out on insulator parts of #22 spill version connectors.
- 100% binocular microscope inspection following the *Contact Retainer Test*
- 100% electrical test

## **b. Observation**

Although optimized, the subject operation requires a substantial operating time, of which industrial and financial implications could jeopardise the viability of the activity.

Besides, it has been noticed that:

- The process itself can generate new defects on the clips (deformation or breakage of the clip's flaps, damage to the insulator's chamfer lead)
- The process cannot detect all the possible defects inside the cavity (clip's shape defects, insulator assembly defect)

For reliability and efficiency enhancing purposes, several studies have been opened:

- Process industrialization:  
Several studies have been carried out along with specialized companies across the past years, none of them resulting in viable solution complying with space industry requirements. Any such solution would nevertheless have led to a DCR for suppressing the manual part of the control.
- Design / Assembly process modification:  
Several ongoing studies are leading to mid-term evolution and qualification.

## **c. Study**

A systematic double check (addition of an independent binocular microscope inspection) has been set in place since 2011 and evaluated from the 07/20/11 to the 11/30/11 in order to assess the relevancy of the retention manual inspection.

This binocular microscope control enables the detection of a wider span of defects (position of the clip, clip's flap deformation, glue migration) without inducing any risk of damage on the connector.

Over this evaluation period, the process has been implemented in this way:

- Information to the production manager of every defect detected during the manual retention test
- Defective assembly back in the production batch under the manager remote follow-up
- Additional systematic binocular microscope control, without prior notice of the potential presence of defective assembly in the production batch.

Both controls were then fully independent and the experience was carried out under control.

Hereunder the results of this study:

			Detection : Manual retention test	Detection : Binocular microscope
Controlled insulators	3501	NC Insulators	3 (0.0857%)	3
Controlled cavities	132027	NC Cavities	5 (0.0038%)	5

Between December 2014 and April 2015, the operation has been renewed with the following results:

			Detection : Manual retention test	Detection : Binocular microscope
Controlled insulators	779	NC Insulators	0 (0.0%)	0
Controlled cavities	39415	NC Cavities	0 (0.0%)	0

### Conclusion:

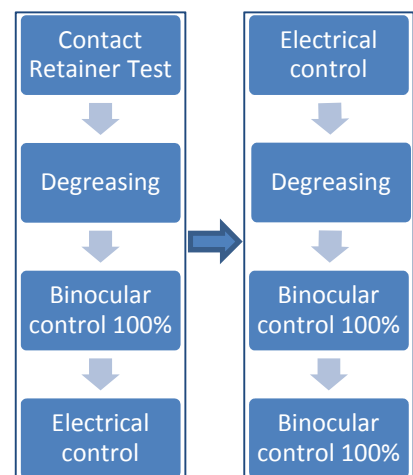
Every defect recorded during the manual retention test has also been noticed during the binocular microscope inspection. The reliability of the two processes is considered at least equivalent. Given the potential defects generated by the manual test and the increased capacity of defect detection offered by the binocular microscope inspection, the sole implementation of the latter is preferable.

## 4. PROPOSAL

### PID:

Replacement of the manual retention test by an additional and independent binocular microscope inspection:

- Remove the manual clip retention test.
- Maintain the 100% binocular microscope inspection.
- Strengthening procedure: add an independent 100% binocular microscope inspection, processed by a different operator.



### ESA/ESCC 3401:

Issue of a DCR.