LIFTSAFETY IN THE NETHERLANDS

A.J. Lenskens, Eur. Ing., Liftinstituut (Netherlands Institute for Lift Technology), Amsterdam, the Netherlands

ABSTRACT

Described is the present day number of lifts and other lift-related installations in the Netherlands. In addition, the number and kinds of accidents are mentioned. Further described are the legal arrangements in the area of lifts, and the role of the Netherlands Institute for Lift Technology.

Introduction

First of all, I would like to begin by describing the current situation. What is being done in the Netherlands to promote lift safety, and how are these matters organised?

The current situation

Lifts with an enterable cage, in other words passenger lifts and passenger and goods lifts, are governed by the Dutch Hazardous Machinery Act and more specifically by the Dutch Lift Regulations.

These regulations stipulate that a lift must be inspected before going into operation for the first time, one year after commissioning, and subsequently every 1½ years.

Monitoring of the correct implementation of and adherence to this Act is carried out by the Dutch Ministry for Social Affairs, specifically by the Dutch Directorate General for Work and the Dutch Factory Inspectorate.

The Netherlands Institute for Lift Technology (Het Liftinstituut) is the sole organisation charged with carrying out lift inspections. The institute has been in existence since 1933, and is a foundation in whose governing body and committees there are many representatives of the interested parties, such as the users, lift manufacturers, the government, scientists, consultant engineers, energy companies and architects.

The institute has a number of committees, including:

- The Safety Committee.
  This committee draws up lift standards, and advises the governing body and the government in safety for lifts and lift-related installations.
- The Research Committee.
  This committee works in partnership with the Delft University of Technology on research into lifts and cables, at several sites including the transport technology laboratory at the Delft University of Technology.
- The Training Committee.
  This committee organises examinations for the diploma as a lift mechanic.

Besides housing these committees, the Netherlands Institute for Lift Technology is therefore an inspecting organisation with a little over 100 employees, of whom some 75 are inspectors. All our engineers, in principle, inspect all those installations which must be inspected by the Netherlands Institute for Lift Technology, generally also have a specialisation, such as hydraulics, electronics, regulated installations, movable suspended scaffolds, escalators etc.

Besides passenger lifts, which are tested on the basis of the legal regulations, the Netherlands Institute for Lift Technology also checks small goods lifts and escalators, on the basis of Dutch Municipal Regulations, on top of which various types of lift-related installation are checked on a voluntary basis.
The Netherlands Institute for Lift Technology also provides courses to lift companies and other companies aimed at advancing knowledge in the field of lift technology.

