INTERNORDIC STANDARDIZATION
INSTA M/LIFTS 1989 - 2005

by Ilkka Mäntyvaara

Background

The Nordic standardization bodies established soon after the Second World War a common body which was called INSTA. It is an abbreviation for Internordisk Standardisering (Internordic Standardization). It is not an official legal person but an organ to promote the cooperation between its members. The Finnish Building Information Foundation was since the year 1972 a member of the so called INSTA Bygg (Build) cooperation known as INSTA B. In the year 1975 also a lift group was activated inside the INSTA Bygg using names INSTA B-4 and B-5. It had two meetings in Stockholm and one in Helsinki discussing mainly on bed lifts whose standardization was actual at that time in Finland as well as in Sweden and in ISO. After the Finnish standard on bed lifts had been completed the INSTA work was stopped. Issues related to lifts were also discussed in the 1970's in the so called NGL group which consisted of authorities and inspection bodies. This work was also stopped later.

New beginning for lift group

An INSTA lift group was established again in the end of the 1980's. This group has been called INSTA M/Lifts or the Nordic lift group (Nordiska Hissgruppen). The first meeting was called to Oslo on March 3, 1989 by **Odd Lyng** who was leader of the Norwegian Building Standardization NBR. At that time more and more EN draft standards were sent for comments and Mr Lyng hoped that the Nordic countries could agree on comments together in order to get more emphasis for them. He also wanted more cooperation between the Nordic lift authorities and inspection bodies. So he called to the first meeting representatives from authorities, inspection bodies and standardization organizations. From Norway the communal lift inspectors of Oslo and Trondheim as well as representatives of Norsk Heiskontroll attended the meeting. Sweden was represented by **Rune Granberg** from Arbetarskyddstyrelsen and **Arne Bajard** from Svensk Anläggningsprovning (SA) who were active members long time even later on. From Finland Lyng had called representatives from the Electrical Inspectorate and MET (Federation of the Finnish Metal industries). Only the deputy managing director **Onni Pirinen** of the Electrical Inspectorate attended. Pirinen had been acting as chairman of the committee which prepared the last national lift safety code in Finland and was quite familiar with lifts. In the Oslo meeting it was decided to call also representatives of the lift industry to the next meeting. The aim was, however, that there should be not more than three representatives from the same country in a meeting. Mr. **Roar Østby** from Norsk Heiskontroll was elected as chairman of the group and the secretary in Oslo was **Robin Johannesen** from NBR (Norges Byggstandardiseringsråd).

In the first meeting the Nordic countries reported on general level about their systems of lift legislation and inspection. Also the national deviations of EN 81-1 and 81-2 in the different countries were discussed. Denmark did not attend the meeting but they had sent in advance a written report on their systems. It was decided to have the next meeting in Stockholm already on April 4-5.

In Stockholm Finland was represented by Onni Pirinen, **Matti Kaakinen** (Kone) and **Ilkka Mäntyvaara** (Otis). Kone Sweden was represented by **Ruben Karnfält**. It was decided that four meetings will be held yearly, one meeting in each country. Each meeting will last two days. The secretariat will be kept by the standardization organization of the meeting country.

In the meetings each member was allowed to speak his own language, except the Finns should speak Swedish, and the minutes will be written in the language of the secretariat. It was the general wish that the Danes would try to speak the so called Skandinaviska (Scandinavian), but in most cases this remained only as a wish. The third meeting was held in Copenhagen and the fourth at the Electrical Inspectorate in Helsinki. In the year 1989 even a fifth meeting was held in December at Hyvinkää. It included a visit to the lift factory of Kone.

