

TUKES REVIEW

1/2002

NEWS FROM THE SAFETY TECHNOLOGY AUTHORITY OF FINLAND



Work on Quality Bears Fruit

Quality policy and, more generally, work on quality were clearly on the rise as instruments of the public authorities as well for about ten years ago. The significance of quality management as an element of the competitiveness of enterprises was then also recognised by increasingly wider circles. The concern for the competitiveness and growth of European enterprises produced the Community industrial policy guidelines in which quality management was considered one element of competitiveness. The Community guidelines fitted well for the national industrial policy thinking of that time. In quality policy this meant two main lines of thinking. On the one hand, the aim was to contribute to the quality work of the business sector by quality promotion measures. On the other hand, the aim was to promote the use of the quality tools in public administration. This sector comprised especially improvement and alleviation of regulation and raising the quality of public services.

These quality policy objectives are still topical. The methods of quality management have been developed and modernised in line with the products and production systems in general. The basic tools at system level – the ISO 9000 quality management standards and quality award models – have been given a totally new

look. The Ministry of Trade and Industry systematically seeks to promote both their development and their use. As regards their use, the philosophy has been "as the old cock crows so cackles the young". The organisations within the public administration can – without underrating them in anyway – be counted among the latter group for the mere reason that the quality management methods in general originate from the business sector. One of the goals of the near future will no doubt be to ensure the abundance of these progressive followers at the tail of the bigger players that at the same time are pioneers in their own sector, just like the Safety Technology Authority TUKES. Thus increasing the use of quality management tools in SMEs and within the public administration is important. However, this will not happen by itself. Firstly, organisations will have to become enthusiastic about it and detect the actual benefits of it. Secondly, training and some refining of the quality management tools will still be needed in order to lower the threshold for implementation.

The quality management tools have played an important role in the improvement of the regulatory environment. Besides standardisation, quality management is, as we know, one of the most concrete methods of self-regulation in, for instance, safety issues. The shift from the culture of control over to independent quality work may not have been as comprehensive as expected upon the introduction of the internal market. There are decelerating factors not only in the sectors governed by our national legislation but also in the Community law. In the long term, and also considering the increasingly global and complex regulatory environment, there will hardly be any alternatives to self-regulation based on independent action and responsible work on quality issues.

Developing the tools of quality management and making inputs into quality work will continue to be important in the future, too, for both the public administration and the enterprises. In the end, those who benefit the most from this will be the customers – that is to say, each one of us.

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Minister of Trade and Industry*

TUKES REVIEW, published by Safety Technology Authority (TUKES), brings you current information about technical safety and reliability in Finland.

Founded in 1995, TUKES is a streamlined expert organisation and surveillance authority subject to the Ministry of Trade and Industry. We operate within the realms of process safety, pressure equipment safety, electrical safety, rescue service equipment, legal metrology, articles of precious metals, and CE-marked construction products.

On the Internet, you will find us at <http://www.tukes.fi>.



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Review of TUKES in 2001

Changes in legislation and new tasks

There were no large changes in the operating environment of TUKES in 2001. However, certain statutory amendments changed some working methods and brought new tasks for TUKES.

The new directive on transportable pressure equipment changed the surveillance procedure of transportation tanks for dangerous goods. The approval of transportable equipment and tanks was transferred to inspection bodies. At the same time, TUKES' licensing tasks were replaced by market surveillance.

The Ministry of the Environment authorised TUKES to start the market surveillance of CE-marked construction products in Finland. The first harmonised product standard in accordance with the Construction Product Directive came into force on 1 April 2001, applying to cement.

The new legislation on articles of precious metals changed the relevant product requirements. The Act and the Decree clearly increased TUKES' powers as the market surveillance authority.

In 2001, new qualification requirements were also set, based on the Act on Environmental Protection, for the installers and maintainers of refrigerating equipment and fire extinguishers and for those taking care of the disposal of the

materials used in this equipment. Those operating in this sector have to inform TUKES of their operations.

Safety level remained the same

The safety situation of TUKES' fields of activity as a whole remained at the same level as in the last few years. This was shown by our observations during surveillance and by the number of accidents in the different fields of activity. Numerous defects and acts of neglect were still found during surveillance, proving among other things of the faulty safety attitudes and systems in some companies.

TUKES was informed of 308 accidents and near-miss situations in the different fields of activity in 2001. Five persons were killed in the accidents and 91 injured. Three of the deaths were caused by electrical equipment, one of them occurred in a mine and one during the industrial handling of dangerous chemicals. We nominated a special researcher or research group to find out the reasons for serious accidents in 12 cases.

