This is a free page sample. Access the full version online.

National Standards Authority of Ireland

IRISH STANDARD

I.S. EN 4533-003:2006

ICS 49.060

National Standards
Authority of Ireland
Glasnevin, Dublin 9
Ireland

Tel: +353 1 807 3800
Fax: +353 1 807 3838
http://www.nsai.ie

Sales
http://www.standards.ie

AEROSPACE SERIES - FIBRE OPTIC SYSTEMS - HANDBOOK - PART 003: LOOMING AND INSTALLATION PRACTICES

This Irish Standard was published under the authority of the National Standards Authority of Ireland and comes into effect on:

1 September 2006

NO COPYING WITHOUT NSAI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

© **NSAI 2006**

Price Code H

Údarás um Chaighdeáin Náisiúnta na hÉireann

This is a free page sample. Access the full version online.

This is a free page sample. Access the full version online.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 4533-003

July 2006

ICS 49.060

English Version

Aerospace series - Fibre optic systems - Handbook - Part 003: Looming and installation practices

Série aérospatiale - Systèmes des fibres optiques - Manuel d'utilisation - Partie 003 : Règles de l'art pour la fabrication et l'installation des harnais

Luft- und Raumfahrt - Faseroptische Systemtechnik - Handbuch - Teil 003: Praktiken zur Fertigung und Installation von Leitungsbündeln

This European Standard was approved by CEN on 28 April 2006.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

© 2006 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 4533-003:2006: E

This is a free page sample. Access the full version online.

Contents

Page

Foreword 3

Introduction 4

1 Scope 5

2 Normative references 5

3 Initial design considerations 5
3.1 General 5
3.2 System design considerations 6
3.2.1 Connectorisation and available power budget 6
3.2.2 The use of redundancy 7
3.2.3 Spare cabling 7
3.2.4 Dormant fibres 7
3.3 Harness routing considerations 8
3.3.1 General 8
3.3.2 Drip loops 8
3.3.3 Circular paths 9
3.4 Securing and attachment mechanisms 9
3.5 Protection mechanisms 11
3.5.1 General 11
3.5.2 Conduit 11
3.6 Installation mechanisms 13
3.7 Through life support 13

4 Manufacturing issues 15
4.1 General 15
4.2 Handling 15
4.2.1 General 15
4.2.2 Minimum bend radii 15
4.2.3 Forming the loom 16
4.3 Cable identification methods 16
4.3.1 Identifications 16
4.3.2 Heatshrink identification sleeves 16
4.4 Installation of fibres in conduit 17
4.4.1 General 17
4.4.2 Connectors and conduit 17

5 Looming and installation on aircraft 17
5.1 Termination, protection of the end-face 17
5.1.1 General 17
5.1.2 Free connectors 18
5.1.3 Fixed connectors 18
5.2 Pulling of fibre optic cables/harnesses through conduits during installation 19
5.3 Routing of fibre optic cables through pressure bulkheads 19
5.4 Electrical/optical 19
5.5 Additional considerations 19
5.5.1 Cable marking 19
5.5.2 Cable storage 20

This is a free page sample. Access the full version online.

Foreword

This European Standard (EN 4533-003:2006) has been prepared by the European Association of Aerospace Manufacturers - Standardization (AECMA-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of AECMA, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2007, and conflicting national standards shall be withdrawn at the latest by January 2007.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

This is a free page sample. Access the full version online.

Introduction

a) The handbook

The handbook draws on the work of the Fibre-Optic Harness Study, part sponsored by the United Kingdom's Department of Trade and Industry, plus other relevant sources. It aims to provide general guidance for experts and non-experts alike in the area of designing, installing, and supporting multi-mode fibre-optic systems on aircraft. Where appropriate more detailed sources of information are referenced throughout the text.

It is arranged in 4 parts, which reflect key aspects of an optical harness life cycle, namely:

— Part 001: *Termination methods and tools*

— Part 002: *Test and measurement*

— Part 003: *Looming and installation practices*

— Part 004: *Repair, maintenance and inspection*

b) Background

It is widely accepted in the aerospace industry that photonic technology offers a number of significant advantages over conventional electrical hardware. These include massive signal bandwidth capacity, electrical safety, and immunity of passive fibre-optic components to the problems associated with electromagnetic interference (EMI). To date, the latter has been the critical driver for airborne fibre-optic communications systems because of the growing use of non-metallic aerostructures. However, future avionic requirements are driving bandwidth specifications from 10's of Mbits/s into the multi-Gbits/s regime in some cases, i.e. beyond the limits of electrical interconnect technology. The properties of photonic technology can potentially be exploited to advantage in many avionic applications, such as video/sensor multiplexing, flight control signalling, electronic warfare, and entertainment systems, as well as in sensing many of the physical phenomena on-board aircraft.

The basic optical interconnect fabric or `optical harness' is the key enabler for the successful introduction of optical technology onto commercial and military aircraft. Compared to the mature telecommunications applications, an aircraft fibre-optic system needs to operate in a hostile environment (e.g. temperature extremes, humidity, vibrations, and contamination) and accommodate additional physical restrictions imposed by the airframe (e.g. harness attachments, tight bend radii requirements, and bulkhead connections). Until recently, optical harnessing technology and associated practices were insufficiently developed to be applied without large safety margins. In addition, the international standards did not adequately cover many aspects of the life cycle. The lack of accepted standards thus lead to airframe specific hardware and support. These factors collectively carried a significant cost penalty (procurement and through-life costs), that often made an optical harness less competitive than an electrical equivalent.

c) The fibre-optic harness study

The Fibre-Optic Harness Study concentrated on developing techniques, guidelines, and standards associated with the through-life support of current generation fibre-optic harnesses applied in civil and military airframes (fixed and rotary wing). Some aspects of optical system design were also investigated. This programme has been largely successful. Guidelines and standards based primarily on harness study work are beginning to emerge through a number of standards bodies. Because of the aspects covered in the handbook, European prime contractors are in a much better position to utilise and support available fibre optic technology.

SAI GLOBAL

This is a free preview. Purchase the entire publication at the link below:

Product Page

Looking for additional Standards? Visit Intertek Inform Infostore

Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation