



RAILWAY EXPERTISE & TESTING
| Urban transport networks

URBAN TRANSPORT NETWORKS

To all mass transit network operators and managers

If you are looking to optimise your maintenance operations, improve staff and passenger safety and comfort, Eurailtest's customised test and consultancy services are the answer.

Tests are a vital part of securing your network's safety, performance, comfort and availability. With its partner laboratories and engineering skills, Eurailtest has the knowledge and experience necessary to support you in a variety of mass transit fields, for example:

- Human exposure
- Maintenance assistance
- Network diagnostics
- Infrastructure and equipment acceptance procedures

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EXPERT
ENGINEERS

MORE THAN
100 YEARS
OF KNOW-
HOW





EURAILTEST

Eurailtest was founded in 1999 by two legacy transport operators, RATP et SNCF, to market the skills and services of their different laboratories. An independent organisation, it proposes a portfolio of consultancy, engineering, test and measurement services worldwide.

The tests proposed by Eurailtest range from reaction to fire of materials to complete type approval campaigns for rolling stock or infrastructure via bogie fatigue tests. Eurailtest has ISO 9001-2015 certification and its partner laboratories can boast a variety of accreditations.



OUR TEST AND MEASUREMENT LABORATORIES

With its partners, in particular the Test and Measurement Laboratory (RATP), the Railway Test Agency (AEF - SNCF Mobilités) and the Measurement and Test Department (SNCF Réseau), Eurailtest can offer complete and comprehensive service packages.

WIDESPREAD RECOGNITION

EURAILTEST laboratories have been recognized by the external bodies COFRAC and CERTIFER.

Our customers can therefore have every confidence in the results of our services, whether in the field of type approval or expert assessment.



EURAILTEST holds ISO 9001 certification for its «consultancy, engineering and railway test» activities obtained from SGS, world leader in inspections, verifications, analyses and certifications. This certification was awarded in September 2011 and is recognition of the processes set in place to ensure the highest possible levels of service in an increasingly complex railway environment.

HUMAN EXPOSURE



AIR QUALITY FOR STAFF

We have the skills and abilities to test air quality at the work place, by establishing occupational exposure to chemical agents according to the French Order of 15 December 2009 (sampling strategy, statutory measurements, inspection to establish compliance or failure to comply with Occupational Exposure Limit Values [OELV]) and, by inspecting ventilation and sanitation facilities at the workplace in accordance with the Labour Code. We are also equipped to measure comfort (temperature, humidity) and indoor air quality parameters in offices and on industrial premises.

To provide these services, we have a vast array of measuring devices such as gas detectors, optical particle counters, individual sampling devices, anemometers and cone airflow meters, smoke generators and portable measuring units.

In addition, we are skilled in training staff and sharpening their awareness of occupational exposure issues.

Strengths

- Familiarity with the regulations, standards and particular challenges of an underground railway environment
- Tunnel airflow expertise
- Over 10 years of experience in measuring occupational exposure and maintenance operations in a railway environment
- COFRAC accreditation in accordance with standard EN ISO/IEC17025 and reference document LAB REF 27 (verification of occupational exposure to chemical agents)
- Member of the AFNOR standardization Committee X43C on Workplace Air

REFERENCES

SNCF - TSO - Vinci Constructions

CASE STUDY

Context

Accident at work caused by exhaust gas and particle poisoning.

Requirement

Monitoring tunnel air quality on a track and ballast maintenance worksite.

Test resources

Optical counter and gas detectors for continuous measurement of particle and gas levels: CO/CO₂, NO_x, SO₂.

Active sample (inhalable and respirable dust, polycyclic aromatic hydrocarbons).

Anemometer for measuring tunnel airflows.

Results

Compliance with the Occupational Exposure Limit Values.

Installation of warning systems with the capacity to monitor the entire moving worksite.

Recommendations

Occasional stoppage of works vehicles in the event of surges in exhaust gas levels.

Ballast damping.

Installation of ventilator fans on the worksite.

Use of suitable Personal Protective equipment.



AIR QUALITY FOR PASSENGERS

With our experience of indoor and underground railway air quality, we are happy to partner you in making constant or occasional measurements of “climatic comfort” parameters (temperature, humidity) in stations, on trains or on buses.

We can also monitor air quality by measuring particle (PM_{10} , $PM_{2.5}$), CO_2 and nitrous oxide (NO , NO_x)

levels using fixed or temporary measuring stations. Last but not least, we have the facilities needed for checking ventilator fan compliance (air speed measurement).

For services of this type, we have gas and particles analysers and anemometers.

