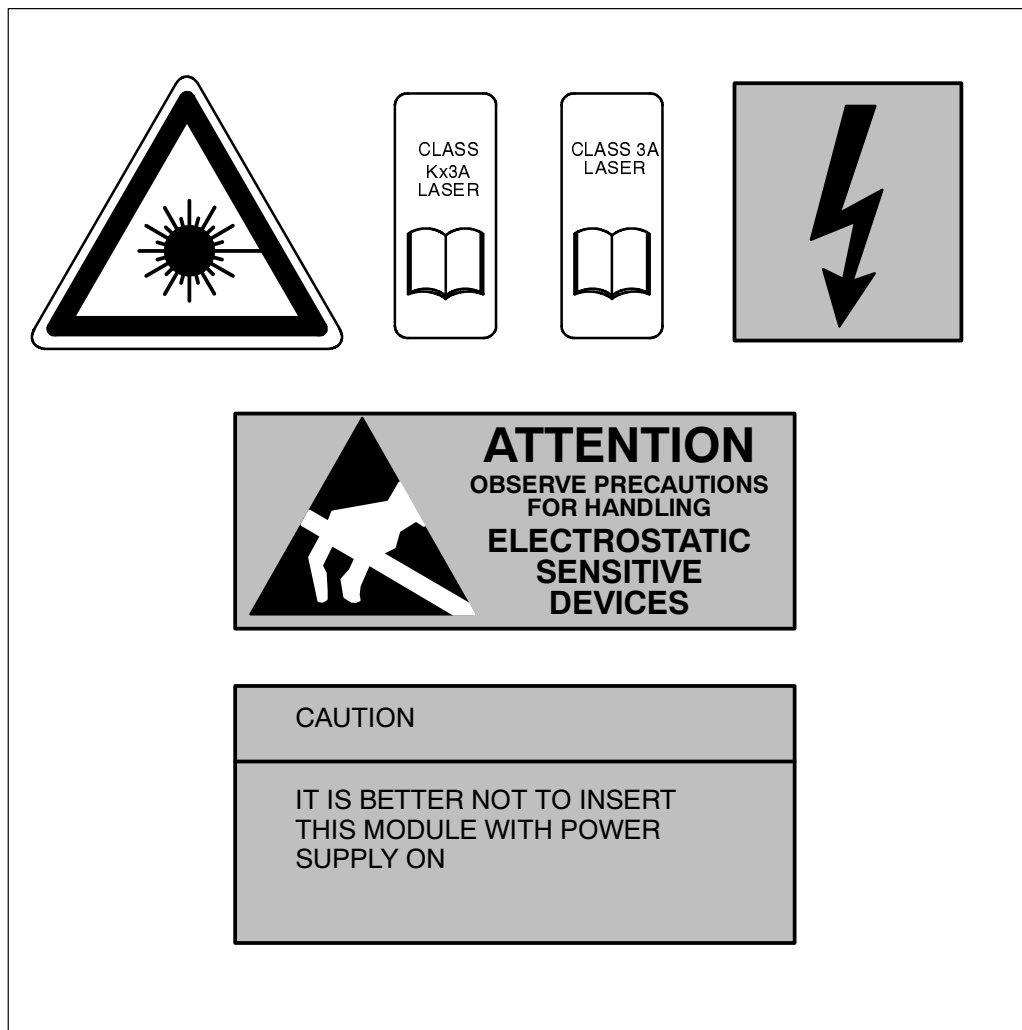


Safety Rules and Operating Precautions

Safety Rules

It is necessary that any personnel working on the system hardware follow the warnings and cautions dictated by the organization in charge of the installation, commissioning and/or operation of the equipment, in particular when the equipment is provided with the following labels or when optical interfaces are used (as specified in the following paragraphs).



Optical Safety

General Information

According to Rec. EN60825-1, to determine the equipment class, the following basic hypothesis are to be considered:

- ◆ *intrabeam viewing condition*
- ◆ *viewing time: 100 sec.*
- ◆ *measurement distance for the aperture: 100mm.*

Normal Working Condition

In normal working conditions, the optical fiber systems do not allow access to radiation. Therefore they are intrinsically safe (CLASS 1).

