EG 2039-2008

# SMPTE ENGINEERING GUIDELINE

# Inspection and Cleaning Processes for the 304M Hybrid Connector



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Approved October 30, 2008

## Foreword

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SMPTE Engineering Documents are drafted in accordance with the rules given in Part XIII of its Administrative Practices.

SMPTE Engineering Guideline EG 2039 was prepared by Technology Committee S22.

## Intellectual Property

At the time of publication no notice had been received by SMPTE claiming patent rights essential to the implementation of this Engineering Guideline. However, attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. SMPTE shall not be held responsible for identifying any or all such patent rights.

## Introduction

This section is entirely informative and does not form an integral part of this SMPTE Engineering Guideline. It is recognized that maintenance and cleaning of the cable / connector infrastructure is of primary concern to users. Fiber optic contacts need to be inspected and kept clean, but maintenance is simply a matter of regular inspection and cleaning.

Most fiber optic problems can be attributed to the fiber optic contact becoming dirty; therefore most fiber optic connectors are designed to make the cleaning of the fiber optic contacts as easy as possible.

Usually with fiber optic assemblies you first "inspect the end face and if it isn't dirty leave it alone". However if the fiber is observed to have any dust, smudges, or oils, it needs to be cleaned.

The Inspection and cleaning process is normally simple and quick, with minimal tooling required, as is shown in this Engineering Guideline. If inspection equipment is not available, the cleaning procedures need to be implemented.

Manufacturers of the 304M connector will recommend and / or provide their preferred inspection and cleaning equipment, together with cleaning and inspection instructions. However this document provides examples of the some of the solutions currently available. Users are advised to contact the connector manufacturer for more specific cleaning instructions.

# 1 Scope

This guideline describes an inspection process and a number of solutions for cleaning the end faces of 304M fiber optic contacts, when fitted into a connector.

# 2 Conformance Notation

Normative text is text that describes elements of the design that are indispensable or contains the conformance language keywords: "shall", "should", or "may". Informative text is text that is potentially helpful to the user, but not indispensable, and can be removed, changed, or added editorially without affecting interoperability. Informative text does not contain any conformance keywords.

All text in this document is, by default, normative, except: the Introduction, any section explicitly labeled as "Informative" or individual paragraphs that start with "Note:"

The keywords "shall" and "shall not" indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

The keywords, "should" and "should not" indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

The keywords "may" and "need not" indicate courses of action permissible within the limits of the document.

The keyword “reserved” indicates a provision that is not defined at this time, shall not be used, and may be defined in the future. The keyword “forbidden” indicates “reserved” and in addition indicates that the provision will never be defined in the future.

A conformant implementation according to this document is one that includes all mandatory provisions ("shall") and, if implemented, all recommended provisions ("should") as described. A conformant implementation need not implement optional provisions ("may") and need not implement them as described.

Unless otherwise specified, the order of precedence of the types of normative information in this document shall be as follows. Normative prose shall be the authoritative definition. Tables shall be next, followed by formal languages, then figures, and then any other language forms.

# 3 Definition

It is essential that the ferrule end faces of the 304M fiber optic contact are clean and free from any kind of debris to ensure the correct performance and operation of the contact. If, after mating a connector pair, an unexpectedly high insertion loss is encountered which results in the system not operating, then all fiber optic contact end faces should be inspected and cleaned if necessary

# 4 Purpose

Inspection and Cleaning procedures provided within this document are recommended to be performed by users of the 304M connector to ensure the connector pair performs to the specified ratings.

# 5 Inspection

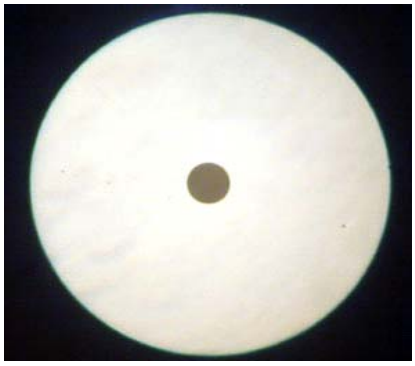
The ability to easily inspect the end face of the fiber optic contact is of importance to any user of a fiber optic system, especially those which utilize butt joint optical contacts.