REFERENCE

RATP

Strengths

- Good knowledge of the regulations, standards and particular challenges of an underground railway environment
- Tunnel airflow expertise
- 20 years of experience in developing and operating continuous monitoring networks (air quality, temperature and humidity)
- Real time measurements
- COFRAC accreditation in accordance standard EN ISO/IEC17025 for continuous PM_{10} , $PM_{2.5}$, NO , NO_x et CO_2 measurements in underground railway environments
- Member of the AFNOR Commissions on Ambient Air, Indoor Air, Olfactometry – Member of the AFNOR standardization Committees X43B: air quality – emissions from stationary sources; AFNOR X43D: air quality – ambient atmospheres; AFNOR X43E: air quality – general aspects; AFNOR X43F: air quality – olfactometry and AFNOR X43I: indoor air quality.

CASE STUDY

Context

Installation of a ventilator fan between stations.

Requirement

Continuous measurement of particle concentrations before, during and after ventilator installation.

Test resources

Installation of a measuring unit (PM_{10} and $PM_{2.5}$) on the station platform.

Results

50% drop in particle concentration on the station platform following installation of the ventilator fan.

Recommendations

Closer monitoring of ventilators to ensure they are working properly.

HUMAN EXPOSURE

EXPOSURE TO ELECTROMAGNETIC FIELDS



We have in our possession all the equipment needed to measure public and operator exposure to electromagnetic fields. Not just in passenger areas but also on rolling stock and in offices and industrial buildings.

On the strength of our railway experience, we can assist clients in their efforts to identify sources of electromagnetic fields and to select ways of reducing the risks connected with exposure to these fields.

Our test facilities extend over the 0 to 6 GHz frequency range and are capable of establishing compliance or non-compliance with the regulations in force (Decree 2002-775 of 3 May 2002 & Decree 2016-1074 of 3 August 2016). We can also perform measurements in relation to standards specific to a railway environment (e.g. EN 50500).

In addition, we are skilled in training staff and increasing their awareness of the risks of exposure to electromagnetic fields.

Strengths

- Over 10 years of experience
- Measurements conducted according to the ANFR/DR 15-4.0 protocol accredited by COFRAC according to standard EN ISO/IEC 17025
- Cooperation with the National Frequencies Agency (Agence Nationale des Fréquences - ANFR)
- Familiarity with the regulations, standards and particular challenges of an underground railway environment
- Establishment of a protocol for dynamic radiofrequency measurement
- Member of the "Electromagnetic Waves & Health" Commission of RATP

REFERENCES

RATP - SFR - Orange - Bouygues Telecom

CASES STUDY

	Context	Requirement	Test resources	Results	Recommendations
#1	Rollout of 3G and 4G on RATP railway premises.	Exposure measurements according to the ANFR protocol in passenger areas near each of the antennas placed in service.	Electrical field gauges and spectrum analysers (100kHz-6GHz).	Compliance with the exposure limiting values and solutions for "atypical" cases.	Efforts to find the best possible solution for minimising exposure and dealing with "atypical" cases.
#2	Analysis of the occupational exposure of the RATP infrastructure manager's staff.	Identification of the sources of electromagnetic fields and measurement of exposure to these fields in accordance with Decree 2016-1074.	Magnetic and electrical field gauges and spectrum analysers (0Hz-6GHz).	Compliance with the exposure limiting values and dealing with instances of over-exposure.	Research and proposals with regard to preventive measures to minimise staff exposure in accordance with Decree 2016-1074.



NOISE AND VIBRATIONS

We can help you with your mass transit noise and vibration issues.

Our services are as follows :

- Characterisation of vibrations and noise pollution affecting neighbouring properties;
- Evaluation of noise emission and vibration compliance in Facilities Classified for Environmental Protection (ICPE);
- Characterisation of the conditions before and after sound isolation and anti-vibration measures;

- Measurement of occupational exposure to noise in relation to the Labour Code;

- Measurement of occupational exposure to vibrations (hands/ arms and whole body) in relation to the Labour Code.

For these services, our partner laboratories have a vast array of measuring equipment, such as type-approved sound level meters, dosimeters and accelerometers.