Plant and Installations Surveillance

The main target of *plant and installations surveillance* was to inspect the safety reports of plants handling *dangerous chemicals*. Many businesses should still develop their procedures and safety management. During on-site inspections, defects were found, among other things, in the tidiness and organisation of plants, in warning signs and for example in the drawing up of space classification plans.

As for *storage of explosives and natural gas plants*, we registered no serious safety defects or considerable neglects in following the legislation. *Pressure equipment safety* also remained stable. Nevertheless, we have found out during pressure equipment surveillance that approximately 10% of regular inspections are carried out late. Also, the introduction of the new procedures required by the pressure equipment legislation has so far been slow, e.g. the risk assessment has only been completed in a few boiler plants and refrigerating plants.

The safety level of *electrical equipment and elevators* is estimated to have remained the same. The surveillance of the operation and maintenance of electrical equipment concentrated above all on targets requiring a leader of operations and on small and middle-sized industry. Defects in service and maintenance programmes and instructions are still common; however, some improvement has taken place compared to the observations made in the previous year. Fewer regular inspections seem to be neglected, but there are still plenty of inspections that have not been completed in equipment category 1. Further positive development has taken place in the initial inspections of electrical contractors; only 5 % of the inspections were found to have neglects or significant defects.

The operations of those carrying out *inspections* and of different *installation and service businesses* were mostly in order. Many defects were found in the initial inspections of *fire alarm equipment businesses*. However, *fire extinguisher businesses* managed their installation certificates relatively well.

Product Safety Enforcement

One point of emphasis of *product safety enforcement* is still *electrical products*. Their safety is developing positively, and the relative number of serious safety defects is smaller than before. The proportion of products conforming to standards of all tested products has continuously increased since 1994. The same positive development is also visible in the interference features (EMC) of the products. In addition, the *energy markings* in refrigerating equipment and in clothes and dish washing machines were fairly well visible, and no faulty information was found in the equipment.



The operating security of *fireworks* has still slightly improved, and the proportion of products rejected in tests has decreased. In test firings, the products have worked really well. The rejection percentage was 27 %, and the reasons for rejections were the products' dangerous way of functioning and non-conformity with approval documents.

The conformity of *gas equipment and the transportation tanks and packages of dangerous goods* has remained good. The surveillance of *pressure equipment* has mainly concentrated on pressurised accessories, such as valves. Some businesses have not yet changed their procedures to conform to the requirements of the new pressure equipment legislation. Therefore, problems may surface after the end of the transition period (29 May 2002). *Simple pressure vessels* brought to the market mainly conformed to the requirements of the legislation. Safety defects in *aerosol dispensers and rescue service equipment* (e.g. smoke detectors, and portable fire extinguishers) have been rare.

There have been no essential changes in the conformity of *measuring instruments*. The average situation with fuel meters can be considered satisfactory. A growing proportion of lubrication oil meters can be duly verified, but periodic verifications are still often neglected. Non-verified scales and even ones that cannot be verified at all are most often used in non-food stores.

The new legislation on *articles of precious metals* came into effect at the beginning of the year. The number of serious defects remained low for the beginning of the year, but towards the end of the year the number of significant non-conformities to the legislation started to grow. However, only approximately 2 % had too low fineness or included none of the precious metal stated in the fineness mark.

During the year 2001 there were still few *CE-marked construction products* on the market. Products not conforming to the requirements were not found.

Studies and development projects

Our development operations became larger and deeper. The work also produced results both within research and internal projects. The most significant



Photo: VTT Fire Technology (2000)

In the research programme of electrical fire safety, a study on the recognition and elimination of electrical fire risk factors was completed in 2001, as were its support projects, the studies on the fire prevention materials used in electrical equipment and on the fire characteristics of the thermal insulation materials used in refrigerating equipment. As the result of the study, we found out what are the most dangerous product groups and building types, for which the resources of prevention work should primarily be addressed. We also try to influence the product requirements related to them through international co-operation by improving the safety level required by the relevant Standards.

