

NEWS :

Dossier on electricity end-use and electrical networks

QUANTIFYING ELECTROMAGNETIC EMISSIONS FROM ENERGY SAVING LAMPS

Testing compliance with new IEC norm

Energy saving lamps generate electromagnetic fields that are said to be carcinogenic. A new standard by the International Electrotechnical Commission (IEC) defines the maximum acceptable emission levels, as well as the correct technique to measure these emissions.

In the previous issue of Laborelec News, we mentioned the new European directive on UV emissions from lamps. In parallel with this directive, the new IEC/EN 62493 norm assesses human exposure to electromagnetic fields generated by lighting equipment. The norm defines how to carry out measurements using an artificial head as well as a filter in order to focus on frequencies around 250 kHz. Compliance with the EN 55015 norm, which focuses on electromagnetic emissions from 9 kHz to 300 MHz, must also be demonstrated.

Specific testing setups

The new IEC/EN 62493 norm also prescribes the various testing setups. It states where the artificial head must be placed in relation to the lamp position and the control gear or electronic converter when carrying out the tests. 'The setup is different for each type of luminaire,' explains Conrad Bottu. 'For a lamp that is remotely controlled, for instance, electromagnetic emissions can emanate from the controlling device as well as from the lamp itself.'

Testing equipment developed in house

Laborelec has developed an artificial head and filter in line with IEC/EN prescriptions to measure the electromagnetic spectrum at an appropriate distance from an energy saving lamp. The head and filter are connected to a high precision measurement device. 'We are currently testing electromagnetic emission levels from a variety of energy saving lamps using this setup,' reports Bottu. 'The sample measurements carried out so far indicate that emission levels are within the risk limit.'

Testing available to customers

'Companies with many luminaires that wish to check their compliance with the new norm can call upon our services,' indicates Bottu. 'A major customer has already asked us to test the compliance of their different types of lamps, for a total of more than 7,000 installed units.' The testing service is also available to lamp and luminaire manufacturers.

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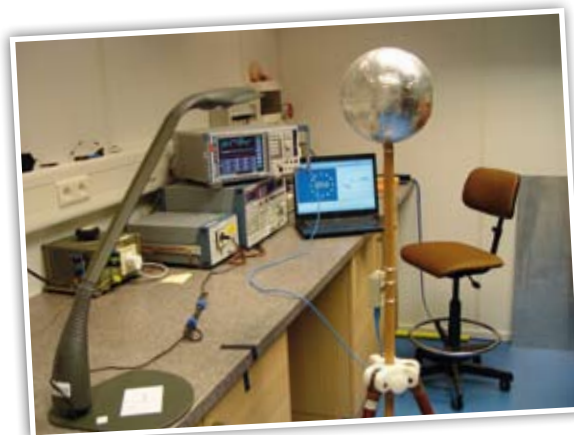
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FUTURE ENERGY TECHNOLOGIES ARE INCREASINGLY BECOMING A REALITY

Raising energy efficiency and matching energy demand with growing renewable and decentralized generation are two challenges facing the energy sector. The answers to these challenges are increasingly becoming a reality. Laborelec is playing an important role in this evolution. Our experts are assisting companies in various sectors to harvest their full energy savings potential. They are also investigating how companies can optimize their energy demand and their local energy production. Our experience with the Antarctic smart grid will prove very useful in this regard. Find out more in this edition of Laborelec News.

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Laborelec developed the artificial testing head and filter in house

In short

- The IEC/EN 62493 norm defines how to measure electromagnetic emissions from energy saving lamps
- Laborelec has developed the appropriate testing equipment to carry out these measurements
- Tests are carried out taking into account a lamp's daily working environment

INCREASING DRYING PROCESS EFFICIENCY WITHOUT INVESTMENTS

The past years, Laborelec has built experience in analyzing industrial drying processes. This enables us to optimize the oven's energy efficiency without any major investment. This was demonstrated during a recent project at one of our industrial customers.

Drying ovens are an essential step in production processes in various industrial sectors. Because of their importance, companies often are reluctant to change their settings. 'In most cases, the drying ovens operate at constant temperature, airflow, etc. regardless of the dimensions of the product that runs through it,' explains Hendrik Nolens. 'Closer investigation of the drying process often reveals room for improvement.'

IMPROVING ENERGY PERFORMANCE IN THE TERTIARY SECTOR

The Belgian government is preparing energy performance regulations for large office buildings. It will be based on European directive 2002/91/EC requiring new and existing buildings to meet specific energy consumption standards. Laborelec's experience can be very useful in this regard.

