

4 – FIRE PERFORMANCE

Nexans Research Center has adapted a program of constant improvement for insulation and sheathing materials, and cable designs.

Some developments ensure fire performance characteristics for the Nexans shipboard cables range as flame et fire retardancy, smoke and fumes emission, fire resistance integrity and cable recycling after life time.

Nexans shipboard cables are fully withstanding the requirements the following IEC standards:

4-1 Flame retardancy: IEC 60332-1 Test on a single vertical insulated wire or cable

This simple test provides an adequate evaluation of the flame retardant characteristic of a single cable. Depending on the cable size (diameter and weight) a regulated flame is continuously applied for a calculated time to the cable.

The test is passed if the cable has self extinguished and the burnt portion of the cable has not reached the top of the sample.



4-2 Fire retardancy: IEC 60332-3 Test on bunched wires or cables

Cables, when installed, vertically or horizontally laid, bunched on cable trays, in conduit or pipes, are potential vectors for fire propagation.

This test was developed to obtain a method to determine the fire propagation characteristic of a group of

bunched cables fixed on a vertical 3.5 m ladder (see Part 10 – apparatus).

The fire propagation along a bunch of cables depends on:

- the volume of combustible exposed to fire
- the geometrical configuration of the cables installation (touching or spaced)
- the temperature at which it is possible to ignite any emitted gases from the cables
- the quantity of combustible gas released from the cables
- the volume of air passing through the cables installation

Nexans provides fire retardant IEC60092 series shipboard cables meeting the requirements of the general standard Part 350 that specifies category 22 in touching configuration in one or more layers.

IEC 60332-3 standard indicates 5 categories depending on 2 parameters:

- the volume of combustible material (insulation, filler and sheaths)
- the duration of flame exposition (20 or 40 minutes)

For specific and small cables (diameter < 12 mm), fire test is according to the new category (25 previously D) test category that needs less cable quantity.

Test category	Volume of combustible (litres/mètres)	Time of flame application (min)
21 (A F/R)	7	40
22 (A)	7	40
23 (B)	3.5	40
24 (C)	1.5	20
25 (D)	0.5	20



4-3 Fire resistance: IEC 60331

Test of fire resistance integrity of cables

In case of fire, some circuits must maintain the power supply for vital safety equipment as emergency lighting, alarm systems, fire pumps...

IEC 60331 standard determines the circuit integrity of a cable during and after a prolonged fire with different test equipments and test methods:

- flame at 750°C temperature during 90 minutes applied to a horizontal cable under the nominal voltage (Part 11 - apparatus and Part 21 - procedure and requirements)
- flame at 850°C temperature during 90 minutes with shocks on the ladder support applied to a cable under the nominal voltage (Part 12 - apparatus and Part 31 - procedure and requirements)

- for data cables (Part 23 - procedure and requirement)
- for optical fiber cables (Part 25 - procedure and requirement)

For electrical cables, tests are passed if no breakdown occurs (no failure of the fuses).

Nexans proposes a large range: power, control and instrumentation of fire resistant shipboard cables tested with test equipment specified in Part 11 and test method in Part 21.

To meet these requirements, Nexans offers the traditional technology with lapped mica tape + extruded XLPE insulation system; and has developed a specific INFIT™ technology with HF90 extruded compound. This new insulation gives installation advantages: easier insulation stripping and secured connexions.

Fire resistant test according to IEC 60331 Part 11 & 21



Fire resistant test according to IEC 60331 Part 12 & 31

4-4 Measurements of combustion gases: IEC 60754 Part 1 & 2

Part 1: this test permits the determination of the amount of halogen gas emitted during the combustion of the different polymeric compounds (insulation, filler, sheaths) taken from a cable.

Part 2: this test determines the degree of acidity of gases by measuring pH and conductivity.

4-5 Smoke density: IEC 61034 (27 m³ chamber)

In case of fire; smoke emissions considerably reduce the visibility on board.

Passenger evacuation has to be held in a very short time. Therefore materials used in ships should not spread a lot of opaque smoke.

Nexans shipboard cables are designed to withstand the requirements of IEC 61034 based on the 27 m³ test developed by the London Transport Executive Research Laboratory.

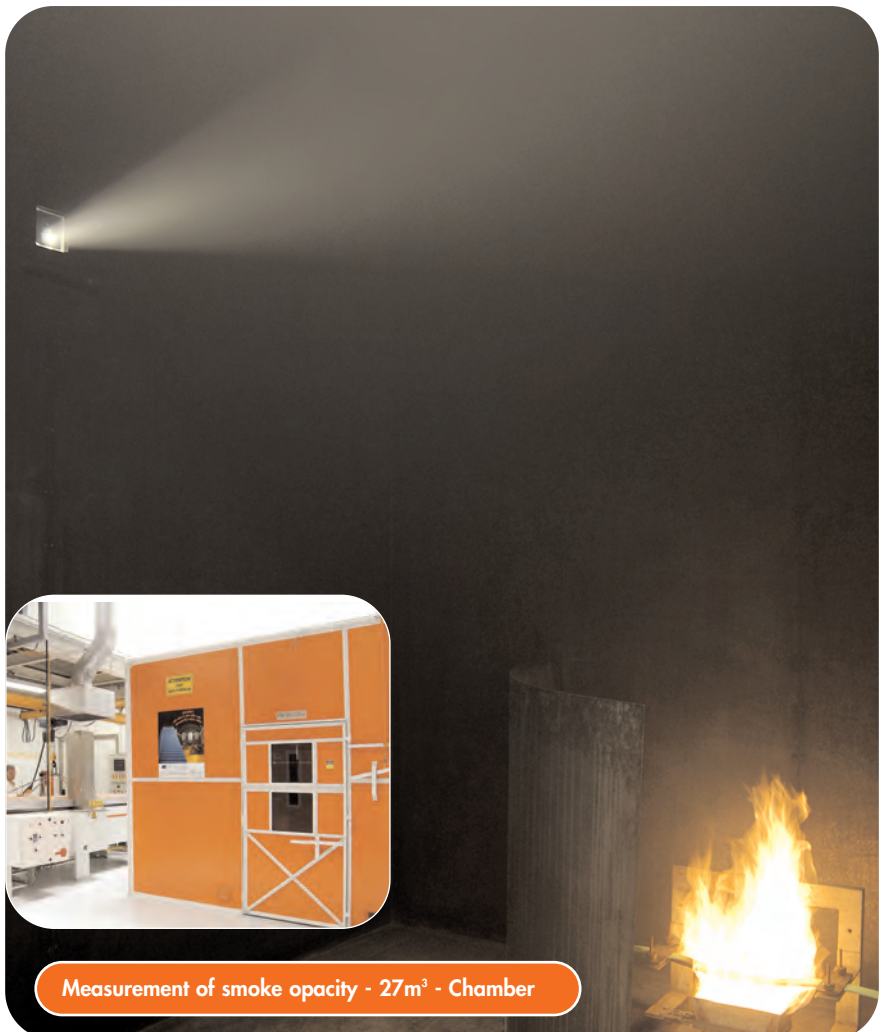
This test permits to measure the density of smoke emitted from burning cables (light transmittance).

Part 1: apparatus including light measurement, fire source, smoke mixing method and qualification procedure

Part 2: procedure and requirements.



Measurements test equipment
of combustion gases according to the
IEC 60754-1/60754-2



Measurement of smoke opacity - 27m³ - Chamber