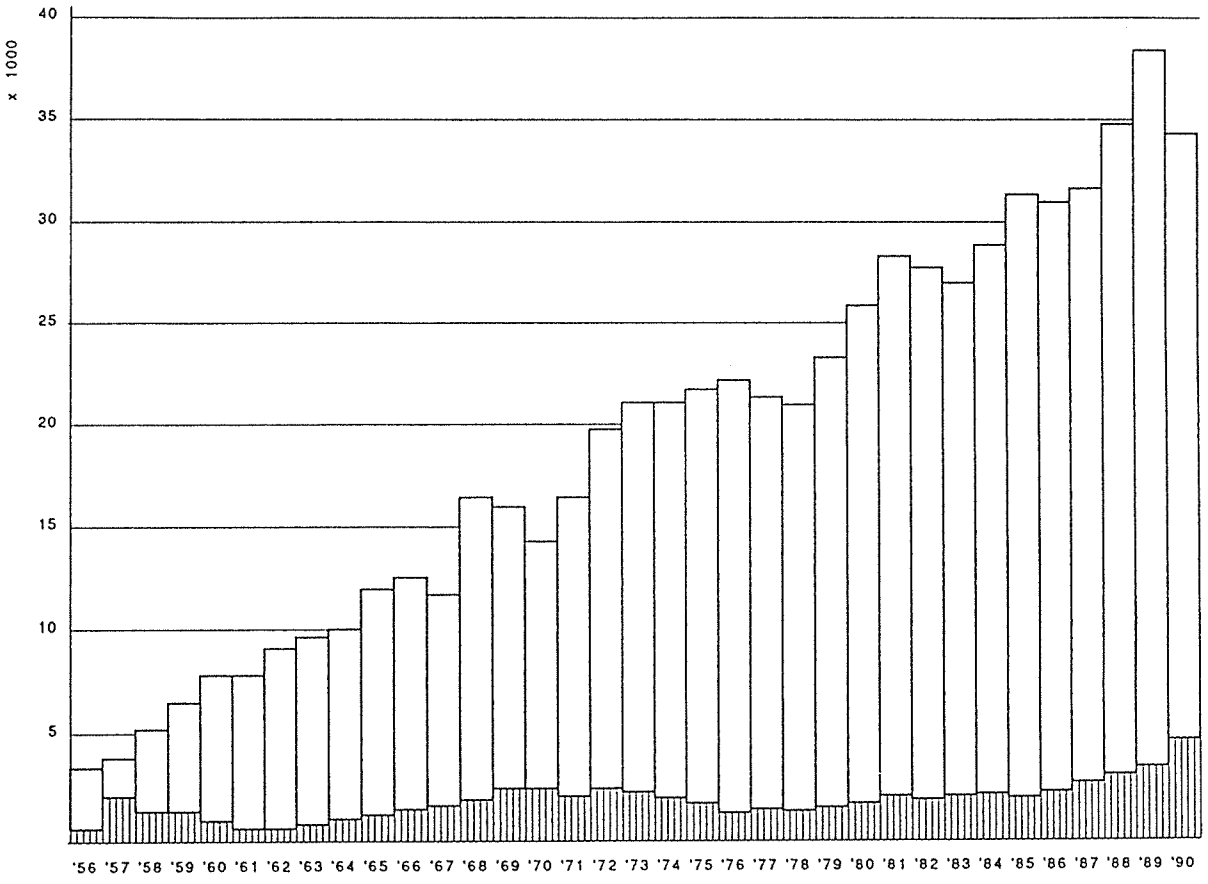
Currently, the following types of installation are inspected by the Netherlands Institute for Lift Technology:

- passenger and goods lifts
- construction site passenger lifts
- small goods lifts
- goods hoists

- raising platforms for passenger transport
- lifts for the disabled
- paternoster lifts
- escalators and moving footways
- stair gliders
- facade maintenance installations
- tower wagons
- warehousing equipment
- electrically driven hoists
- fairground attractions
- other related installations

Today, our database contains information on some 58,000 pieces of equipment inspected. This database is stored on the computer at the Netherlands Institute for Lift Technology, by postcode and address, giving technical specifications and inspect data.
Inspection planning is organised from our head office in Amsterdam, from where the owner and maintenance company are automatically informed every eighteen months of the coming periodic inspection.
In 1991, the Netherlands Institute for Lift Technology carried out 30,000 periodic and approximately 5,000 initial inspections.
In 1992, we expect to carry out 35,000 periodic and 5,000 initial inspection.

That, then, briefly describes the situation in the Netherlands



inspection carried out

▥ new/commissioning/reconstruction

— total

Accidents in the Netherlands

As soon as one begins to talk about lift safety, the question immediately arises: lift safety in comparison to what?

In comparison to road safety or air-traffic safety, or perhaps in comparison to the number of kilometres travelled in a year, or compared with lift safety abroad?

There has been very little published as to the last point. But one publication, however, is known to me, which originates at the A.I.B. inspection institute in Belgium, and dates from 1987.

In this publication, Belgium, West Germany and the Netherlands are compared from the point of view of lift safety. The safety levels in the Netherlands and Germany are approximately comparable, but in Belgium, according to this information, lift accidents occur approximately 7 times more regularly. This publication suggests that the stricter regulations in Germany and the Netherlands, as compared to those in Belgium, are the reason for Belgium's poorer safety record.

See figure on next page.