Strengths

- COFRAC accreditations for characterisation of Facilities Classified for Environmental Protection (ICPE) and for characterisation in relation to complaints from local residents
- Noise and vibration expertise in railway and mass transit environments
- Skills and experience with occupational exposure in the mass transit system maintenance and operations sectors

REFERENCES

RATP - JEMA - SNCF

CASES STUDY

	Context	Requirement	Test resources	Results	Recommendations
#1	Creation of an "occupational hardship" account for workers under the Macron Law ¹ .	To assess exposure to noise and vibrations (hardship factors) of RATP staff and service providers.	Sound level meters, dosimeters and accelerometers.	Quantification of staff exposure to noise and vibrations. Provision of a system for calculating exposure for the use of those in charge of preventive measures.	To support and train those in charge of preventive measures in the notions of noise pollution and vibrations.
#2	Noise pollution and vibrations affecting local residents.	Characterisation of the noise pollution affecting local residents and identification of its sources.	Accelerometers and sound level meters.	Measurements before and after work and comparison with statutory thresholds.	Validation of the effectiveness of the measures put in place.

¹ French legislation governing early retirement rights for employees working in particularly harsh and demanding conditions

MAINTENANCE ASSISTANCE

METRO LINE TRACK RECORDING TRAIN



Our laboratory can conduct dynamic measurements of the electrical and mechanical characteristics at power transmission interfaces (negative and positive polarity collector shoes against Vignole and traction rails). Dynamic monitoring provides useful input for track maintenance by recording characteristic behaviour at interfaces.

Places where there are anomalies with the potential to cause vehicle damage or electrical failures (for example, short circuits) are also closely monitored (distance markers).

The laboratory can also offer technical skills in establishing the causes of such events.

Monitoring operations may involve a number of different actions:

- Video monitoring of interfaces;
- Mechanical measurements;
- Voltage and current measurements;
- Odometry.

Strengths

- Electrical and mechanical interface diagnostics
- Targeted maintenance, organised in relation to priorities
- Precise identification and location of failures
- Technical know-how with regard to tyred and steel rail/steel wheel metro system interfaces

REFERENCES

RATP - RTM

CASE STUDY

Context

Recurrent short circuits and collector shoe breakages on a metro line following the commissioning of new tyred rolling stock (RATP).

Requirement

Location of the points the most sensitive to collector shoe pressure.

Identification of short circuit causes.

Test resources

Cameras for continuous collector shoe monitoring.
Accelerometers to measure impact.

Voltage and current sensors to locate points where there is loss of power supply and current peaks.

Results

Identification and location of the phenomena causing short circuits.

Targeted maintenance.

Disappearance of these problems on the line.

Improved traffic flows.

Recommendations

Resetting the interfaces at certain turnouts.

Adjusting short circuit thresholds.

Targeted maintenance on certain sections of line.

LABORATORY EXPERIMENTS



Do you have materials that have been affected by wear and tear, premature ageing or other similar phenomena? If so, why not ask Eurailtest for assistance? With its partner laboratories, it is fully equipped to carry out laboratory tests on your problem materials.

We can conduct analyses to identify the causes, their nature, establish the conditions in which the phenomena occur and check for compliance.

Our service consists of identifying malfunction phenomena and offering our clients suggestions as regards advisable remedial measures and products that are both suitable and compliant.

The following two case studies should give you a better idea of the service we propose.

REFERENCES

RATP - RRT PACA

CASES STUDY

	Requirement	Test resources	Results	Recommendations
#1	Examination of fishplate joints following a fire on Line 6 of the Paris metro.	Multi-skill analyses: Electrical measurements, physical/chemical and fire analyses.	Identification of the nature of the bubbles forming at the surface: fused silica (glass fibre heated to very high temperatures).	Using the knowledge acquired to re-examine the phenomenon overall. Remedial measures, if necessary, on all similar components.
#2	Study of the tag resistance of different surfaces under consideration for use in metro/RER stations.	Aggressiveness and effectiveness tests on the surfaces studied.	Establishing whether or not tags on particular surfaces are removable.	Prevention of potential damage to railway property.

NETWORK DIAGNOSTICS

ELECTRICAL DIAGNOSTICS IN THE TRACK



For rail transport, track is a critical factor. Electrically, it has a twofold role: it conveys return current to the sub-stations and transmits signaling information to ensure operating safety. Track is also easily accessible to the public, so voltage in the track must never be allowed to reach dangerous levels. Last but not least, stray currents and the associated corrosion phenomena need to be regularly checked to prevent disputes with other concessionaires.

The LEM, our laboratory, has all the equipment needed to help you with the various stages in the process of checking the electrical quality of the track (location of cables and buried defects, conductance, electrical insulation, rail/ground voltages, connector strength, etc.) on the basis of the Ministerial order of 17 May 2001 and standards EN 50122-1 and EN 50122-2.

