

Zoran D. Živković¹⁾

1) JP "Gradsko stambeno",
Beograd, e-mail:
zoran.zivkovic@
stambeno.com

RISK MANAGEMENT OF OPERATION AND MAINTENANCE OF LIFTS

Abstract: Elevators are one of the most massive means of transport. Elevators are lasting, and reliable means of transport, giving people the right to mobility, no hard-core use if for personal transport or for business purposes.

When it comes to elevators, it is important to society as a whole, the price of mobility and accessibility within the housing, the elevators and escalators provide all social groups. The Society also expects to travel to be as secure as possible.

Use and maintenance of elevators are accompanied by risks, which is the appropriate approach, it can manage, and only the operation and maintenance of elevators item has ordered the state regulations. The paper presents the European and national standards that treat these areas.

Keywords: elevators, security standards, risk management

1. INTRODUCTION

Risk management process can be divided into two phases, the phase of risk assessment and risk control of the stage. Risk assessment can be made at any time ("the sooner the better"), and control risks assumed prior assessment of risks.

Risk management is the process by which to identify, assess and handle risks by using consistent and repeatable processes and methods for individual parts of the organization or the organization. This process confirms the business justification of choice of security solutions and controls that will provide a sufficient level of security.

Therefore, risk management can be defined as a general management function that seeks to identify risks, assess risks and prepare the organization (company) on the causes and effects (consequences) risks.

The meaning of risk management is to enable organizations to realize their goals in the most direct, effective and efficient way.

Risk management applies to all risks. In this sense refers to all clean, but also the speculative risks.

The area of operation and maintenance of lifts European standards governing safety and security of the National Standards, which are still presented in the paper.

2. EUROPEAN SAFETY STANDARDS

In the European Union, for many years, there are rules of controlling the manufacture and installation of new elevators. As the techniques and technology improves every day, a continuous improvement and control regulation is introduced in this area. However, until recently there were no general European rules, which would be relevant to the maintenance of existing elevators that are in operation, especially in terms of safety and accessibility of existing elevators. In the last decade, these rules were introduced, and they can

provide the highest safety standards. The rules are defined as recommendations, which were passed in the next phase in the standard directive. Standards for the safety of existing elevators are formulated as SNEL or EN 81-80.

SNEL (Safety Norms for Existing Lifts), essentially covers the following areas:

- Security for elevator users
- Security of personnel working for the maintenance of elevators
- Improving accessibility to elevators for persons with special needs
- Fire protection
- Protection of vandalism in elevators

In the European Union SNEL runs the application of latest achievements in identifying and taking appropriate corrective method for the elimination of potential hazards when elevators are in use.

Under SNEL's, 74 potential risks are defined, which are ranked according to frequency and severity of the situation and appropriate solutions to eliminate or reduce such risks. Implementation of SNEL in Europe allows individual countries to consider the existing regulations and to set priorities according to the statistics of accidents and social expectations.

SNEL has become a benchmark (reference point) for assessing and improving safety and accessibility of existing elevators. The European Union, in particular insists that this area is adequately covered in the candidate countries for EU membership.

SNEL has been voted in half of 2003. and published in the first half of 2004. since then it is in use as an official document. Publication of EN 81-80 version is considered as a basic rule for maintaining and / or safety improvement on existing elevators. In general, EN 81-80 is used as a guide for the following categories:

- Company for maintenance, to assess risks on site and proposed solution
- Companies and individuals responsible for the inspection of elevators, so risks can be identify immediatly and proposed solutions
- Owners of elevators, to assess risks and possible solutions.

The main role of SNEL is the initiation of replacement and transformation in a part of the fleet of elevators, where the high risks can not be eliminated in a cost effective manner. This especially refers to elevators in service, which are made by outdated technologies, and are in use much longer than they had been in amortization period. The second case is the initiation of modernization in the part of the fleet in elevators whose age and usage level is less than 60% of amortization period and where modernization can be conducted in an economical manner.

3. NATIONAL SAFETY STANDARDS

National regulations control safety and work on repairs and maintenance of the elevators, dating from 1968. year. When it comes to elevators and care about them on this issue, it can not be said that nothing has done for the past 40 years. Informed people, claim that in a few years the owners of apartments in buildings with several floors, have to fully finance the acquisition of new elevators, which might be hard to do when you know that the tenants of many buildings barely able to agree on payment of an annual adjustment that is not too great a burden for the average budget.

The regulations are modified 1986 th and after that in a couple of times some changes are made, to be in accordance with the time. However, in order to meet the challenge of European standards it

needs much more, because 75% of the elevators in the capital city is older than 25 year.

Regulations that are used to normate the design, installation, certification and servicing of elevators, escalators, moving slanted and flat belts, include 25 regulations, directives and rules.

One of the most important rules is the Regulation on technical standards for electric elevators for vertical transportation of persons and goods ("Official Gazette of SFRJ no. 16/86, 28/89, 22/92 and" Official Gazette ", no. 47/95, 14/96). This regulation normalize:

1. Technical conditions and requirements that must be met in the production of electrically driven elevators for vertical transport of persons and goods, in terms of shaft, in the design, installation, use and maintenance of elevators;
2. method of marking and labeling parts of lifts and elevators, which is important for safety and protection of human life and health;
3. technical fire prevention measures and technological accidents;
4. procedure, manner and intervals of performing the required periodic technical inspection of elevators and their parts;
5. method of handling lifts, the way of maintenance and mandatory guidelines on the handling of elevators and their maintenance;
6. method of securing certain properties, characteristics and quality of elevators and the manner of interrogation;
7. documents accompanying elevator in traffic or at delivery.

