Fire Behaviour Tests -
Cables & Materials

eurailtest
A WORLD LEADER IN RAIL TESTING & CONSULTING

You are **a rail or a building material supplier or manufacturer** and you are requested to evaluate the fire behaviour of your cables or materials?

Our Test & Measurement Lab (LEM) experts can provide you with:

- Appropriate results through **tailored tests – accredited for urban rail and buildings**
- **Consulting services** – thanks to experts who are members of **European standards committees**
- A large set of tests: **A dozen tests exclusively dedicated to fire behaviour**

Many clients have already benefited from our **know-how** and **30 years of experience in fire testing**.
Why not you?

Eurailtest

Created in 1999 to provide customers with services and expertise of the two main French rail operators (RATP & SNCF), EURAILTEST is an independent organization that offers engineering, testing and consulting services worldwide.

EURAILTEST coordinates about ten laboratories, each of them having - in its own specialty - a very long experience in rail testing.

Our Test & Measurement Laboratory (LEM)

Thanks to the Test & Measurement Laboratory (LEM), Eurailtest can mobilize the skills of 70 engineers and technicians capable of providing urban and suburban transport companies, equipment suppliers, cable manufacturers… with the highest level of safety and reliability for their materials, cables or infrastructure.

Test Resources

The Physics & Chemistry Unit has over

30 years

of experience in fire behaviour of various equipment and materials

1,500

measuring devices

2,000 m²

test facilities

External Recognitions

The Test & Measurement Laboratory of RATP, a member of the EURAILTEST joint venture, is recognized by the following organizations:

cofrac ESSAIS

CERTIFER

- EN ISO/IEC 17025 awarded by COFRAC
  (French Accreditation Committee)
  The Test & Measurement Laboratory is COFRAC accredited under the number 1-1523 (scope available at www.cofrac.fr)

- The LEM is also awarded with the ISO 9001:2008 certification

Fire Behaviour of Cables

OUR TESTS

Flame propagation test C2
(according to IEC 60332-1)
- Determination of cable height that is damaged by a 1 kW flame
- Test sample dimensions: 600 ± 25 mm

Smoke opacity test in a 27m³ test chamber
(according to IEC 61034)
- Measurement of optical density for a cable subject to a specific source
- Test sample dimensions: Cables or cable sections (1,000 ±5 mm)

OUR REFERENCES

- LCIE
- NEXANS
- OMERIN
- SYSTRA

Fire propagation test C1
(according to NF C32-070)
- Determination of cable height that is damaged for a test sample composed of cable sections
- Stranded cables tested in an electric furnace
- Test sample dimensions: 1,600 mm in length

Fire propagation on ribbon cables
(according to IEC 60332-3)
- Determination of cable height that is damaged by a 20.5 kW flame
- Test sample dimensions: 2,500 mm in length

Gas toxicity and corrosivity
(according to NF X70-100 and EN 50267)
- Determination of Conventional Index of Toxicity (CIT)
- Determination of corrosivity of combustion gases

Oxygen consumption calorimetry test
(according to EN 50399)
- Measurement of heat
- Measurement of cable height that is damaged
- Measurement of thermal energy released
- Test sample dimensions: 2,500 mm in length
- Scope of applications: All cables used for rail facilities and buildings (EU Construction Products Regulation - CPR - CE marking)

STANDARDS

- **EN 45545** - Railway applications - Fire protection on railway vehicles
- **EN 50267** - Common test methods for cables under fire conditions - Tests on gases evolved during combustion of materials from cables
- **EN 50399** - Common test methods for cables under fire conditions - Heat release and smoke production measurement on cables during flame spread test - Test apparatus, procedures, results
- **NF X70-100** - Fire tests - Analysis of gaseous effluents
- **NF C32-070** - Classification tests on cables and cords with respect to their behaviour to fire
- **IEC 60332-1** - Tests on electric and optical fibre cables under fire conditions - Procedure for 1 kW pre-mixed flame - Part 1: Test for vertical flame propagation for a single insulated wire or cable
- **IEC 60332-3** - Tests on electric and optical fibre cables under fire conditions - Part 3: Test for vertical flame spread of vertically-mounted bunched wires or cables
- **IEC 61034** - Measurement of smoke density of cables burning under defined conditions

Fire Behaviour of Materials

OUR TESTS

Vertical radiant heating panel
(according to ISO 5658-2)
- Flame propagation on materials used in vertical configuration
- Measurement of Critical Flux at Extinguishment (CFE - kW/m²)
- Test sample dimensions: 800mm x 155mm (max. thickness: 70mm)

Oxygen consumption calorimetry test
(according to ISO 5660-1)
- Reaction to fire test with a cone calorimeter – Heat release rate
- Measurement of MAHRE (Maximum Average Heat Rate Emission, kW/m²)
- Test sample dimensions: 100mm x 100mm (max. thickness: 50mm)

