

ISLAND AVIATION SERVICES LTD



Cabling Standard

Internet/Intranet Cabling

Version	1.1
Last Updated	25th June 2024
Status	Valid
Classification	Standards
Distribution	External

History

Version	Date	Author	Remark
1	25 th June 2024	Ibrahim Aseel	Initial Document
1.1	30 th June 2024	Ahmed Naufal	Formatting / Review

Table of Contents

1	Network Cable CAT6e Requirement.....	5
1.1	Cable Routes	5
1.2	Installation Requirements	6
1.3	Installation of cabling within cabinets	7
1.4	Patch panel specification.....	7
1.5	Patch Panel Termination	7
1.6	Patch Panel Capacities	8
1.7	User Outlet Specification.....	8
1.8	Wall Box & Floor Boxes	8
1.9	Face Plates	8
1.10	User Outlet Terminations.....	9
1.11	User Outlet & Patch Panel Labelling Scheme	9
1.12	Patch Cables and Patching	10
1.13	Cable Testing	10
1.14	Installation Testing.....	11
1.15	Acceptance Testing.....	11
2	Backbone Optical Fiber Installation	12
2.1	Introduction.....	12
2.2	Routes	12
2.3	Installation Requirements	12
2.4	Labelling	13
2.5	Fiber Optic Termination	14
2.6	Fiber Optic Cable Specification.....	14
2.7	Fiber Optic Patch Cords.....	14
2.8	Fiber Optic Testing	14
2.9	Fiber Optic Installation testing.....	15
2.10	Acceptance Testing.....	15
2.11	Containment.....	15

2.12	Mechanical Protection	16
2.13	Electrical Protection.....	16
2.14	Electromagnetic Compatibility	16
2.15	Completion Documentation	16
2.16	Drawings	17
3	Communication.....	18

Following document is Based on TIA and ISO 11801, EN 50173 which has other additional requirements for network cables. In general, this standard is consistent with the ISO/IEC 11801 standard.

1 Network Cable CAT6e Requirement

- IEEE 802.3 Ethernet (10BaseT), Fast Ethernet (100BaseTX) and Gigabit Ethernet (1000BaseT and 10Gbase-T)
- IEEE 802.3 Type 1 / Type2
- EIA RS 232-D (asynchronous)
- 1000 Mbit/s services - i.e. TPDDI/CDDI/TP-PMD
- ATM standards (ATM25, ATM52, ATM155 & ATM1200)

All materials shall be new and of types approved by the IASL IT Team. Attention is drawn to the selection of the appropriate cables for each type of installation environment.

The color of the cable will comply to manufacturers and industry standards.

All installation works must be undertaken in line with applicable standards and the manufacturer's installation instructions.

Attention should be paid to cable segregation, cable fixing spacing and defined cable routes in under floor routes.

The above standards should be the minimum acceptable standards.

1.1 Cable Routes

All cables with their origin and destination within the same building shall be run internally.

Where there is a requirement to run externally for outdoor applications i.e. CCTV then a transition point will be permitted to allow for the use of external grade cable. External grade cable not to run more than 2 meters internally. (Total length not to exceed 90m).

All cable routes should be agreed with the IASL IT Team before commencement of their installation.

All routes will follow public spaces for easy access after project completion and hand-over.

All vertical cables shall be secured to install the tray at the intervals recommended by the manufacturer. Contractors should confirm their intended method of securing the cables.

No cables will be left un-supported.

Any installation of cabling in raised floors shall be done in no less than in a space of 300mm of height and within the appropriate containment. Any changes to this specification should be explained to and accepted by IASL IT Team

No other cables are permitted in the containment.

1.2 Installation Requirements

All cables shall be installed in accordance with latest issue of BS EN50174 and the manufacturer's instructions and recommendations. Care should be taken to ensure the minimum bend radius is not exceeded thereby preventing kinks in the cable construction.

Power and Data should be separated using appropriate containment systems such as conduit.

All cabling shall be loaded into a maximum of 24 cables. The looms shall be Velcro wrapped in a cable basket in accordance with manufacturer's installation instructions. Cable looms should be maintained in the equipment cabinet within the premises. Care should be taken not to crush cables by over tightened fixings. If metal type cable ties are used to comply with fire regulations ensure excess tail is cut flush, to avoid the creation of sharp and dangerous edges.

All rooms will be fed from a single server room, there will be absolutely no mixing of cabling from two or more server rooms, into the areas in need of connection.

Any work within ceilings or under floor must be made good prior to completion.

All cables shall not exceed 90 meters in length. Server Room's should be strategically located to allow for this. All 4 pair cables should be continuous between the Patch Panel in the rack and the user outlet at the User Connection Point. All cables should be installed within the containment provided or specified.