For new buildings, Laborelec can study the feasibility of renewable energy techniques such as heat pumps, cogeneration, and solar panels.

Regarding existing buildings, our experts can perform an energy audit. They investigate the entire energy balance or focus on a specific application, ranging from heating, ventilation and air-conditioning (HVAC) to the Building Management System (BMS) or from lighting to sanitary water. 'Based on our findings, we propose appropriate improvements,' reports Ralf Bosch. 'Since we are an independent partner, customers can rest assured that our advice is in their best interest.'

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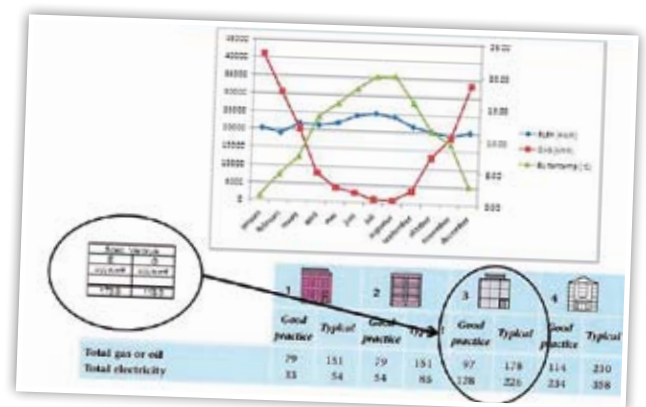
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During a preliminary study, our experts determine the oven's energy savings potential. The study also identifies the best locations to install the measurement tools. They join forces with GDF SUEZ partner Crigen because of their vast experience with these types of measurements.

Based on the measurements, Laborelec advises the appropriate improvement measures. This can sometimes amount to large cost savings. 'Recently, we enabled one of our customers to cut the consumption of natural gas by 9% just by adjusting the drying oven's temperature setting,' illustrates Nolens. 'A perfect example of how closer investigation can lead to considerable cost savings without having to invest in new equipment.'

"ADJUSTING THE SETTINGS OF DRYING OVENS CAN SAVE COSTS WITHOUT MAJOR INVESTMENTS"

An energy efficiency audit can be the first step in determining an energy plan. Such a plan contains an overview of all potential improvements prioritized in order of urgency, profitability and required investment. Our experts help ensure that the recommendations generate the anticipated effects through coaching. 'We coach the staff to use the energy systems more efficiently,' explains Bosch. 'We can also determine the technical specifications for new infrastructure.'



Laborelec assists the tertiary sector in optimizing their energy performance through feasibility studies, energy audits, energy planning, and coaching.

EUROPEAN STANDARD FOR ENERGY MANAGEMENT

The European EN 16001 standard aims to improve energy management at companies throughout the EU. The standard might become mandatory in the near future. Laborelec assists customers in reaching compliance.

By 2020, energy efficiency throughout the EU needs to improve by 20%. According to a study by McKinsey in 2007, reaching this target does not necessarily require heavy investment. Companies can achieve nearly 50% of it through better management of their energy consumption. The EN 16001 standard aims to ensure companies utilize this potential by providing guidance for monitoring and improving energy performance.

Continuous monitoring for better management

Companies first need to get a clear view of their energy consumption and how it is affected by day-to-day operations,' notes Pieter-Jan Stockmans. Laborelec offers a broad range of energy auditing services to determine the main influencers.

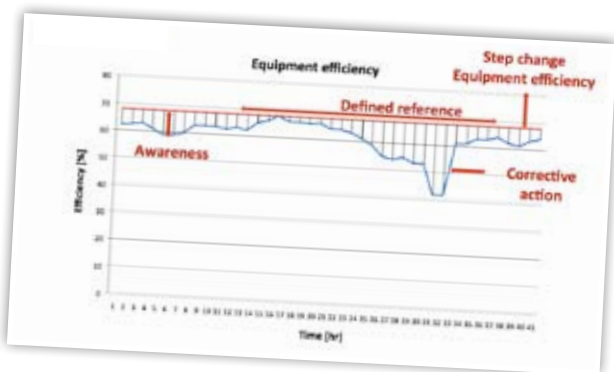
Once this analysis is completed, it is crucial to benchmark the energy performance of important installations with their historical data. 'Our vast experience enables us to assist customers in making this comparison,' explains Stockmans.

Continuous monitoring generates data that can be compared to the highest possible efficiency, identifying inefficiencies when they occur. Such transparency will help create awareness and convince management, the maintenance department, and all other interested parties to take remedial action quickly. 'We can advise on the appropriate monitoring tools and we can perform a gap analysis to install the optimal monitoring system or upgrade the existing one,' adds Stockmans.