OUR REFERENCES

- ALSTOM
- HITACHI
- HUTCHINSON
- PRODEX
- SIB-ADR
- SIEMENS
- SOURIAU
- VON ROLL

Limiting Oxygen Index (LOI)
(according to ISO 4589-2)
- Determination of fire behaviour of materials thanks to the LOI test
- Measurement of minimum oxygen concentration for sustaining combustion of a material

Gas toxicity
(according to NF X70-100)
- Determination of Conventional Index of Toxicity (CIT)
- Tube furnace

Smoke opacity
(according to ISO 5659-2)
and smoke toxicity measurement using Infrared
(according to EN 45545-2 annex C)
- Determination of optical density: Ds(max), VOF4 and Ds4
- 25kW/m^2 furnace with pilot flame or 50kW/m^2 furnace without pilot flame
- Test sample dimensions: 75mm x 75mm
- Determination of Conventional Index of Toxicity (CIT)

STANDARDS

- **EN 45545** - Railway applications - Fire protection on railway vehicles
- **ISO 4589-2** - Plastics - Determination of burning behaviour by oxygen index - Part 2: Ambient-temperature test
- **ISO 5658-2** - Reaction to fire tests - Spread of flame - Part 2: Lateral spread on building and transport products in vertical configuration
- **ISO 5659-2** - Plastics - Smoke generation - Part 2: Determination of optical density by a single-chamber test
- **ISO 5660-1** - Reaction to fire tests - Heat release, smoke production and mass loss rate - Part 1: Heat release rate (cone calorimeter method)
- **NF X70-100** - Fire tests - Analysis of gaseous effluents
- **NF F16-101** - Rolling stock - Fire behaviour - Materials choosing

CABLES COMPLIANCE - EN 50575

Since the 1st of july 2017, the Construction Products Regulation (CPR) which regulates the free movement of products demands a declaration of performance and a CE marking for all commercialized cables in European Union.
The cables concerned are all of the cables installed in buildings or other engineering structures, data and telecommunication cables included.

The reaction to fire performances are named in the harmonized standard EN 50575 (closely linked to the CPR). These performances are one of the few requirements for any cables that are meant to be incorporated in long-term constructions.

These performances - Euroclasses - are defined in the EN 13501-6 standard. They correspond to a set of five tests that enable to identify the class (A to F) and other complementary classifications (s : smoke emission, d : ignited material drop and a : smoke acidity).

These tests, (apart from the EN ISO 1716) are performed by our partner laboratory Laboratoire Essais et Mesures (LEM).

Class / Test	A_{ca}	$B1_{ca}$	$B2_{ca}$	C_{ca}	D_{ca}	E_{ca}	F_{ca}
EN ISO1716	x						Non-
EN 50399^{ds}		x	x	x	x		
EN 60332-1-2		x	x	x	x	x	determined
EN 61034^{s}		x	x	x	x		
EN 60754-2^{a}		x	x	x	x		performance

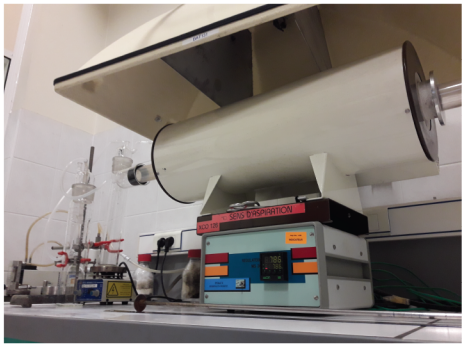
d, a, s : tests that enable complementary classification

Side note : the CE marking of Euroclasse cables A, B1, B2 and C must be managed by a 1+ notified body.
As for the other cables, the evaluation by the laboratory test is sufficient.

Heat measurement and smoke density during the flame propagation test -- EN50399 performed ina test cabin «CPR»

Flame propagation test on isolated cables -- EN 60332-1-2 performed with a 1kW burner. This is the only test to perform for the Euroclass E.

Smoke density measurement test -- EN61034-2 performed in a 27m3 test chamber.



Smoke acidity and conductivity measurement test --EN 60754-2 performed in a rotary kiln.

The LEM is a COFRAC certified and RPC notified (system 3) institution with 30 years of experience in the field of fire reaction. It delivers test reports and accompanying letters for the Euroclass determination.

eurailtest
A WORLD LEADER IN RAIL TESTING & CONSULTING

1 boulevard Saint-Martin 75003 Paris
Tél : +33 1 44 61 93 20
contact@eurailtest.com

NANDO : NB 2745

A WORLD LEADER IN RAIL TESTING & CONSULTING

1, boulevard Saint Martin 75003 Paris
Tel : + 33 1 44 61 93 20
contact@eurailtest.com
www.eurailtest.com

Eurailtest has received **Research Tax Credit Approval**
from the French Ministry of Higher Education and Research