Activities in the early 1990's

Onni Pirinen attended the meetings in 1989 but decided then to step aside. He was replaced by lift inspector **Bertel Blomster** who retired in the mid of the 1990's. Ilkka Mäntyvaara continued alone to represent Otis. Kone was well represented. In the 1990's most meetings were attended by **Veli-Matti Vainio** and **Erik Relander** from Finland and **Ruben Karnfält** and **Gunnar Hagelin** from Sweden. Also Devehissar were sometimes represented. Rune Granberg from Sweden attended meetings for a long time. First he represented Arbetarskyddstyrelsen and after that IKH. Reber Schindler from Norway was often represented by **Arnfinn Breivik.** The first meetings in Finland were organized by the Electrical Inspectorate. In the summer 1991 MET (Federation of Finnish metal industries) joined the group, represented by **Arto Kivirinta**. After that MET took the secretariat and the meeting organization in Finland. Usually 10 - 12 peoples attended the meetings.

In the year 1990 each member country gave a summary of their national lift safety codes. Also the use of glass in the walls and doors of lift hoistways and cars was a topic of discussions. This issue had been studied in Sweden and they had drawn up detailed rules for the use of glass in lifts. They had also translated these rules into English and proposed them to be taken into the new edition of EN 81-1 and EN 81-2. Other Nordic countries promised to support this proposition and the Electrical Inspectorate started to apply these rules also in Finland. In the turn of the years 1991-1992 the inspection bodies formed an ad-hoc group which made a summary of the lift inspection practices in the Nordic countries.

The organization of the group

In the first years following organizations were generally represented in the meetings:

Sweden:
- Arbetarskyddstyrelsen (authority for goods passenger lifts)
- Boverket (authority for passenger lifts)
- S.A., later SAQ (inspection body)
- SIS/IKH (standardization body for lifting equipment)
- Kone AB (lift company)

Denmark:
- Arbejdtilsynet (lift authority and inspection body)
- DS (standardization body)

Norway:
- Norsk Heiskontroll (lift authority and inspection body)
- Communal lift inspectors
- NBR (standardization body for buildings)
- Reber Schindler AS (lift company)

Finland:
- Electrical Inspectorate (authority and inspection body)
- MET (standardization body for mechanical equipment)
- Kone Oy (lift company)
- Otis Oy (lift company)

The activities were partly financed by the Nordisk Industrifond which gave some money for the secretariat expenses. Later on some money was also collected from the attendants of the meetings. Also the Nordic Council was asked for financing but without result. The travel costs were mostly paid by the employers of the meeting participants.

The work program included mainly following items:

- collecting and filing of information concerning lift and escalator accidents, distribution of this information and preparing actions to prevent these accidents
- coordinating of Nordic points of view related to lifts including comments to directives and standards
- follow-up of the activities in CEN/TC10 and ISO/TC 178
- collecting information on inspection bodies and there methods and approvals
- preparing standards for lifts in areas which are covered by the national legislation, like repair, modernization and service of lifts

INSTA meetings have been an important forum for discussions and they have given the participants a lot of knowledge about the issues important for the lift industry and standardization. It has often been possible to base the discussions on the working papers of TC 10/WG1 and other working groups which were not publicly available.

Towards the new millennium

The circulation of the meeting places worked as agreed up to the year 1995. Then the Danes informed that they don't have money for travelling and they hoped that all future meetings would be held in Copenhagen. On the other hand they promised to take the secretariat for the next two years. During this time also Iceland joined the INSTA group but mainly by correspondence. In August 1997 one meeting was held in Reykjavik in order to get acquainted with the lift inspection and standardization in Iceland. In 1998-1999 the meetings were held in Stockholm and IKH took care of the secretariat. After that the standardization activities were reorganized in Sweden and IKH did not exist any more. The Swedish attendance was reduced and in most cases only Boverket was represented.

In the year 2000 the meetings were held again in different countries except Sweden. Since the year 2001 the meetings have been held mainly in Copenhagen. **Hans-Jørgen Larsen** retired from Arbejdtilsynet and established a consultant company of his own, called Liftconsult which took care of the secretariat. In the year 2004 the chairman Roar Østby retired and **Knud Løe** from NBR was chosen as the new chairman. In 2005 it was decided that also English can be spoken in the meetings and also the minutes will be written in English.