Laborelec is currently conducting a pilot project to help a major Belgian industrial company achieve full EN 16001 compliance.

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Continuous monitoring enables to identify inefficiencies as soon as they occur, triggering the necessary remedial actions.

In short

- EN 16001 envisions companies improving the management of their energy consumption
- Continuous monitoring helps identify inefficiencies
- Laborelec assists customers in improving their energy management system

Preparing for Smart Local Energy Management

Laborelec is investigating how smart grid technology can assist industrial and tertiary customers with Smart Local Energy Management (SLEM). The goal is to develop a control system that:

- Smooths the customer's net power import from the electricity grid
- Enhances the flexibility of local energy consumption and production and makes it controllable to respond to new energy offers
- Increases local production of renewable energy for a given capacity of the grid connection

To achieve this, our experts can count on their experience with the Princess Elisabeth Research Station smart micro-grid in Antarctica.

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Princess Elisabeth Antarctic Research Station up and running

The Princess Elisabeth Research Station in Antarctica has been fully operational since March 2010. After completing final on-site tests, Laborelec handed over its smart micro-grid and water purification system. This brought an ambitious collaboration with the International Polar Foundation to a successful conclusion. In only three years, our electrotechnical and chemical experts developed, installed, and tested both of these innovative systems, thus enabling the operation of the world's first self-supporting zero emission polar research base.

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After the final tests, Laborelec handed over its keys to the technical core of the Princess Elisabeth Research Station to Alain Hubert, president of the International Polar Foundation.

NOVEL RESIDENTIAL ENERGY SYSTEMS

Assessing impact on local distribution networks

Energy systems in households are undergoing fundamental changes. Decentralized generation systems are on the rise and new applications such as heat pumps and electric vehicles increase demand for electricity. Laborelec The Netherlands is assessing the impact of these systems on distribution networks. It has recently carried out a number of studies for the three major Dutch grid operators.

The grid operators need to know what impact to expect on low and medium voltage distribution networks and whether any adaptations are required to the network design.

Quantifying available network capacity

'To assess the impact of new technologies, we modelled local networks and carried out numerous simulations,' says Michiel Van Lumig. 'These simulations were also executed on the actual networks of seven districts of various size and population. Results show that, assuming an average capacity of 1 kWe, micro-cogeneration units can usually be connected to a local network without grid overloading or voltage level problems. Photovoltaic systems, however, given their greater average capacity, are more likely to supply larger amounts of energy to the grid when energy demand is low. In the event of a high concentration of PV systems in one area, this could require fundamental grid changes.'

As for heat pumps, they can pose a threat to existing low voltage networks since they increase the potential maximum capacity of households six-fold. Particular precautions must be taken by grid operators to avoid fuses from melting when the weather is very cold. 'We are carrying out ongoing measurements on 15 heat pumps to assess how their electricity demand reacts to external temperature variations, among other things. This study will result in a number of recommendations to grid operators,' adds Van Lumig.

Recharging electric vehicles

Laborelec Netherlands is also helping Dutch grid operators prepare for the future. In collaboration with the Technical University of Eindhoven, our experts researched an energy neutral hotel facility with a car park for 100 electric vehicles. They modelled the impact of the network during the simultaneous recharge of these vehicles. The study also theoretically analyzed a system that would allow the recharging of the cars to be sequenced using assigned priorities.

Assessing planning tools

'The Dutch grid operators also asked us to analyze their grid planning tools,' notes Van Lumig. 'These tools were installed long before decentralized generation units were being connected to the grid. We are helping them assess whether these tools are still suited to modern network evolutions or if they need to be updated or replaced.'

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The popularity of heat pumps could use up local network capacity.

In short

- Laborelec carried out various decentralized generation studies for Dutch grid operators
- Results show that micro-cogeneration units have limited impact on local networks
- The connection of heat pumps requires grid operators to take precautions regarding capacity

Mapping energy storage techniques

Which energy storage techniques are currently being developed in order to be available for distribution grids by 2015? Laborelec recently carried out an extensive study to answer this question. Our experts classified each technology according to economic and ecological criteria, as well as technical maturity. The study focused on electrochemical storage with hydrogen vector, storage with electromechanical conversion, electromagnetic storage, and electrostatic storage. It also provides a detailed overview of what is expected to be available by 2015. In addition to providing valuable information to distribution grid operators, the study enabled Laborelec to extend its knowledge in the field.