

## **Integral Safety Vision**

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**Liftinstituut believes elevator and escalator safety is not a one-dimensional or single factor responsibility. Rather, it is a complex combination of factors including design and maintenance, but also, and possibly more importantly, behavioural aspects. In recent years Liftinstituut is looking to combine these factors into an integral safety approach.**

Experiences with both European Standards and North American Standards and the interpretations of these standards across the globe and the review of different Risk Assessments for similar products led to the conclusion that risks are differently interpreted and mitigated

People's behaviour is part of their culture, the effectiveness of methods to improve safety may differ depending on said culture. E.g. a measure perfectly working in Germany may be misunderstood in China or North America. With global products and global safety standards risks may be introduced unintentionally,

Therefore as a manufacturer you have to consider more than just safety standards and provide manuals. The interaction time with lifts and escalators is very short. People are assumed to know how to behave around or with / operate these products. So there is a limit to the effectiveness of the provided information by the manufacturer / installer. Therefore other information channels need to be used to inform the public.

### **Introduction**

When somebody mentions safety we all have different associations with that word. For one person it means to protect his or her children from harm. For other people it is their daily job, safety inspectors for lifts, the police. The dictionary says: the condition of being protected from or unlikely to cause danger, risk, or injury. In our work field we transport people. The lift is classified as one of the safest means of transport. Many accidents happen; every month there are messages about engineers not returning to their loved ones and children falling from escalators while playing on them.

In order to protect people and to reduce these numbers something should be done.

## Integral Safety Approach

To improve safety for lifts and escalators we need to look at the whole picture. During the design process we tend to focus on one specific item. This is normally the item in which we are specialised. And if this point is taken care off we think we are done. That's why it is very important that in for example a risk assessment team you have people from different departments. Everybody has a different view on risks in relation to the product. Liftinstituut has defined 5 points which are important to improve lift and escalator safety. We will discuss these points one by one.



## Why do accidents happen?

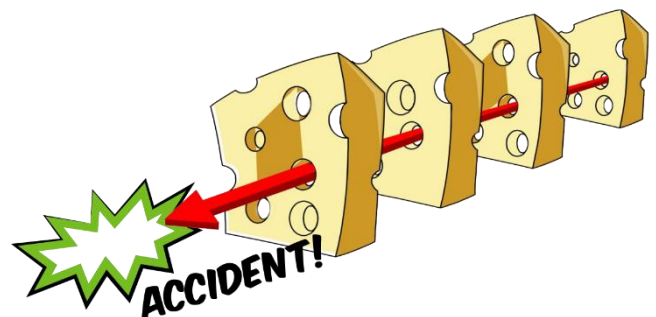
According to James Reason a Professor of Psychology from the University of Manchester an accident is caused by multiple failures and is introduced as the Swiss cheese model. Every slice of cheese is a barrier to prevent an accident from happening. All the measures we take will have some weaknesses, the holes in the cheese.

The four slices stand for organizational influences, supervision, preconditions, and specific or unsafe acts.

**Specific or unsafe acts:** The act can be directly related to the accident and is called an active failure. Examples are: ignoring safety procedures (e.g. Lock out /Tag out, non-use of PPE).

The other three are latent failures. The failures exist already but are not directly noticeable. They are the consequences of decisions made during the design of the product, during the build of the product or management decisions.

**Organizational influences:** Examples are: management decisions regarding maintenance of organisational assets, working atmosphere (e.g. structure, culture).



**(Unsafe) Supervision:** No or insufficient supervision, the worker is not corrected if he/she does something wrong. Another example is a known problem is not being fixed.

**Preconditons:** the reason why the unsafe act was made for example, time pressure, improper equipment, fatigue and inexperience.

Below is a list of the 7 most common causes of accidents on the work place.

1. Shortcuts
2. Overconfidence
3. Poor housekeeping or lack thereof
4. Starting a task before getting all necessary information
5. Neglecting safety procedures
6. Mental distractions
7. Lack of preparation

If we look at this list you can see the relation between the four slices and most common causes for accidents. With this you can conclude that not one of the causes of accidents is caused by a single slice. For example, if a person starts his job without the proper information, who is to blame? The worker? Well yes and no, the first question we should ask is: **WHY?** Why did he/she not get the information, did he/she get the wrong information, was he/she forced do something he did not understand and/or was he/she afraid to ask?