The assessment of the effects of the changes in statutes continued in the study on the introduction of the pressure equipment legislation, and in the research project on the introduction and effects of

achievement of our research activity was the completion of the results of the study on fires caused by electrical equipment. Significant projects for the internal development included the project "Results Together" on planning of operations and the project on the management of skills; as the result of the latter, a procedure mapping skills was completed at the end of the year. As the result of the National Quality Award Competition, TUKES was distinguished by the jury in the category of public authorities and non-profit organisations for its exemplary development work.



the SEVESO Directive. In the TUKES' research programme on safety culture, a project on the use of electrical household appliances and on the values, attitudes and practices of the home environment was completed in 2001. According to the study, the Finns' information and attitudes on electrical safety are excellent, and most consumers also operate safely, though differences were found between different population groups.

TUKES also participated, among other things, in the co-operative project on the safety of heating oils and on the management of environmental risks (CISTER) and on the research project on the risk-based maintenance and inspection of pressure equipment (RBMI).

Communication and influence

Our communicative operations were active, and the issues brought up by TUKES were particularly visible in the media. The electrical fire studies in particular have received considerable publicity.

TUKES' communicative operations implemented consumer campaigns on the prevention of electrical fires, on the



safe use of LPG and on the safety of fireworks. The electrical fire and LPG campaigns were realised by publishing informative and factual advertisements in magazines. The fireworks safety campaign was completed at the turn of the year as TV and open-air advertising. Web advertisements were also utilised during the campaigns.

The fireworks campaign was the largest and most comprehensive of the communication campaigns. Based on the

follow-up study, the results were very good. Approximately nearly 3.4 million Finns remembered that they had seen the campaign. The attention value was of a high level compared to other similar campaigns, and the functionality of the campaign was also excellent. For example, the message about protecting one's eyes got through very well to those who saw the campaign, and the use of protection classes has also increased; among those who let off fireworks, 47 % said that they had used such classes, compared to 28 % in 2001.

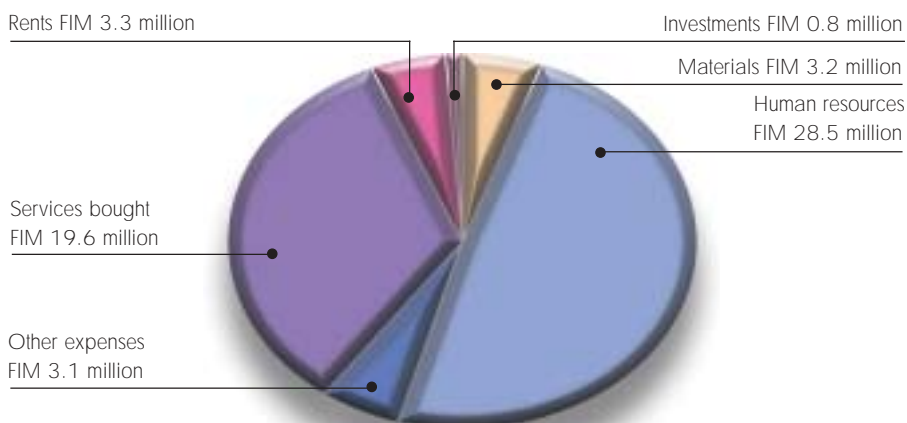
Communication to professionals and consumers was carried out in the same way as before in all TUKES' fields of activity, by using such channels as articles, information bulletins, brochures and guides, web communication, lectures, events and performances at fairs. The new TUKES website was introduced at the beginning of February.

Staff

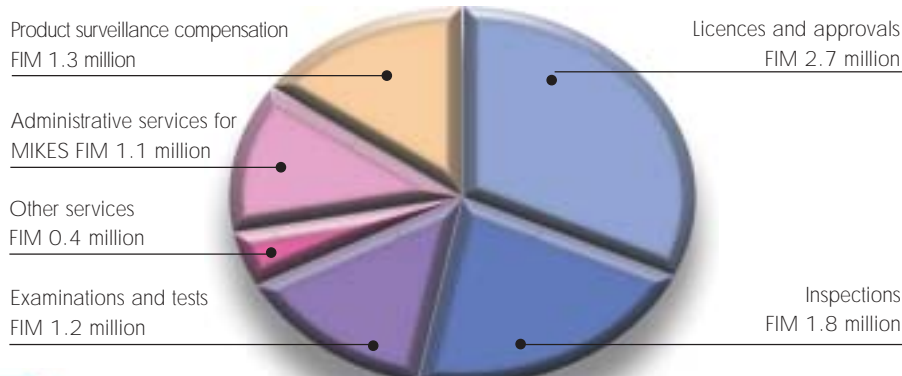
Person-years at TUKES by Group

Group	2000	2001
Plant and Installations Surveillance	48	47
Product Safety Enforcement	31	32
R&D and Support Services	30	33
Total	109	112

Expenses by item in 2001 (total FIM 58.5 million)



Income and compensation in 2001 (total FIM 8.5 million)



Staff education level

Doctor, licentiate	5
Graduate engineer	30
Other university	11
Polytechnic	2
Engineer	28
Other college or intermediate	
intermediate grade	31
Comprehensive school	5

Economy

The total costs of TUKES' operations amounted to FIM 58.5 million. Of our income for services subject to a charge and of other income we accounted a total of FIM 8.5 million to the state.