After the Electrical Inspectorate had been closed down in Finland the authorities were represented by **Heikki Viitala** of TUKES and the notified bodies were represented by **Vesa Haakana** of Fimtekno (later Inspecta) and some times by Suomen Hissitarkastus. From Sweden only **Jaan Karsna** of Boverket has attended the meetings in the last years. The representation of Finland was reduced in the end of 2005 when Ilkka Mäntyvaara retired and Otis did not send a new representative. Also TUKES and MET (later Federation of Finnish Technology Industries) decided that they will not participate in INSTA any more. After that new participants have come from Norway and Denmark. By December 2005 there had been 65 INSTA/M lifts meetings since the beginning in 1989.

Examples on discussed items

The following examples are based on the minutes of the meetings and on private notes by Ilkka Mäntyvaara.

Items related to directives

The first draft of the **Lift directive**, III/3822/90, which included also other lifting equipment was discussed already in 1990. Next time it was discussed in October 1991 after the lifting equipment for passengers had been moved to the amendment of the Machinery directive. Also in the first two meetings in 1992 there was a lively discussion on this amendment of the Machinery directive and the published draft of the Lift directive. IKH from Sweden had a lot of comments for both directives. They would e.g. have included the lifts without car doors up to 0,6 m/s in the directive. A part of these comments was forwarded to the Finnish authorities hoping that they could promote their acceptance in the Machinery committee of EFTA. Also Denmark was asked to support these comments because it was able, as the only Nordic EU member country that time, to attend directly meetings which processed the lift directive.

Even after the lift directive had been accepted and published it was subject of many discussions.

In 1996 Mr. Larsen from Denmark pointed out that because there are no harmonized standards for goods lifts and similar lifting equipment the notified bodies may use different criteria for approval and therefore the level of requirements may be different between countries. This may also cause that the inspection system may be different even in the Nordic countries depending on the type of lifting equipment and the directive it is belonging to.

The implementation of the new lift directive into national legislation was discussed. It should be done before the end of June 1997. Denmark has prepared a draft where the legislation has been divided into two parts: Construction of lifts (100A) and Use and inspection of existing lifts (118A). Denmark published the lift directive on Dec. 30, 1996 and Sweden on Jan. 2, 1997. In the meeting in January 1997 it was stated that Finland had not published it yet because of the high work load in the Ministry. The publication is being prepared and it will occur in February or March 1997 (in fact it occurred in June). The time table for publication in Norway was not clear yet. However, the Building law to be published in March will make a reference to the lift directive.

The **EMC-directive** was discussed 1996 because there were no harmonized standards for lifts. As for the national application of the on lifts following information was shared:

- Denmark can refer also to the draft standards (prEN 12015/16) if harmonized standards don't exist. The relevant authorities are Arbejdtilsynet och Demco. The directive is applied on completion of the lift.
- Sweden does not so far apply the directive on lifts
- Finland applies the directive on the lifts sold after 1.1.1996. The draft standards are accepted. The relevant authority is TUKES (Centre of Safety Technics)
- Norway had some doubts concerning the radiation and emission levels in the draft standards

The Standing Committee for lift directive has had its first meeting on June 9-10, 1997. Mr Karsna from Sweden had attended the meeting and distributed his memorandum of the

meeting. Six countries incl. Denmark, Sweden and Finland had implemented the Lift Directive before the meeting. Other issues discussed:
1) The meeting was called a working group meeting because ‘inofficial observers’ were present in addition to the official representatives of the member states. The observers were representing organizations like FEM, CEN and EEA.
2) Platforms for handicapped (LD/MD)
3) Stopping accuracy

In 1998 authorities in many countries felt that the final inspection made by a lift company is not very reliable even though the company would have a certified quality system and they are planning some additional controls. This is the situation in Norway and to some extent in Denmark.

In 1998 a new draft of **Machinery Directive** was under discussion (III/4101/97 rev. 3). The structure of annex 1 is different from the existing directive. The building hoists have now been included and in several clauses additional requirements for building hoists have been given. The possibility was discussed to give additional requirements for vertical platforms for the disabled in a similar way because they apparently will stay in the Machinery Directive.