If we look at the development of standards, we see that the safety requirements are the results of accidents in the past. The accidents are investigated and hopefully the cause is found. If the accident occurs more frequently the standard is changed. Of course the standard is not only based on accidents but also on the innovation of products. Standard writing takes a lot of time, three to five years is peanuts. Standards are therefore like trains, they are always late (except in Japan).

### **SNEL / ASME A17.3**

With the introduction of the Lifts Directive in 1995, the minimum requirements for lifts were determined by the essential safety requirements as mentioned in the Directive. These requirements were translated in the standard EN 81-1 and EN 81-2. These standards are normally applied for new installations only. So what to do with the existing installations? Existing installations can be modified of course, but it depends on the willingness of the owner of the installation and the national requirements. It became clear that something had to done with the existing installations, so a list of 10 essential requirements was made. In 2003 the EN 81-80 was introduced, also known as the Safety Norm Existing Lifts (SNEL).

In North America the ASME A17.3 was introduced in 1986, but requirements for existing installations were already considered as early as the 1925 edition of the AMSE A17.1.



National authorities determine whether this standard is applied or not. For example in the Netherlands the Dutch government left it to the responsibility of the owner of the lift. In France they introduced a mandatory 5 year plan to modernize all the existing lifts for public and residential buildings.

## Worker Safety

In order to keep our installations in working order we need maintenance. But first of all the installation needs to be build. So we have persons in an area which, can be dangerous. When installation of the lift is started, normally the hoistway/well/shaft is finished first. The hoistway/well/shaft is a big concrete (or other material) tube with holes in the side for landing doors which reaches all the way from the top of the building to the pit. Many accidents happen in the vicinity of the hoistway/well/shaft due to improper protection. Here you see a lot of differences between countries. In the United Kingdom all hoistway accesses have a metallic type swing door protection. In other countries just three beams are provided,



a handrail, an intermediate bar and a kickboard. This is the result of the fact that every country has different labour safety regulations. During installation the workers have a deadline, and from my experience with new buildings, when things go wrong the delivery time does not change drastically. Therefore people take shortcuts, even when there is no deadline; people are trying to do their work the easiest way. So instructions need to be logical and understandable to prevent shortcuts.

## User Safety

Our products are used by millions of people every day, as a manufacturer you are responsible for the safety of these people. I have never seen a person read any instruction before entering an escalator or lift. Still the manufacturers trust we can operate and use these products safely. The contact time between the escalator/lift and the person using it is very short. Therefore the product needs to be intrinsically safe. Is this really possible? In order to make a product safe we need to know what the person will do in a certain scenario. Based out of experience not all persons behave in the same way, especially if you look at different countries or cultures. Still we use one lift and one escalator standard almost everywhere in the world.

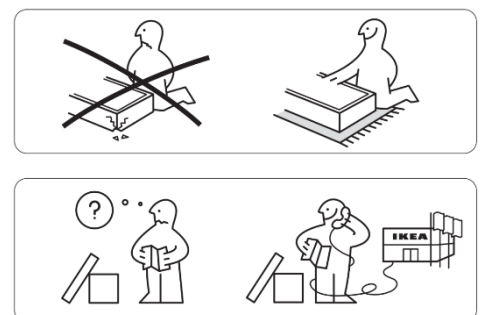


## Awareness

As explained before the contact time with our products is very short. So if we want to inform the user we need to do this before they use our products. In this case a manual will not do the trick. In the standards we focus on the owner's manual to get the information for the safe use of our products, but how owner informs the user is not clear. This is a point where much can still be achieved.

## Integral Safety Vision

In the integral safety vision the focus is to get the message correctly to the person involved. This means we have to take into consideration human behaviour and culture. One of the first things we need consider is the way inform the users. Do we write a manual or do we inform the people with drawings. A great example of easy-to-understand-manuals are the IKEA manuals. No words are written in these manual so they are universal. The question is can this type of manual be used for our line of products?



We can use pictograms and some lift manufacturers have made their manuals like IKEA. The question is does the product lend itself to have a manual consisting of only pictures. To assemble a book case is different from installing a lift. What is the minimum educational level of the reader? The manual in question was not very clear even for me. But that could be because I don't have the minimum required educational level. So in my opinion we still have to write some texts to clarify the meaning of the pictures.