There are a number of proprietary systems that can be used for field inspection of the fiber end faces.

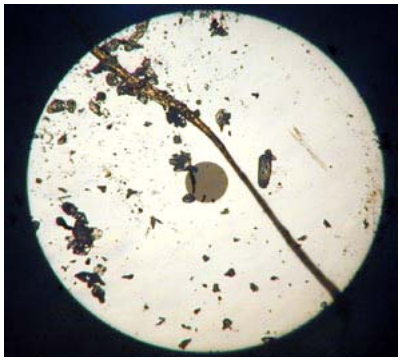
The system shown below (one of many proprietary systems) can be purchased with a 2.0mm adaptor suitable for the 304M connector as can the other inspection systems that are suitable for this purpose

The inspection process uses a remote probe and an LCD screen. In the case of the male contact the probe is simply placed over the contact and focused by means of the thumb wheel to allow viewing of the contact end face. The contact shown above is dirty and would need cleaning. This remote probe and display avoids any eye safety issues of direct observation.

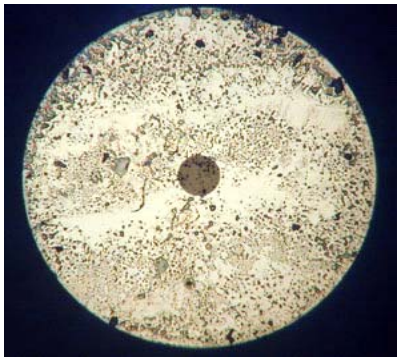
In the case of the female contact either the adaptor on the probe is changed to allow inspection of the contact through the alignment sleeve, or the alignment sleeve is removed and the contact is inspected using the same probe adaptor and procedure as for the male contact.



**Clean Ferrule**



**Dusty Ferrule**



**Greasy Ferrule**

## 6 Cleaning

The procedure for cleaning one manufacturer's style of 304M connectors using tools they supply is described in this document, in order to clearly demonstrate the process which should be followed. Other lint free swabs are also available from other vendors and other styles of 304M connectors may require a different alignment device removal tool.

In order to clean the female contact on the plug side it is necessary to remove the alignment device.

There are also other proprietary cleaning tools available on the marketplace which clean with varying degrees of success, when using these the manufacturers operating instructions for the tool should be followed. Most of these use a “dry clean” method.

When cleaning excessively dirty ferrules the heavy build-up of dried-on greasy debris has sometimes proven impossible to remove using any “dry” method. In this case the recommended solution is to use lint free swabs soaked in chemically pure isopropyl alcohol (IPA), or other fiber optic cleaning agents and to leave them in contact with the ferrule for approximately 30 seconds to soften the contamination, then remove the residue.

**Ferrule Cleaning, Using lint free swabs**

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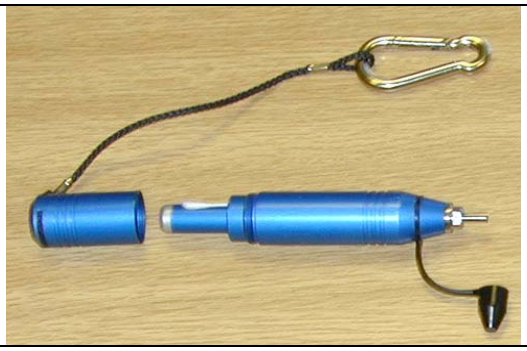
|  |  |
| Alignment device removal tool and lint free swab blister pack. | Cleaning Tool |

The simplest version comprises an alignment device removal tool and lint free swab blister pack. The lint free swab blister pack contains 2 lint free swabs, one is dry and one is soaked in IPA. So each blister pack can clean two ferrules (the swabs should only be used once then discarded).

For field maintenance, the more robust cleaning tool with a protective holder for the cleaning fluid and set of swabs may be preferred. The cleaning tool is supplied with lint free swabs inside which can be replenished using commercially available swabs. Each swab is used once only.