If necessary, Optical units implement Automatic Laser Shutdown (ALS) as per Rec. ITU-T G.958.

The ALS will normally switch off an operating laser in the event of a loss of signal (LOS) being detected. In this case the units are safe (CLASS 1). Although ALS enhances optical safety under normal working condition, it must not be relied upon as a substitute for safe working practices.

In case of cable break or disconnection of optical connector, hazardous conditions can arise particularly if, during installation and maintenance procedures, the operator has disabled the ALS for test purpose.

Failure Condition

In case of circuit failure, the optical interface can emit radiation with a power greater than the standard values.

In this case the system is classified using contemporary the following conditions:

- ◆ *reasonable foreseeable event (EN60825 – 4.4.1)*
such as optical fiber break, disconnection of connector, error or inattention of an operator (EN60825-2 – 3.19)
- ◆ *under certain extreme fault conditions*
(EN60825-1 – 8.1 and EN60825-2 – 4.4.1)
such as a laser driver short circuit that allows the flow of the maximum current on the laser emitter.

Optical Unit Characteristics and Warning Labels

This paragraph summarizes:

- ◆ *the optical characteristics of the interfaces used in the SDH system in case of normal operation and worst case failure*
- ◆ *the relevant warning labels.*

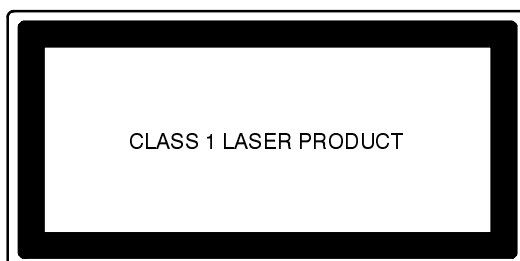
Units Fitted With Class 1 Laser

STM-1 S-1.1 Optic/Mux Sub-Unit 130-3493/xx

STM-1 S-1.1 Optic/Mux Unit 131-8682/x3

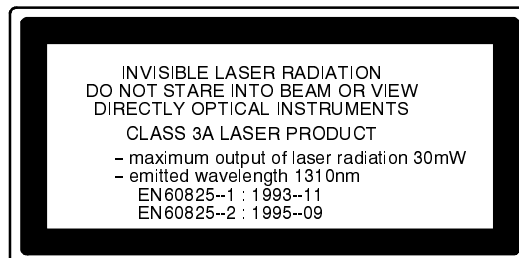
STM-4 S-4.1 Optical/Mux Unit Type 1 131-8681/x3

Interface	S-1.1	S-4.1
Assessment of hazard level	CLASS 1	CLASS 1
Max. Output Power (normal working condition)	0.158mW	0.158mW
Range of operating wavelength	1285/1330	1285/1330

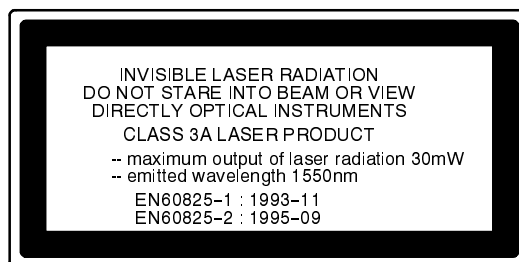


Units Fitted With Class 3A laser**STM-1 L-1.1 Optic/Mux Sub-Unit 130-3494/xx****STM-1 L-1.1 Optic/Mux Unit 131-8682/x1**