1.3 Installation of cabling within cabinets

All cables should be neatly installed and secured collectively to the Cabinet or Frame, from the point of entry to the point of distribution across the rear of the patch panel.

All cables installed must have a service loop to increase flexibility in cabinet relocation or movement (emergency or unforeseen events).

It is acceptable for the cables to be dressed as either, 24 cables from one side or split as 12 from each.

All racks will be grounded for electrical safety.

1.4 Patch panel specification

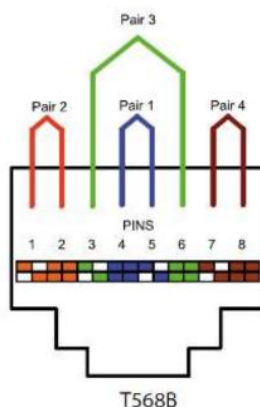
All patch panels should meet or exceed the transmission performance requirements for Twisted Pair Connecting Hardware defined by the standard or the BS EN 50173 Commercial Building Telecommunications Wiring Standard ANSI/EIA/TIA-568B where this standard exceeds BS EN 50173.

Patch panels, outlets, main link and patch cables should be preferably selected from a single manufacturer's system. Patch panels should be Cat6e.

1.5 Patch Panel Termination

All four pairs of the cable shall be terminated onto the rear of the patch panel via Insulation Displacement Connection (IDC) techniques.

The horizontal cables shall be terminated as per the EIA/TIA 568B wiring scheme so that the presentation of the cable pairs on the RJ45 socket are as follows:



To ensure the transmission performance requirements of the cabling system are maintained, the amount of untwisting shall be kept to a minimum and last twist should be no further than 13mm from point of termination. In addition, the stripping back of the outer sheath shall also be limited to the minimum amount required to achieve a successful termination.

Where a rear management bar is provided each cable should be individually secured by way of a cable tie, grouping of cables is deemed to be a poor installation practice.

1.6 Patch Panel Capacities

1u 24-way patch panels should be used throughout the installation.

1.7 User Outlet Specification

All user outlets should meet or exceed the transmission performance requirements for Twisted Pair Connecting Hardware defined by the standard or the BS EN 50173 Commercial Building Telecommunications Wiring Standard ANSI/EIA/TIA-568B where this standard exceeds BS EN 50173.

Patch panels, outlets, and main link should be preferably selected from a single manufacturer's system.

Please contact IASL IT Team to confirm data outlet requirements. ***The final numbers will be confirmed by the Information Technology Department*** based on end user requirements and known usage from the group(s) in other areas.

1.8 Wall Box & Floor Boxes

All wall boxes & floor boxes are to be sized to allow for the minimum bend radius to be achieved as per the manufacture's guidelines.

1.9 Face Plates

The user outlet faceplate should meet the following requirements:

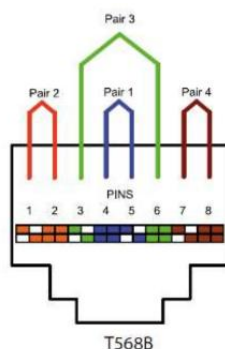
- All outlets shall be provided with spring loaded shutters that automatically close when patch leads are removed.
- All IDC (RJ45 CAT6 Keystone) connector blocks shall be permanently fixed to the faceplate.

- All unused faceplate apertures shall be provided with blanking plates.
- UPVC plastic to be UV resistant.
- UK standard faceplates should be used.

1.10 User Outlet Terminations

All four pairs of the UTP cable shall be terminated onto the rear of the faceplate via Insulation Displacement Connection (IDC) techniques.

The cables shall be terminated as per the **EIA/TIA 568B** wiring scheme so that the presentation of the pairs on the RJ45 socket is as follows:



To ensure the transmission performance requirements of the cabling system are maintained, the amount of untwisting shall be kept to a minimum and last twist should be no further than 13mm from point of termination. In addition, the stripping back of the outer sheath shall also be limited to the minimum amount required to achieve a successful termination.

Enough slack should remain on the cable to allow the termination to be remade at least twice.

1.11 User Outlet & Patch Panel Labelling Scheme

Cabling will be installed and labelled in a logical fashion, as you enter a room cabling ID's will run from left to right in a sequential order. Where there is more than one entrance to a room or area it will be down to the contractor to come up with a logical system that runs in a sequential order.

All cables will be labelled at patch panel and outlet side for easier identification. This will be placed in the cable sheath and be done so it won't fall off or smudge.

Example:

PP1 – P1

Where PP = Patch Panel followed by Patch Panel number i.e 1.