Strengths

- Measurements in accordance with standards EN 50122-1 and 50122-2
- Development of an innovative method for measuring track quality by analysing real stray currents without cutting off the power supply to the sections concerned
- Knowledge of regulations, standards and railway constraints
- Participation in drafting and updating standards
- Over 20 years of experience in this field

REFERENCES

RATP - SYTRAL - STIB - VEOLIA - YAPI MERKESI

CASES STUDY

	Context	Requirement	Test resources	Results	Recommendations
#1	Poor quality buried electrical connections (position of connections unknown).	Location and measurement of the resistance of equipotential connections on the Lyon tram network.	Electrical defect detector and an electrical resistance measuring chain adapted to railway environments.	360 connections located and measured.	Repair of all the resistive electrical connections identified.
#2	Conductance on an RATP tram line.	Analysis of the electrical quality of an entire tram line on the RATP network.	Electrical conductance measuring chain adapted to railway environments.	Conductance along the length of six 2-km sections of line.	Remedial measures on the electrically vulnerable areas on the line.

LIGHTING COMPLIANCE CHECKS



Our partner laboratories are happy to assist its clients in checking whether the lighting and contrast levels in areas frequented by the public, offices and industrial premises are compliant with requirements.

Measurements can be conducted in relation to a number of standards and location-specific regulations:

- Articles R4223 of the French Labour code;
- Standards EN 124-1 & 2 (lighting of indoor and outdoor work places);

- French order of 1 August 2006;
- French standard NF P98-351.

Maps of the different areas are designed to help clients to identify places requiring stronger lighting.

Our partners can also offer a periodical measurement service to check any dimming of lighting levels over time and help clients optimise their maintenance or pinpoint areas requiring new lighting.

Strengths

- Knowledge of regulations, standards and railway constraints
- Numerous measurements performed for RATP in conjunction with the changeover to LED lighting in areas accessible to the public.

REFERENCE

RATP

CASES STUDY

	Context	Requirement	Test resources	Results	Recommendations
#1	Improving the conditions for evacuating passengers in tunnels.	Measurement of lighting levels on passenger pathways on the two longest sections of line between stations on Line 14 of the Paris metro.	Light meter compliant with the requirements of the standard.	Identification of inadequately lit areas.	Stronger lighting.
#2	Verification of the lighting in a railway maintenance shed.	Measurement of the lighting at all the work stations in the workshop, including the main and secondary inspection pits and exit ways.	Light meter compliant with the requirements of the standard.	Identification of inadequately lit areas at some work stations.	Stronger lighting.

NETWORK DIAGNOSTICS



LUBRICATION MAPPING

Locating areas of lubrication on tram and mass transit networks is a vital safety and railway maintenance factor. If lubrication operations are not carried out as they should be, problems may occur, for example premature wear in the rails on curves or on the wheels of railway rolling stock.

Inspections are performed by sending a revenue-service vehicle fitted with the necessary instruments over the line.

Strengths

- Skills in producing maps showing the areas where lubrication has been performed on a line
- Rapid diagnosis via measurements recorded on board (outward and return trip along the line)
- Possible comparisons: real/theoretical lubrication



REFERENCE

RATP

CASE STUDY

Context

Acceptance procedures for a tram-mounted automatic lubricating device.

Requirement

Confirmation of areas where lubrication has been performed and comparisons between theory and reality.

Test resources

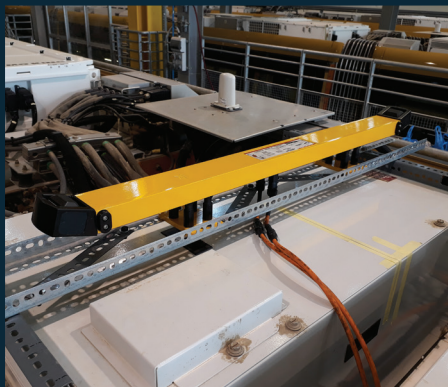
GPS.
Measuring system.

Results

Interactive map of lubricated areas.

Recommendations

Adjustment of lubrication software settings.



DYNAMIC MONITORING OF THE OVERHEAD CONTACT LINE

Overhead contact line geometry needs to be regularly checked to avoid any risk of incident. Our equipment can be fitted on any unencumbered flat surface on the vehicle roof. It can then be used to monitor contact wire geometry over a complete journey.

Inspections relate to overhead line height and stagger. Measurements are performed using a contact-free measuring device.

Strengths

- Compact device requiring little space and easily adaptable to all rolling stock types
- Tram technology know-how

REFERENCES

RATP - ENGIE INEO - SETRAM

CASE STUDY

Context

Acceptance procedures for the Sidi Bel Abbès tram system.