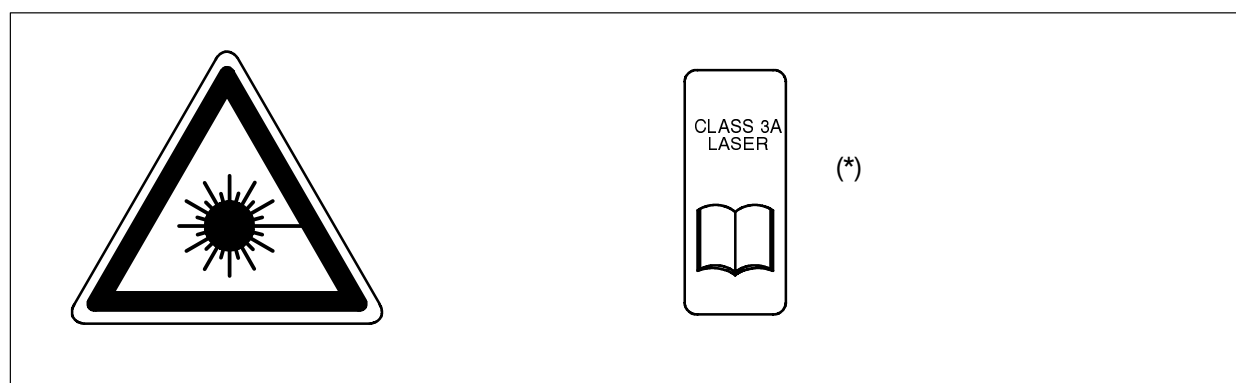
Interface	L-1.1
Assessment of hazard level	CLASS 3A
Max. Output Power (normal working condition)	1mW
Range of operating wavelength	1285/1330

**STM-1 L-1.2/L-1.3 Optic/Mux Sub-Unit 130-3495/xx****STM-1 L-1.2/L-1.3 Optic/Mux Unit 131-8682/x2**

Interface	L-1.2 / L-1.3
Assessment of hazard level	CLASS 3A
Max. Output Power (normal working condition)	1mW
Range of operating wavelength	1530/1570



The following labels are shown on the front panel units.



NOTE (*) When the symbols above are printed on the unit front panels, please refer to the handbook (this chapter) for detailed information concerning the optical characteristics.

Static Sensitive Device Handling Precautions

Warnings and Safety Precautions

In order to avoid or at least to minimize possible damages to equipment, or service interruptions, the following rules must be followed:

- ◆ *When removing covers, cards or connectors always wear wrist straps (Fig. 0.1-1) connected to an electrostatic discharge (ESD) bonding point*
- ◆ *Handle plug-in units by the edges and carry out all the servicing operations in an electrostatic protected area*
- ◆ *Always store plug-in units in their antistatic bags*

Static electrical charges can build up on the body: when they rapidly discharge through the equipment damage or interference can occur.

Electronic Units

All electronic units are subject to damage by rough handling or from electrostatic discharge. Adhere to the following procedures to avoid damaging the electronic units.

Static Electricity

It is defined as a static charge generated whenever two different surfaces come in contact or are rubbed together and then separated.

It is usual for static electricity charges to build up when walking even short distances. This build-up of static electricity is sufficient to damage an electronic unit. Therefore, when working on a rack or cabinet, on cables connected to an electronic unit, or on an electronic unit itself, always wear a skin-contact ground strap or other suitable personal grounding device. Use testing equipment to ensure that the grounding devices are working properly. Place an electronic unit on certified ESD work surfaces only.

Racks and Cabinets provide a wrist strap ground point.

Anti-static protection may also be provided by mounting the subracks on conductive floor coverings, and wearing conductive shoes or heel grounders.

All electronic units are shipped in anti-static shielding bags.

IMPORTANT *All electronic units must be stored in closed anti-static shielding bags.*

Handling, Installing or Replacing Electronic Units

When handling, installing or replacing electronic units, you must observe the following precautions:

- ◆ *Wear a wrist strap or other static-grounding device before removing an electronic unit from its package or from a subrack. Attach wrist strap to rack ground point*
- ◆ *Place each electronic unit in a closed anti-static shielding bag when it is not mounted in a subrack*
- ◆ *Handle each electronic unit by the front panel*
- ◆ *Do not touch the solder side of the electronic unit, thin pin connector, or the components*
- ◆ *Do not touch the fibre cables when handling electronic units*
- ◆ *Do not stack electronic units on or against each other*
- ◆ *Inspect all electronic units for damage before sliding them into the subrack. Closely inspect all pin connectors to ensure the pins are undamaged*
- ◆ *Do not force electronic units into their packaging material*
- ◆ *Avoid any physical contact with fibre optical cable on electronic units*
- ◆ *Protect any exposed optical connectors of the transmit and receive electronic units by cleaning them and keeping them covered with clean dust caps*
- ◆ *Before inserting any electronic unit into the subrack, allow it to reach the environmental temperature*
- ◆ *If the electronic unit is fitted with optical connectors on its back-panel side, remove dust caps and clean the fibre optical connectors before inserting the electronic unit*