Plant and Installations Surveillance

Old pressure vessel inspector procedure to end on 29 May 2002

Land-use planning in the vicinity of chemical establishments

Land-use planning in the surroundings of dangerous chemical factories and storage sites is currently topical all over Europe. The situation is similar in most countries: factory areas have been created up to 100 years ago, and the dwelling areas have grown and moved closer to the factories. Recent serious accidents in plants situated near built-up areas, for example in Enchede, the Netherlands, and Toulouse, France, have made people consider how to improve the situation.

Land-use planning is regulated by the Seveso II Directive, which aims to achieve sufficient distances between the production plants giving rise to risks and the near-by houses (dwellings, schools, hospitals). The population density in Finland is low, so our problems in regard to the location of industrial plants are not as big as elsewhere in Europe. This does not mean we should ignore the issue in any way.

When new production plants are built, adequate distances are focused when the relevant licence is under consideration. So as to no longer build dwellings or similar too close to hazardous production plants, the planning and construction authorities and other decision-makers should have access to sufficient information on the hazards involved. Therefore, each proposal for

planning and construction within the so-called consultation zone is circulated for comments from the municipal fire chief and from TUKES. The procedure is described in the Ministry of the Environment Letter No. 3/501/2001, sent to all municipalities in our country. The purpose of the co-operation between the planning authorities and TUKES is to prevent the increase of risks due to dangerous operations. In addition to preventing new risks, we should also aim to decrease the existing risks. Moving factories and dwellings can only be considered realistic in very few exceptional cases. The primary method should be to decrease risks, i.e. to decrease the area affected by accidents, and to prevent the probability of accidents at production plants. Similarly, it should be checked whether the existing land-use plans are appropriate when all the risks are taken into account. One of the probable obstacles in carrying out these solutions will be financing.

Even though the risk of accidents could be decreased by making the distances longer and by taking a number of technical measures, some risks will always remain. Their influence can be limited by implementing functional rescue plans and by informing the inhabitants of the relevant risks, providing them with examples of how to act in foreseeable hazardous situations.

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Pressure equipment can be offered for sale during the transition period of the pressure equipment legislation until 29 May 2002, even though they have been manufactured according to the old pressure vessel legislation. A manufacturer's or an importer's inspector that has been approved by TUKES can carry out structural or initial inspections of pressure vessels, manufactured in accordance with the old pressure vessel legislation, as stated in Section 4 of the Pressure Vessel Decree (549/1973), if the pressure vessels are put up for sale on 29 May 2002 at the latest.

The new pressure vessel statutes came into force on 29 November 1999. The new legislation no longer includes a procedure whereby TUKES approves a person to carry out structural and initial inspections of pressure equipment.

According to the new legislation, pressure equipment should be manufactured in accordance with the Decision of the Ministry of Trade and Industry on Pressure Equipment (938/1999) or that on simple pressure vessels (917/1999).

According to the decision on pressure equipment, the manufacturer has to choose the procedure used for the conformity assessment of a piece of pressure equipment. The procedures are defined according to the pressure equipment category. A notified body (an inspection body) is involved in the conformity assessment procedure of categories II, III and IV.

The manufacturer or the notified body checks the plan and the manufacture. The inspection of manufacture includes final assessment, including visual inspection and studying of manufacturing documents, and a pressure test and an inspection of safety devices. The manufacturer or the notified body carries out the final assessment.

Manufacturers can replace the inspections by a notified body by using their own quality system approved by the notified body which also supervises the operations according to the system. Thus, the manufacturer needs qualified persons to perform the conformity assessment.

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Investigation on five years' electrical accidents

The electrical accident notifications given to TUKES during the last five years (1997–2001) were examined in a special project last year. A total of 286 accidents had been registered, of which 20 had caused deaths. It is apparent that only a fraction of all accidents, particularly of those occurring at homes, are reported to us. Of them, however, the most serious can be registered.