Requirement

Initial overhead line geometry measurements on behalf of ENGIE INEO (site sub-contractor for the systems part of the project).

Test resources

Cameras.
Overhead line measuring systems.
Inclinometers.

Results

Establishment of geometry characteristics (height, stagger) over the whole 30km + of tram system and stabling siding overhead contact lines.

Recommendations

Identification of incorrect settings and instances of non-compliance.

INFRASTRUCTURE AND EQUIPMENT ACCEPTANCE PROCEDURES

LINE AND MAINTENANCE SHED ACCEPTANCE PROCEDURES



REFERENCES

RATP - TSO - STIB - PREFARAILS - VEOLIA - COLAS RAIL - ETF - GLOBAL FERROVIAIRE

Among the services offered by the Test & Measurement Laboratory (LEM) to its clients is that of assisting them throughout all their new track works acceptance phases to help obviate the problem of stray currents and the resulting corrosion phenomena that can damage concessionaire pipes and bridge and tunnel structures.

Our laboratory can boast all the equipment needed to measure electrical insulation in the track according to standard EN 50122-2.

Over the years, we have built up a wealth of experience by working with different clients on their track quality issues.

Strengths

- Measurements conducted according to standard EN 50122-2
- Innovative yet tried and tested method for verifying widespread areas without physically cutting into the rails (flexible implementation)
- Knowledge of regulations, standards and railway constraints
- Participation in drafting and updating standards
- Over 20 years of experience in this field



REFERENCES

RATP - SOGEA TPI - DEMATHIEU BARD

CASES STUDY

Context

Construction of the Cuenca tram system (Ecuador).

Requirement

Measurement of conductance along the length of the running rails according to standard EN50122-2.

Test resources

Current injection and measuring chain compliant with the requirements of the standard.

Results

Characterisation of 16 sectors over more than 4 km of line.

Recommendations

Location of defects in non-compliant sections and increasing local staff's awareness of stray current issues .

Context

Platform renewal at Châtelet station (RER Line A).

Requirement

Verification of platform and sidewall insulation on the two platforms in the station.

PLATFORM AND PLATFORM SCREEN DOOR (PSD) INSULATION

Strengths

To protect users, platforms have to be earthed to prevent differences in potential between platform and train. The Test & Measurement Laboratory (LEM) is happy to assist its clients in verifying platform insulation compliance during all worksite phases (qualification of test areas, station acceptance, etc.) or throughout station lifecycles.

Measurements are performed in accordance with standard C15-100, which recommends the insulation criteria to be met in areas close to the platform edge (floors, walls, uprights, etc.).

- Measurements performed according to standard NF C15-100
- Knowledge of regulations, standards and railway constraints
- Over 20 years of experience in this field



REFERENCES

RATP - SOGEA TPI - Conseil général 92

ACCEPTANCE OF PUBLIC AREAS: LIGHTING AND CONTRAST

One of the services offered by the Test & Measurement Laboratory (LEM) to its clients is that of verifying compliance with the lighting and contrast requirements for buildings accessible to the public, offices and industrial premises, both for acceptance of new areas and during the installation of new, more modern lighting systems (LEDs, for example).

Measurements are performed in accordance with standard NF P98-351 and the official order of 1 August 2006 setting out the provisions for application of Articles R. 111-19 to R. 111-19-3 and R. 111-19-6 of the Building and Residential Code, which relate to accessibility for the disabled of public buildings and facilities

and action required at the time of their construction or installation.

LEM can boast robust experience of these measurements acquired during operations conducted for RATP on many of its public access areas.

Strengths

- Measurement of lighting contrasts according to standard NF P98-351
- Knowledge of regulations, standards and railway constraints
- Participation in acceptance procedures for numerous RATP developments

Test resources

Megohmmeter and standard probe compliant with standard NF C15-100.

Results

63 compliant and 10 non-compliant areas.

Recommendations

Measures to ensure compliance of poorly insulated areas and laboratory characterisation of the tiles and adhesive materials used.

Context

Acceptance of Mairie de Montrouge station (Line 4 of the Paris metro) and its various accesses.

Requirement

Measurement of lighting and contrasts throughout the station to assure compliance of the vigilance strips in relation to the regulations in force for buildings and facilities accessible to the public.

Test resources

Light and luminance meters compliant with the standard.

Results

Identification of dark and poorly lit areas and insufficiently visible vigilance strips.

Recommendations

Stronger lighting and addition of a black strip on floor areas bordering the vigilance strip.



Eurailtest,
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and engineering service portfolios

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