Where P1 stands for Patch Panel port followed by User Outlet port.

The above-mentioned examples can be seen at IASL locations.

1.12 Patch Cables and Patching

All patching between active data equipment ports, voice services ports, peripheral services ports and terminated outlets should be accomplished using **CAT 6 RJ45** patch cords.

The patch cords should be a part of the proposed cabling system and should be included within the cabling systems application and performance warranty. Patch cords used by the end-user should be included within the project cost.

All patch cables should meet or exceed the transmission performance requirements for Twisted Pair.

Connecting Hardware defined by BS EN 50173.

Different color patch cables should be used to differentiate between service types:

Data	Blue. Labelled “Port Numbers” accordingly
Wireless	Yellow. Labelled “W-AP
CCTV	Red. Labelled “CCTV” respective to Camera name
Server	Black, Labelled “Server Names
Switch to Switch	Green, Labelled "UPLINKS

All the above shall be labelled as per labelling standards and labels provided by IASL IT.

Where flood patching is requested (Meeting Rooms, Exam Centers and others where applicable) the patch leads must be labelled at both ends of the lead (labels to be 2x number of patch leads).

Information needs to be provided to IASL IT Network Infrastructure Delivery Team and the labels will be provided.

1.13 Cable Testing

Following completion of the installation, there are two forms of testing that shall take place:

- *Installation testing* – to be undertaken by the Contractor.
- *Acceptance testing* – to be undertaken by the Contractor but shall be directed and witnessed by IASL IT Team. It should be noted that acceptance testing will involve retesting up to 100% of the entire installation.

1.14 Installation Testing

Installation testing should comprise a 100% exhaustive test of the installation by the installation Contractor performed using a ISO/IEC 11801-1 (11801) standard rating equipment. The testing will be carried out in accordance with the manufacturer's recommended testing procedures & shall prove the link performance characteristics defined within EN50173.

1.15 Acceptance Testing

Upon completion of the installation testing, test results are to be sent to IASL IT. The test results shall be sent in detailed format (PDF). This should be a 100% test. We will then use this information to perform 100% witness test on the entire installation.

Test results should not be provided in paper format. The results should be provided in electronic format. It is, however, mandatory that the results are formatted in a database type structure on the disc/memory stick that a means of searching for individual results is provided. A printed summary of results should be provided with the completion documentation.

The results shall be sent to the email address provided by the IASL IT Team.

2 Backbone Optical Fiber Installation

2.1 Introduction

This Section details the required standards for Fiber Optic cabling. The following cable type is preferred when installing a fiber uplink:

Armored / Shielded Outdoor specified cable This fiber is to be used for external building links where a higher core count is required. Available in multiple core counts. **Fiber Optics Standards - TIA 492CAAA (OS1) / TIA 492CAAB (OS2)**

2.2 Routes

For the main fiber cable, there should be a minimum of two duct lines provided from two different locations of the building for cable to enter the premises.

Duct lines should be connected to server room

2.3 Installation Requirements

All cable routes should be agreed with IASL IT Team's representative prior to commencement of the installation.

All cables shall be either:

- Enclosed in trunking.
- Pulled in duct.
- Securely fastened to tray.

All containment shall be clearly marked at 3-meter intervals and at all concealment points with the following label:

“IASL DATA CABLES”

A minimum of 2 spare cables shall be laid from the server room to all internal floor cabinets.

All cables should be complete between termination points; **no cable joints or splices** will be permitted unless with specific authorization of the IASL IT Department in writing.

Holes drilled through walls or floor for the routing of cables shall be suitably sleeved to prevent damage to installed cables.

2.4 Labelling

All termination points shall be clearly labelled.

The cable will be labelled with wrapround cable markers, before the fiber panel, showing:

IASL IT

<Fiber ID> <UPLINK TO> - <LOCATION (OFFICE)>

Where <Fiber ID> is an IASL IT Internal ID that will be provided to the installer by IT Department. For this to occur the following information needs to be provided:

- <UPLINK TO>
- <LOCATION (OFFICE)>
- Number of cores
- Number of cores terminated
- Connector type
- Cable type
- Any important comments on the installation.

The following format documentation shall be provided for fiber termination:

ODF PORT	Port History	SFP Port	LOCATION
A-1	LIVE	-	Office 1
A-2	SPARE	-	Office 1
A-3	LIVE	-	Office 2
A-4	SPARE	-	Office 2

As a safety measure a Laser/LED information sticker will be placed on the front (right hand side) of the fiber tray. All cables shall be clearly labelled at 5-meter intervals and at all points of entry and exit for concealment.