Electrical professionals were reported to have suffered 120 accidents, of which 47 were caused by an electric shock and 73 by an electric arc. Non-professionals met with 129 electric shock accidents and 34 accidents involving an electric arc. In addition, three electrical accidents were reported to have happened to animals. Most accidents, and the most serious, occurred in industry and on building sites. The accidents suffered by professionals were often due to the fact that the voltage of the work item had not been measured appropriately before starting the work. Accidents also happened when returning the equipment back to normal after the work, particularly when the voltage exceeded 1,000 V.

The most serious accidents at building sites happened when vehicle booms etc. hit an open overhead powerline. In most cases, visual perceptions had probably been wrong when estimating the distance from the powerline. These accidents could also have been prevented or their consequences limited by installing work shields, available on the market, in the powerline, or by coating the open conductors. Among the causes were also unfinished parts of electrical equipment or parts with inadequate protection against direct contact, which were in temporary use at building sites. The requirement to install residual current circuit breakers (RCCBs) at building site socket-outlets has clearly decreased accidents caused by equipment that suffered a failure in normal use.

Of the reported electrical accidents at home, most were caused by electrical installations in connection with renovation, rebuilding etc. In many cases the electrical works had been carried out unprofessionally and without an appropriate electrical contracting authorisation. In all of the cases, an initial inspection as provided by law would

have revealed the mistakes made in the installation and in the connections. Accidents that happened at workplaces mostly involved an appliance or a part of an installation that had been damaged by time.

The notifications also showed that in fact live working has to be done, though one may argue against this. This has often, even consciously, led to considerable risks when doing live working with inappropriate tools and without proper work-specific instructions and planning. Problems also occurred when the work area for one reason or another was changed or extended, so that the original instructions could not be followed. Nearly all accidents that took place in live working could have been avoided by following the given instructions, in cases where instructions had been made at all. Also, the accidents would have been considerably less dangerous if appropriate shields had been used.

Arranging training for the safety at electrical works and regular refresher courses increase care, eliminate old, unsafe routines, and inspire people to choose the safest alternative to perform the work. Besides, systematic servicing and maintenance of electrical equipment, including the relevant inspections, would help to decrease the number of accidents.

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Product Safety Enforcement

LPG users well aware of safety issues

TUKES and the National Consumer Research Centre have studied the points of view, attitudes and operation methods related to the safety of LPG appliances among consumers. The relevant questionnaire was targeted to a total of 1,012 consumers who use liquefied petroleum gas (LPG) appliances at summer cottages and in boats, caravans and camping vans.

The study revealed, among other things, that consumers read the instructions for use rather carefully, and also take care of the condition of their appliances either by servicing them themselves or by having them serviced by a service business. During the last year, three out of four respondents had tested the condition of an LPG hose by looking for broken points by bending the hose. One out of three respondents had looked for leakage in hose joints or regulators with soapy water during the last year.

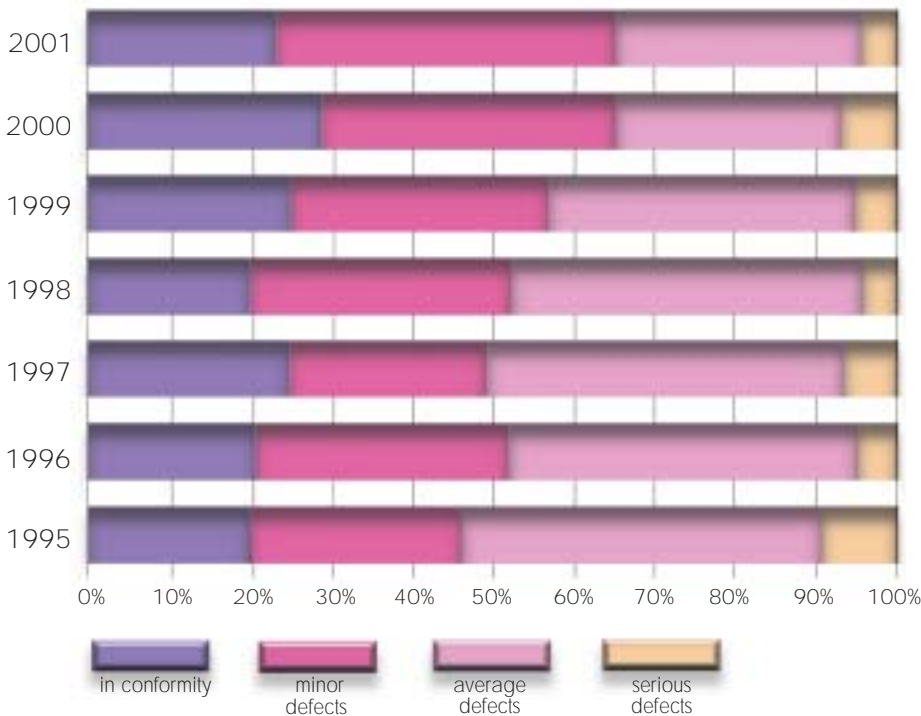
Accidents related to LPG appliances are rare. However, many respondents had experienced less dangerous situations, such as flames at the moment of ignition and leakages. Most of the cottage owners among the respondents thought that their cottage had adequate ventilation for the use of gas appliances. However, it must be noted that of those using an LPG heater in the sleeping rooms of a cottage, as many as one out of four uses heaters that have not been equipped with carbon dioxide safety devices.