Storing Electronic Units

Spare electronic units must be left in the original shipping container until needed. (Packaging should be checked periodically for deterioration). To prevent damage to electronic units while in storage, you must observe procedures that prevent the following:

- ◆ *accumulation of dirt or dust on the pin connectors*
- ◆ *damage to the board or its components*
- ◆ *Board warpage (to boards stored in areas where the humidity can exceed 95% and the temperature can exceed 70°C)*

Transporting Electronic Units

When transporting electronic units, pack each of them in its original anti-static shielding bag, padding and box. If the original material is lost, use other suitable material to prevent damage in transit.

Optical Device Handling Precautions

Handling Optical Fibre Cables

When working with optical fibres, you must observe the following precautions:

- ◆ *Avoid direct exposure to fibre ends or optical connector ends where the laser signal can be accessed*
- ◆ *Handle optical fibres with care. Position them in a safe and secure location during installation*
- ◆ *Protect all unused optical fibre connectors with dust caps at all times*
- ◆ *Observe a minimum bending diameter of 76mm at all times*
- ◆ *Optical connections to the optical units should be finger-tightened only*
- ◆ *Follow the manufacturers instructions when using an optical test set. Incorrect calibration or control settings could result in hazardous levels of radiation*

Optical Connectors

These procedures are used to clean optical connectors and bulkheads. Dirt/dust particles within the assembly can cause reflections and loss of signal.

Use a Fibre Scope of at least 200X magnification for connector inspections. Inspect each connector before mating it and after each disconnect and reconnect process. Connector contamination will result in unstable optical signal level and damage the connector end face. Connectors will degrade over time and unpredictably will result in optical system degradation. Protective dust covers must be placed on the connector and bulkhead connection whenever the connector is not in use.

Cleaning Optical Connectors

Microscopic dirt/dust particles within the assembly can migrate and cause reflections and loss of signal. Technicians should exercise a high degree of care in cleaning the optical assembly by inspecting the connector end face, ferrule edges and connector alignment sleeves.

Fig. 0.1–2 provides an example of dirt, film or particles on a fibre end face when examined through a fibre scope.

Cleaning Methods for Optical Connectors

Tools

The following tools are recommended:

- ◆ *Can of compressed air (Chemtronics .2 micron filtered air)*
- ◆ *Alcohol dispenser (Lenline SD-18 or equivalent)*
- ◆ *Fibrescope with 200X magnification (Seikoh Gikens "Clearfocus", Bausch & Lomb eye loupe or equivalent)*

The following items are required:

- ◆ *Kimwipes or Texwipe Absorbent lint-free cloth*
- ◆ *Isopropyl 100% alcohol*
- ◆ *Stick cleaners, Siecor (P/N 2104255-01) or Fujikura Alcoa (P/N C008812)*

The following tables describe the method for cleaning the various connectors used on the equipment.

Cleaning Method for Optical Connectors		
Step	Procedure	
1	Insert the connector that requires cleaning into the magnifier and assess the cleanliness	
2	Remove the connector from the magnifier	
3	Holding the can of compressed air in an upright position, apply a short burst of air perpendicular to the ferrule of the connector, that is, across the end face	
NOTE	Never reuse cleaning cloths. Use new material for each connector	
4	Moisten a new Kimwipe with 100% alcohol and using pressure, clean the ferrule end of the connector	
5	Alternative Cleaning Methods	Wipe the ferrule end with a new dry Kimwipe using pressure
		Using cartridge cleaner, carefully clean the end of the connector
6	Using .2 micron filtered compressed air, blow across the ferrule for less than 1 second. (Hold compressed air can upright to avoid releasing liquid freon)	
NOTE	Make sure the scope is clean before proceeding	
7	Check the connector with the fibre scope. Re-clean the connector if any dirt, film or particles are present by following steps 4 through 6	
8	When damage to connector end face is observed, perform a back reflection test on the connector in question. If back reflection requirements are not met, polish or replace damaged pigtails or jumpers when damage connector assemblies are observed	
9	When connectors are damaged on an unit, return the unit for repair	
10	Make sure that no stress is applied to the pigtails on the units	