The tool must be filled with chemically pure isopropyl alcohol (IPA) or other optical cleaning fluid before use.

An alternative to the methods above is to simply buy an alignment device removal tool, some lint free swabs, some IPA or other optical cleaning fluid and a dispenser.

Note: Do not use ordinary cotton swabs; these are likely to leave lint behind, which can impair performance

MAGNIFIED VISUAL INSPECTION RESULTS FOR THE LINT FREE SWAB CLEANING METHODS

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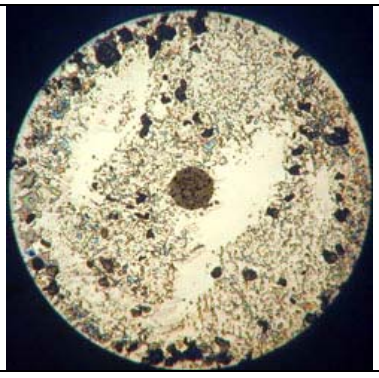
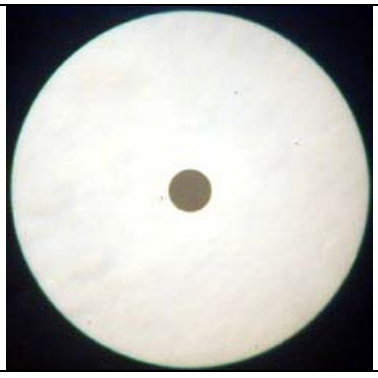
|  |  |

As can be seen from the photomicrographs above the entire ferrule end face is cleaned using this method.

Annex A shows two methods which detail the cleaning procedure for contacts in 304M plug style connectors. To clean the ferrules in socket connectors follow the instructions for a plug style connector but omit the alignment sleeve removal and replacement steps.

Method A utilizes a robust cleaning tool which is designed more for the regular/routine maintenance operator.

Method B utilizes a smaller, lighter tool easier to carry for the occasional “trouble shooting” field operation.

# Annex A (Informative)
# Example of Maintenance of Fiber Optic Contacts in a 304M Connector Using Lint Free Swabs

Method A

Working from the front of the connector, screw the internally threaded end of the cleaning tool onto one of the alignment devices and, with a firm pulling action, remove it from the contact.

Unscrew the end cap from the tool, and remove a new lint free swab.

Moisten one end of the lint free swab by pressing it into the sponge containing S grade Isopropyl Alcohol, within the tool.

Clean the ceramic ferrule by applying the alcohol damped end of the lint free swab to the ferrule end face and **gently wiping it across** the end face

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Using the dry end of the lint free swab, apply to the ferrule face and **gently wipe across** it. This will thoroughly dry the ferrule.

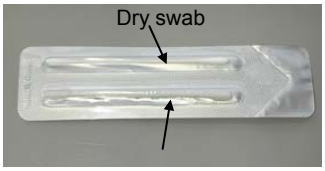
Use a lint free swab end once only as they quickly become contaminated.

Refit the alignment device by positioning it over the ferrule, then with a firm push engage it onto the ferrule body with an audible “click”, then unscrew the tool.

Method B

Working from the front of the connector, screw one of the internally threaded ends of the alignment device removal tool onto one of the alignment devices and, with a firm pulling action, remove it from the contact.

Get ready the cleaning kit of two lint free swab




Alcohol-moistened swab

Peel open the backing foil from the blister pack to release the two lint free swab inside. Select the alcohol-moistened lint free swab

Clean the ceramic ferrule by applying the alcohol damped end of the lint free swab to the ferrule end face and **gently wiping it across** the end face.

Select the dry swab and using one end of it, apply to the ferrule face and **gently wipe across** it. This will thoroughly dry the ferrule.

Use a lint free swab end once only as they quickly become contaminated.

Refit the alignment device by positioning it over the ferrule, then with a firm push engage it onto the ferrule body with an audible “click”, then unscrew the tool.