Particularly interesting is the segment which refers to the control and data sheet on the following categories: newly built and reconstructed lifts, elevators equipped for use after the accident, the elevators which made replacement for any of the following components: supporting cables, power machines, catching devices, speed limiter, steering device, the braking device or devices to lift and lifts for which the

examination revealed defect that can lead to hazardous driving conditions due to the lift off from use and can not be put into operation before the technical control lifts the fulfilled all the prescribed conditions for its safe operation. Lifts are subject to mandatory periodic technical inspection.

In accordance with these regulations, technical control of the newly constructed elevators and lifts trained to use after the accident shall be reviewing the entire facility lifts, elevators as well as static testing and dynamic testing of lift. Review of the entire facility includes checking: correct functioning of all safety devices and parts of elevators, their level of use and safety of the elevator. In addition, occasional technical control of the elevator must be made no later than the expiration of one year from the previous technical review of the elevator. Occasional technical control of the elevator includes a review of the entire plant during a technical review before putting into operation and dynamic testing as well as in technical review prior to commissioning.

ATS is in the field of lifts accredited a number of control organizations and certification section. Control organizations accredited by the ATS perform monitoring of lifts before putting into use and periodic inspection (regular and emergency) in accordance with the requirements set out in the Regulations on technical standards for various types of elevators and European standards for elevators that are not recognized in national law (eg, hydraulic lifts) . While certification sections for certification of elevators provide certification to the certification system defined in the Regulations on compulsory certification and the procedures for the types of voluntary certification of lifts that are not covered by the above Regulations on the mandatory certification, certification section for products can independently get done activities within the control system certification, and also can use the results

obtained from control organizations (request 4.4 standard EN 45011 relating to subcontracting). The above example of control and certification in the field of elevators is an example where the control of the receiving organization's control of the certification system.

When it comes to the maintenance of lifts, very important thing is the standard ISO 9001:2008. and recommendations for opportunities to improve management processes (especially processes of "outsource") as well as conducting training of internal auditors and other employees.

4. RISKS IN THE FIELD OF ELEVATORS

Risk assessment includes risk assessment in terms of the remaining risk and the acceptable level of security. Risk assessment can be calculated by the following principle: $R = A \times U$ (severity and frequency).

When it comes to the categories of severity, it is possible to perceive the existence of four categories (catastrophic, critical, marginal and negligible).

When it comes to the level of frequency, it's a six level: often, perhaps, occasionally, weak, unbelievable and impossible. Each level has its own definition.

Therefore, risk assessment involves an assessment of risk in terms of the remaining risk and the acceptable level of security. If the security level is unacceptable, further measures to reduce risk and apply the following procedure:

1. Eliminate risks.
2. In the case that the identified risk can not be removed, take the necessary measures to reduce risk to an acceptable level of security, as prescribed by the owner of the elevator with the help of technical staff.
3. Informing users about the possible residual risk. This example include

information, training, setting up warning signs, protective equipment for staff and others.

If the risk assessment and further implies that the residual risk is within an acceptable level of security, the process must be repeated.

In assessing risk, the frequency of incidents should be assessed. Based on the number of registered accidents and incidents, combined with the estimated lifespan elevators, the aim is to link a predefined numerical values defining the frequency of the ISO / ITS 14798th

It was assumed that the lifetime of the lifts in the past was between 20 and maximum 30 years. Today this is considered a short life due to changing environment, innovation in technology and the high expectations of end users with respect to the comfort of the ride, making noise, optimal communication, energy use, security and accessibility. The result is a greater need for periodic upgrading installations, requires quick meet of customer demands elevators.

According to the research and ELA VDMA Association for the elevators, the most common cause of injury lift service during the work, refers to injuries caused by inadequate equipment, followed by injuries caused by unsafe machines and access to the room with driving traction sheave.

5. CONCLUSION

Maintenance of elevators is regulated by national and European regulation and standards. Among national, according to Regulations on technical standards for electric elevators for vertical transportation of persons and goods which are prescribed technical conditions and requirements that must be met in the production of electrically driven lifts for vertical transport of persons and goods, marking and labeling of lifts and parts of elevators,

which is important for safety and protection of life and health, technical fire prevention measures and technological accidents, procedure, manner and intervals of performing the required periodic technical inspection of elevators and their parts, the method of handling lifts, the way of maintenance and mandatory guidelines handling lifts and maintenance, process and method of securing certain properties, characteristics and quality of elevators and the manner of the interviews and

documents accompanying lift in traffic or at delivery.

Sense application of SNEL is based on risk assessment of each lift, and given the methodology proposed corrective method, based on the definition of high, medium and low risk. SNEL allows the gradual upgrade, which is very important in this economic time. Additionally, the SNEL to include a checklist of security that allows the independent control of all existing installations.

REFERENCES:

- [1] Ćirović M, Milisavljević M, Pokrajac S, Mašić B, Heleta M, " "Strategic Management", Scientific Society of Serbia, University Singidunum, Belgrade, 2009.
- [2] Ela European Lift Association <http://www.ela-aisbl.org/intro.htm>
- [3] Musabegović I, Study - Modernization of existing elevators in Belgrade, in accordance with the latest standards of the European Union, financial-economic model", November 2009.
- [4] Paunović, B., Zipovski, D. Business plan: a guide for creating, Publishing Center of Faculty of Economics, Belgrade, 2010.
- [5] Živanić LM, Badnjar DR. Testing - control - certification - how do you tell?. Total Quality Management & Excellence.