The use of written text leads to another problem namely language. This is an easy thing one may think. But if you look at how documents are translated made vital mistakes are made in the translation or important goes missing. Then the second question is which language do you need to provide the manual? Sometimes the language of the country is not enough. You can imagine that in a Chinese Embassy in France or Germany a manual in French or German will not inform the users correctly.

The next step is to make the manuals clear and easy to understand. So no complex wording or terminology only known to lift people can be used for example there are many refugees in the world. These people speak a foreign language and may never have seen a lift or escalator and don't know how to use them properly. In the risk assessment for these product we do not take this into consideration.

Then there is still the issue whether or not the manual is read by the real user! If you look at escalators they are installed in shops and airports around the world. Do we get instructions on how to behave on an escalator? Some may say yes, because there are pictograms when you enter the escalator. One cannot be sure if everybody looks at these, because nowadays we stare at our mobile phones or are having conversations with friends while entering the escalator. Then we have the parents who go shopping in the weekend with their children. Several times I have heard a parent telling his/her child to go play by the escalator. And we all know what can happen next. An escalator has a brake path of 3-4 steps. Childrens arms and legs are not that long. So we have to make the people aware of the risks. Not only with escalator but also with lifts. In 1991 the Elevator/Escalator Safety Foundation (EESF) started their program to inform children how to ride the escalators safely: The Safe T Riders program. In 2014 Liftinstituut started a safety campaign to inform the public in the Netherlands about the safe use of lifts and escalators.

Every year in November there is a safety week organized in the Netherlands and in North America. In the Netherlands Liftinstituut focuses on a certain topic to inform the public. The first safety week in 2014 was about the safe use of the escalator. The year after that was about how to behave in the lift in case of a malfunction. Even when organising an event like this you have to consider who do you want to reach? So if we want to reach children a radio commercial or tv commercial may not be the right approach as this would work better with adults. For children the best place to teach them about lift and escalator safety is at school, so Liftinstituut developed a program for the safe use of escalators which can integrated in the lessons of school. To inform the people on how to react when the lift is stuck, Liftinstituut arranged a temporary lift in the square of a city and let people experience at first-hand how it feels to get stuck.

Are we able to use these programs everywhere? Some parts can be used of course but it may not end up in the same results. A program made for Dutch children may not get the same results in for example Japan.





As explained before you may need to develop your program in multiple languages. In Belgium there are two/three official languages, in Switzerland even four. To develop these kind programs costs a lot of money. Some governments will not prioritize lift and escalator safety. The EESF in the North America for example is completely depending on donations. Liftinstituut thinks it is his task to provide safety for people who use lifts and escalators. It is in our DNA.

### **Conclusion**

To improve the safety of escalators and lifts we do not need to just comply with the standards. Even when products are complying to the standards accidents can happen.

People's behaviour is part of their culture, the effectiveness of methods to improve safety may differ depending on said culture. With products being installed worldwide according to the same standard, we may oversee certain risks unintentionally, therefore a manufacturer has to consider more than just safety standards and provide manuals.

The interaction time of the user with lifts and escalators is very short. The user is not always properly informed. People are assumed to know how to behave around or with / operate these products. There is a limit to the effectiveness of the provided information by the manufacturer / installer. This is the reason why there is a need of informing users in other ways. The introduction of a safety week is a good way to get attention for the risks involved in the use of lifts and escalators. These programs have to match the culture of the country and the intended persons.

### **References:**

[www.liftinstituut.com](http://www.liftinstituut.com)

[www.liftinstituut.nl](http://www.liftinstituut.nl)

[www.eesf.org](http://www.eesf.org) Safe T Rider Program

### **Biography**

Robert Kaspersma has over 22 years of experience with the European Directives (2006/42/EC (machines) and 2014/33/EU (lifts)) and European Standards (EN 81 series). During his work he works with the latest ISO standards (ISO 9000 series, ISO 14178 (Risk Assessment), ISO 8100 series). Since 11 years Liftinstituut is an Accredited Elevator/Escalator Certification Organization as such Robert Kaspersma is involved in the certification according the ASME standards (ASME A17.1/CSA B44 and ASME A17.7 / CSA B44.7).

Robert Kaspersma is involved in different standardization and working committees. As such he is a Vice Chair of New Technology Committee ASME A17.7 / CSA B44.7, and member of the Mechanical Design Committee ASME A17.1, Wind Turbine Elevator Project Team ASME A17.8, Notified Body- Lifts, Safety Components working group and CEN TC10/ WG11, prEN 81-44: Lifts inside Wind Turbines