Most of consumers having a boat or a caravan use LPG in accordance with safety regulations.

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Surveillance of electrical products. Safety test results in 1995-2001



Electrical product safety improved

Surveillance by the Safety Technology Authority (TUKES) has shown that the safety of electrical products on the market has improved compared to previous years. It has been noted that the manufacturers and importers of electrical products have invested more in securing the conformity of their products. The market surveillance co-operation between European authorities has also become more efficient in the last few years. Fewer electrical products not conforming to the requirements enter the Finnish market than before.

In 2001, the electrical product inspectors at TUKES paid more than 2,300 visits to shops and 190 visits to domestic manufacturers and importers. More than one thousand electrical products, suspected not to conform to requirements, underwent closer examination and testing. Nearly two thirds of the tested products passed the test or were found to only have minor defects. Products with safety defects included e.g. cord extension sets, chargers, lighting fittings and adaptors. All in all, as there are several tens of thousands of electrical product types on the Finnish market, the products generally conform well to the safety requirements.

Although we tested over 10 per cent more products than the year before, the

number of sales and delivery bans remained approximately the same – 107 sales bans and 71 delivery bans. In 23 cases the consumers were asked to return a product, found to be dangerous, to the place of purchase. Continuous market control has had a positive effect on the results, and when considering the results of the last five years, one can see that the proportion of products not conforming to requirements has continuously decreased. Along with the more efficient European co-operation in market surveillance, more and more dangerous products are withdrawn from sale either already in a European country of manufacture, or in the country where the product was first imported.

In addition to safety, we also monitored the electromagnetic compatibility (EMC) of electrical equipment. Approximately one hundred products were tested; significant defects were found in less than twenty of them. This also indicates positive development, since the number of tested products in 2001 was nearly 50 % larger than in 2000, and the number of sales bans did not increase. The EMC characteristics of household appliances and audiovisual devices have improved, whereas particularly PCs and energy-saving light sources still have problems.

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Energy-saving light sources tested for disturbances

Low-energy fluorescent lamps have quickly achieved increased popularity at the same time as the variety has grown and prices dropped. The quality and price of the lamps on the market vary a lot. Lamps of low quality may cause electromagnetic disturbances for other electrical appliances at home or in an office. We investigated the safety of the lamps sold in Finland and their characteristics as for the electromagnetic interferences.

Today, an energy-saving lamp usually consists of an electronic terminal and a fluorescent tube fitted onto the lamp cap. The terminal alters the 50 Hz mains current into the lamp's operation frequency of 20–30 kHz. The high frequency may cause electromagnetic disturbances. We have been reported e.g. of problems, where energy-saving lamps or fluorescent tubes have disturbed the use of remote controls or local area communication networks.

TUKES had 36 different low-energy lamp models tested in accordance with the EMC Standard EN 55015. In the tests, as many as 10 lamps exceeded the highest allowed value of electromagnetic emissions. Serious defects were revealed in three models, for which we ordered an immediate sales ban. These models exceeded the limit values to the standard by more than 15 dB. Excessive interference emission was found both in expensive and cheap models. However, the disturbances caused by energy-saving lamps are not a serious problem. In practice, the disturbance occurrence highly depends on the intensity of the emission and on the near-by appliances' immunity to such interferences.

A more common problem is the short lifetime of low-energy lamps. A lamp may break due to voltage peaks in the electrical network, and, used in outdoor locations and exposed to humidity, the lamp's electronics may be damaged. The lamp often lasts only for a few weeks, whereas it should usually work for at least 3 years with a daily operation time of 6–8 hours.

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