2.5 Fiber Optic Termination

All optical fiber cables should be terminated within fiber panels mounted at an IASL IT specified location inside the weatherproof fiber box / ODF, in accordance with the proposed layout.

Panels will be mounted in the box such that the connectors are flush with the mounting rails of the box. The front of the ODF panel should not be **recessed SC/LC connectors** will be used throughout. All fiber cores shall be spliced and tested and results should be shared with IASL IT

After testing the contractor should make sure that all dust caps are in place. To facilitate re-splicing of fibers, sufficient slack cable should be left to enable at least two re-terminations to be achieved. A minimum of 5m service loop should be coiled neatly within the fiber ODF or the box.

2.6 Fiber Optic Cable Specification

Fiber Optic Cable Type:	Single Mode
Standard Fiber Wavelengths:	Single Mode Fiber: 1310nm and 1550nm
Type:	Armored

2.7 Fiber Optic Patch Cords

Single mode SC/LC simplex patch cords should be used.

2.8 Fiber Optic Testing

Following completion of the installation, there are two forms of testing that shall take place:

- *Installation testing* – to be undertaken by the Contractor.
- *Acceptance testing* – to be undertaken by the Contractor but shall be directed and witnessed by IASL IT Department. It should be noted that acceptance testing will involve retesting up to 100% of the entire installation

2.9 Fiber Optic Installation testing

Installation testing should comprise a 100% exhaustive test of the installation by the installation Contractor. Tier 1 certification must be completed and submitted for each fiber link. Each fiber core shall be tested bi-directionally at 1310 & 1550nm and the results combined will be stored electronically. Tier 1 certification refers to the use of a light source and power meter to perform continuity and loss testing of the installed links, the loss testing achieved should be **below 0.01db** for acceptance. The length of the fiber is also measured and result to be provided.

Test results will be presented electronically in PDF. The results form will record:

- The unique identifier of the fiber optic cable and fiber number
- The name of the person conducting the test
- The type and manufacture of the cable being tested
- The date and time of the test

The results to be recorded on the form shall be:

- All settings of the test equipment so that the test may be exactly recreated if necessary
- The end of the cable from which the test is carried out
- The measured cable length
- The attenuation at 1310nm and 1550nm (dB) or as appropriate

2.10 Acceptance Testing

Upon completion of the installation testing, test results are to be sent to IASL IT by email. The test results shall be sent in detailed format (PDF). This should be a 100% test. We will then use this information to perform 100% witness test on the entire installation.

2.11 Containmentment

Cablofil Steel Wire Cable Tray or equal conforming to the material. Cable baskets shall be manufactured from steel wires, welded together and bent into final shape prior to surface treatment. The surface shall be treated with anti-corrosive substances such as a primer.

2.12 Mechanical Protection

Holes drilled through walls or floors for the routing of cables shall be suitably sleeved to prevent damage to installed cables. Where cables pass through floors such protection shall be extended to at least skirting height.

Waterfall systems and others are to be used on exit of the basket into cabinets and appropriate supports used for any flexible ducting used to link any main cable runs to rooms.

2.13 Electrical Protection

Notwithstanding the compliance to BS6701 and the issues of cable segregation, additional care should be taken to ensure cables are not routed adjacent to other services where electromagnetic emissions may be generated. Cables should have at least 300mm air gap/separation to any main electrical distribution.

2.14 Electromagnetic Compatibility

All cabling components should have been successfully tested for EMC compliance as specified in the European EC Directive 89/336/EEC as amended by Directive 92/31/EEC.

2.15 Completion Documentation

The installation Contractor should, on completion of their works and prior to acceptance by IASL IT, submit two copies of all records and schematics for the installation by email.

Schematics will detail all cable runs and termination points. The installed cable capacity, cable identification reference, length, brand and type of cable shall be identified.

Records will show clearly all cable terminations and cross connections together with cable capacity and installed length.

The following documentation is required:

- Cabling schematics
- As fitted drawings
- Test results
- Cabinet Layouts
- All relevant operating and maintenance manuals

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- All documentation and drawings will be required in electronic format. All drawings shall be “as fitted” and shall take account of all changes and variations.

2.16 Drawings

All drawings should be provided in accordance with IASL IT’s acceptable policy, in digital format.

3 Communication

All communications regarding the projects shall be made to the IASL IT Department via the email provided. All changes must be communicated and must be approved by the IASL IT Department before commencing. Prior to the start of the project IASL IT Department will provide details of communication and all concerned personnel involved in the project. A POC will be assigned prior to the start of the project, and their contact information with an alternative contact method will be provided by IASL IT Department.

END OF DOCUMENT