	BELGIUM	WEST GERMANY	THE NETHERLANDS
	1975–1984 (1)	1981	1975–1984
Deaths per year and per 10,000 lifts	0.8 to 1	0.14	0.1 to 0.2
Serious accidents per year and per 10,000 lifts	15	1.4	2

(1): These figures are based on a document produced by Fabrimetal, dated November 1984, entitled "Accidents caused by lifts".

The degree of lift safety is indicated by the number of accidents, for example, for every 10,000 lifts, as described above. However, if an attempt is to be made to avoid accidents, the type of accident which occurs must first be analysed. The type of accident gives an insight into the "unsafe" aspects of lifts, which means that technical improvements or solutions can be sought, leading to a reduction in the number of, or the avoidance of accidents.
For this reason, I have drawn up an overview of the number and type of accidents in the Netherlands, during the period 1960 to the fourth quarter of 1991. In other words, over a period of 31 years.
These accidents involve both maintenance personnel and lift users.

Lift mechanics

14 fatal and 39 serious accidents were registered by us, amongst mechanics and inspectors. The fatal accidents can be divided up as follows:

- 6 during the installation of a lift;
- 4 with 2 or more lifts in a single shaft;
- 4 during troubleshooting.

The 39 serious, but not fatal accidents, can be divided up as follows:

- 10 during installation, primarily as a result of falls, or jams;
- 25 accidents occurred during maintenance and repair, including 8 cases of fingers being caught between the bearing cables and the traction sheave; 5 other cases of crushing, between the cage roof and the counter-weight; 9 falls; and 3 cases of touching live parts;
- 4 during lift inspections, of which 3 cases involved crushing, and 1 fall.

Besides these, during the same period, 5 installers died whilst raising passenger lifts on building sites.

Users of passenger and passenger and goods lifts.

29 fatal accidents occurred amongst the users of passenger and passenger and goods lifts. These figures include 2 painters working on the roof of the lift cage, one female worker who died when opening the inspection door to clean the glass shaft, and one cleaner who died when cleaning the cage windows. A further 88 serious accidents are described in Notice issued by the Netherlands Institute for Lift Technology (Liftinstituut Mededelingen).

The 29 fatal accidents can be divided up as follows:

- 10 between the cage wall and a trolley or other object jammed against the shaft wall, in lifts without cage closure;
- 4 in the case of the lift moving off, with the shaft door open;
- 3 by falling into the shaft;
- 1 in a home lift for disabled people, from which the cage closure had been removed;
- 2 trapped in the threshold crack (2 children of 3 and 7 years), despite the presence of safety thresholds;
- 4 on the cage roof (including the 2 previously mentioned painters);
- 2 during cleaning activities on the cage or shaft windows;
- 2 as a result of stumbling in lifts which stopped unevenly;
- 1 as a result of the crash of an illegal lift.

The 88 serious accidents involving users can be divided up as follows:

- 21 cases of trapping in the threshold crack, in lifts with no cage closure;
- 13 crushings between the cage wall and a trolley or other objects jammed against the shaft wall, in lifts with no cage closure;
- 10 crushings between doors;
- 4 crushings as a result of missing glass in the viewing windows;
- 8 falls into the shaft well or the shaft;
- 14 falls, 12 caused by uneven stopping of the lift;
- 3 in the case of lifts "falling";
- 3 when lifts hit buffers;
- 2 during safety gear stopping or emergency stops;
- 1 when lift departed with door open;
- 2 boys playing on the cage roof;
- 2 as result of worm wheel axle breakage on a building site passenger lift;
- 5 others.

Besides the above-mentioned accidents, nine further fatal accidents are described in the Liftinstituut Mededelingen, on a stair glider, a passenger paternoster lift, a belt paternoster lift, a window cleaner's lift, a bosun's chair, a big dipper and suspended scaffolding.
The majority of non-fatal accidents are unknown to us, since there is no obligation to register these accidents in the Netherlands.

Conclusion and recommendations.