Cleaning Method for Adapter Sleeve and Optical Connectors		
Step	Procedure	
1	Blow around the bulkhead/adapter port with compressed air before cleaning to remove any dust contaminates. DO NOT tip the can of air more than 40 degrees or shake the can before use. The propellant from the canned air will contaminate the connector end	
2	Inspect the alignment sleeve for damage (an eye loupe is preferred). If the sleeve is fractured or cracked it will cause misalignment. If the bulkhead is damaged, the bulkhead adapter must be replaced. DO NOT replace the connector on an electronic unit. This will void the warranty. Send the electronic unit back for repair	
3	Moisten a stick cleaner tip with 100% isopropyl alcohol and insert it into the bulkhead sleeve. Clean the bulkhead using a circular motion (back and forth) while applying pressure against the ferrule	
4	Allow the alcohol to evaporate, DO NOT use canned air. Clean the port with a new dry cleaner tip (do not reuse cleaning materials). Rotate the cleaner tip in one direction (clockwise or counter clockwise) only.	
5	Apply a short burst of air to remove any remaining particles	
6	Place a CLEAN cap over the adapter port or insert fibre	
7	Inspect and clean, if necessary, the connector to be mated	

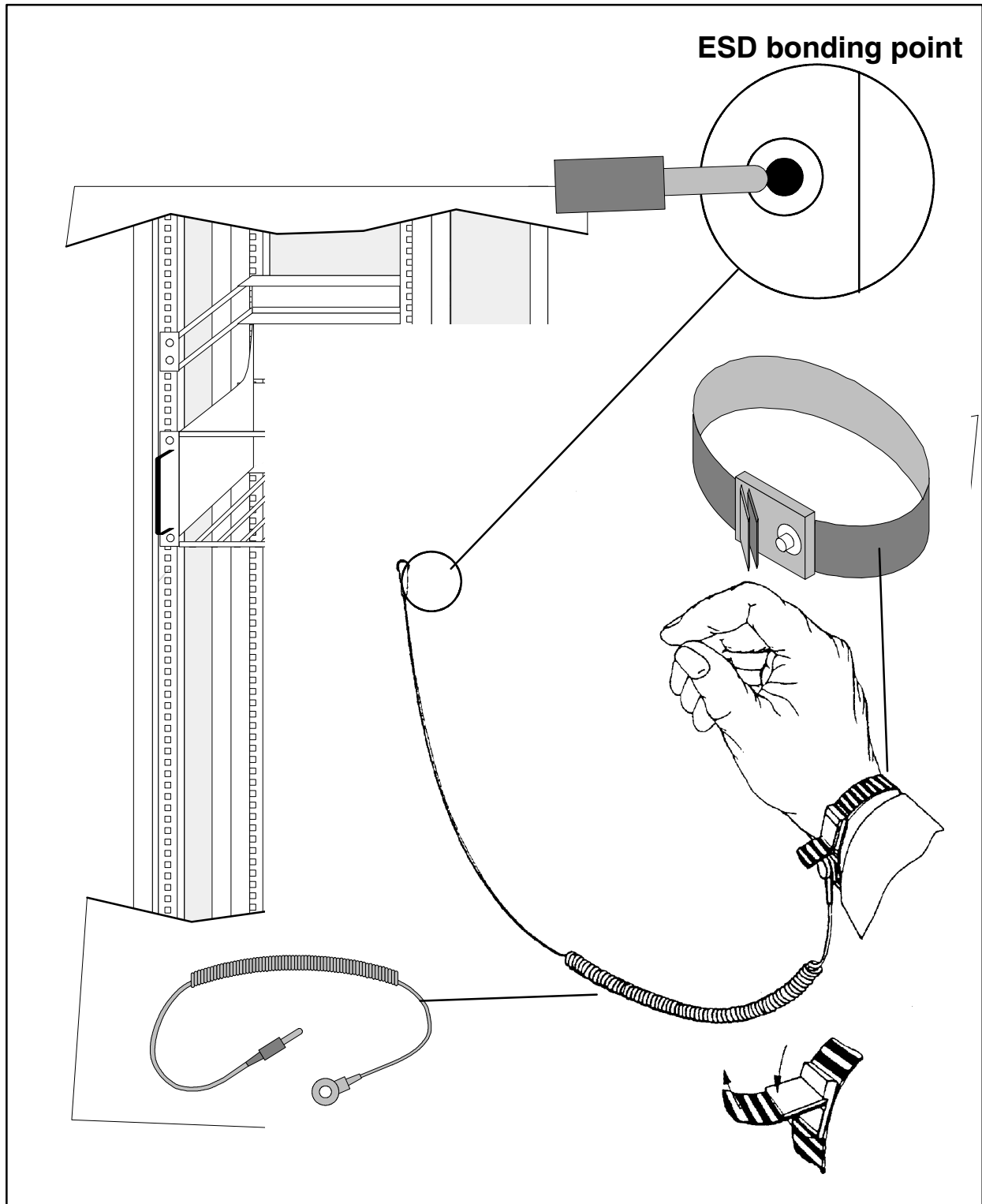


Fig. 0.1-1 Example of conductive wrist strap and ESD connection

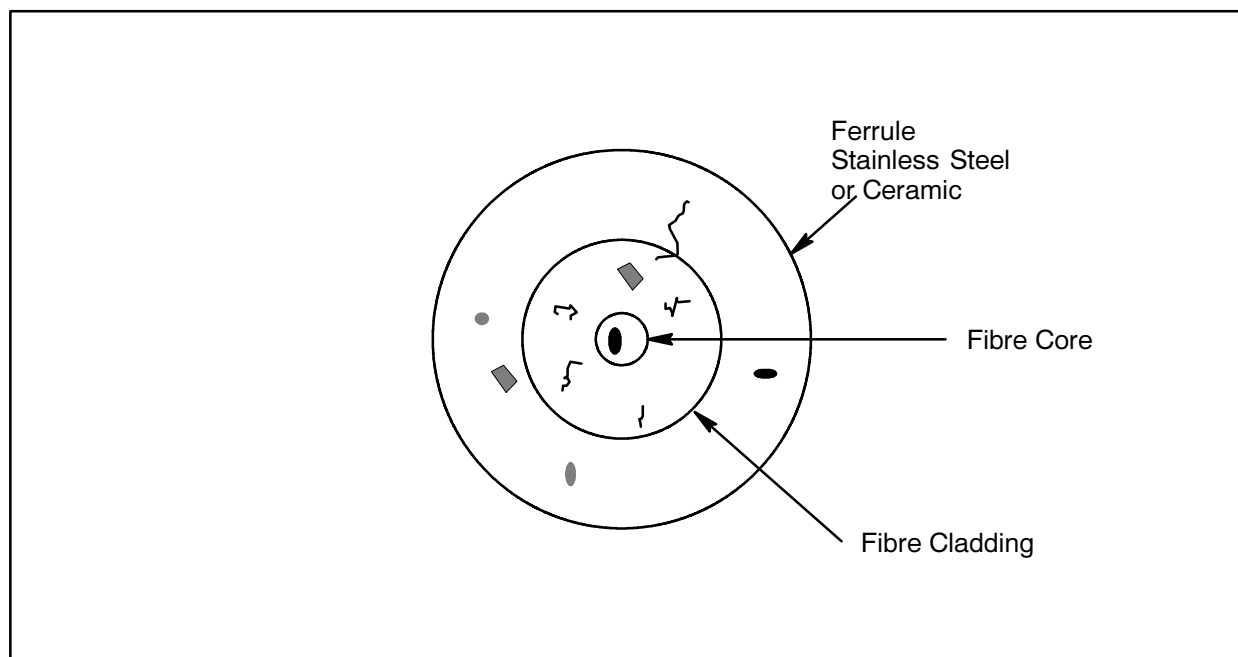


Fig. 0.1-2 *Example of particles on fibre end face*

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