Lift mechanics and inspectors

Given the relatively small number of professionals in this field, (approximately 1,600 in the Netherlands), the percentage of accidents amongst lift installers and inspectors is still quite high. Although a great deal is already being done to ensure the safety of lift installers, it is still important to attach great attention to the following points, in order to reduce the number of accidents.

- safety during installation;
- safety precautions to prevent falls both during installation and maintenance

work.

- Safety precautions against crushing;
- Good and clear marking of live parts;
- Good lighting;
- Good lifting equipment;
- Good instructions;
- Good training;
- Protection in the presence of two or more lifts in a single shaft.

In order to reduce the risks on the last point, i.e. the danger of crushing with two or more lifts in a single shaft, the requirements for NEN–EN 81–1 in the Netherlands have once again been tightened up.

If the separation between two lifts, or a lift and a counter weight is less than 0.3 m, according to NEN–EN 81–1 and 2, a separating wall must be fitted.
In the Netherlands, thanks to the stricter regulations, a separating wall must also be fitted or a blocking switch for the next lift must be fitted on the cage roofs, if the separation is greater than 0.3 m, but less than 0.5 m.
A study was also carried out by the safety department of the Delft University of Technology, into alternative safety facilities instead of the obligatory minimum free space above and below a lift cage, for lifts in existing buildings.

Lift users

Amongst the users, the above–mentioned accidents clearly indicate the danger accompanying lifts without a cage closure, which played a role in the 10 fatal accidents caused by becoming caught between the cage wall and a trolley or other object jammed against the shaft wall, and the 34 serious accidents caused by a missing cage closure.
Since 1979, for newly–installed lifts intended purely for passenger transportation, a cage closure is obligatory.
The lift safety commission of the Netherlands Institute for Lift Technology has advised the government that by 1 January 2000 all passenger and passenger and

goods lifts, including those already installed in the Netherlands, should have a cage closure.
This advice has not yet been taken up in the form of a requirement, by the Dutch government.

A second danger which emerges amongst the users of lifts is stumbling over the cage– or floor threshold, often caused by the uneven stopping of the lift.
It would be certainly be advisable for the lift manufacturers, amongst others, to carry out more research into solutions which would avoid this phenomenon. This is of particular importance for homes for the elderly, care institutions, hospitals and blocks of flats.
Possibilities would be:

- accurate setting, and monitoring of stop differences during maintenance work;
- reducing the zones within which the doors open, or may be opened, for example by reducing the electrical zones, or reducing the mechanical locking zone;
- an automatic back–up command to move to another stopping position, if the doors fail to open after a certain period of time;
- electric regulation giving smaller stop differences;
- good threshold lighting;
- colour differentiation between cage floor threshold and floor surface;
- red stop light at cage and shaft entrance for unevenly stopped lifts, combined with an automatic back–up command to move to another stopping position.

It is not possible to compare lift safety with road safety. In a lift, a passenger has no influence on, or control over their means of transport. Very often, a passenger has no contact with the "outside world", and as such must have absolute trust in the safety of the lift. In this light, a lift can well be compared to a bridge; both in a lift, and on a bridge, there must be no room for doubt as to safety. After all, the lift has a bridging function between the various floors.

Lenskens, A.J. Eur. Ing.

Born: 1933

- Higher technical education in mechanical engineering
- Worked at AKZO, Arnhem, as technical designer and standardisation officer
- In 1961, became lift inspector at the Netherlands Institute for Lift Technology
- In 1968, became chief inspector of the Netherlands Institute for Lift Technology
- In 1991, became chief inspector/deputy managing director of the Netherlands Institute for Lift Technology
- Member of the Research committee, chairman of the working group
- Member of the Lift Safety Committee of the Netherlands Institute for Lift Technology
- Member of the Lift Mechanical Education Committee
- Member of the Netherlands Steel Wire Rope Committee
- Expert for CEN/TC10/WG1 and 2 (lifts and escalators) CEN/TC1O/SC1/Plenair (building hoists) and CEN/TC10/SC1/WG1