According to the clause 2.2 of Annex I of LD the refuge spaces in the extreme positions of the car can be replaced by "other means" if the Member states accepts this. It was discussed in 1999 whether the Member state only can say "yes" or "no" for the "other means" or can it also decide what these "other means" are. The manufacturers were of the opinion that the Member state only can say yes or no but the Notified body then accepts the solution proposed by a manufacturer based on a risk assessment. This acceptance should be valid in all countries which have said "yes" for the other means. The Swedish authority was of a different opinion and said that the Member state has also the power to accept or forbid a solution. There was no common opinion whether or not this should be discussed in the Standing committee.

In 1999 SAQ was of the opinion that all national registration systems for lift contractors are against the Lift directive. Other countries did not agree.

The borderline between Machinery directive and Lift directive had been discussed in the Standing committee for Lift Directive in June 2000. The Commission would accept a speed limit (0,10 or 0,15 m/s) but the question of maximum rise is still open. Some safety requirements could be added into the Machinery Directive. In 2001 the general opinion in the INSTA meeting was that the safety level for lifting persons should be the same in both directives. This is not the case and there are still several ESR’s of the lift directive missing in the machine directive. Examples:

- no protection of people on the platform against crushing
- no requirement for two-way communication
- no protection against the movement of automatic doors
- no protection against overheating
- no requirement for emergency lighting
- no requirement for function in case of fire

In 2003 new standards of EN 81 series were published. There was a discussion who can prescribe where the new standards EN 81-70, -71, -72 and -73 should be followed. There was no clear conclusion. In Finland the building rules will give reference to EN 81-70.

In 2005 Jaan Karsna from Boverket told about the LD Standing Committee meeting which was held in November. The main topics had been the draft for Guide to application of the Lift Directive and the Amendment of Lift Directive caused by the amended Machinery Directive. Sweden had also proposed that information on the life cycle of the lift and its components should be included into the owner's manual. This was not accepted.

Recommendations for existing lifts

In 1996 the recommendations of the EU Commission concerning existing lifts were discussed first time. Already before the EU Recommendations Norway had prescribed photo cells to be installed in doorless cars to protect the entrance (normally 3 photocells in each car). A cost study concerning the installation of car doors has been made in Norway. Denmark does not rely on photocells but requires a light curtain. Due to the lack of labour force the time limits prescribed for the improvement works in Denmark cannot be kept.

In Sweden Boverket has made in 1997 a consequence analysis to the Ministry of the Interior concerning the implementation cost of the EU Recommendations. In Finland a similar analysis has been made by TUKES to the Ministry of Trade and Industry. They are going to send in May 1998 a letter to all lift owners emphasizing the voluntary fulfilling of four EU recommendations to improve safety of the existing lifts (car doors, stopping accuracy, two way communication and emergency lighting). They will also propose installing of a special warning sign in all lifts without car doors.

In 1999 Ilkka Mäntyvaara made a presentation on the draft of Safety Norm for Existing Lifts (SNEL) which has been made by the EFLA working group. The participants were interested and no one opposed this project. However, the Work equipment directive 95/63/EC has so far not been applied for lifts in the Nordic countries. The cost to upgrade existing lifts is a major problem. The standard EN 81-80 was published in 2003 and in 2004 there was a discussion in the Standing Committee whether the 10 recommendations should be replaced by a reference to this standard. Six countries were opposed.

EN 81-1 and EN 81-2

The national deviations to EN 81-1 and EN 81-2 were different in each Nordic country and they were compared in discussions in the year 1990. Also information about the so called obvious errors was collected and discussed in the same year. In April 1990 Veli-Matti Vainio presented the work of an ad-hoc group of WG1 concerning the collection of information from the safety chain for control and monitoring purposes. The matter was discussed very lively and the results of this work have later on been included in the Annex H of EN 81-1.

The standards EN 81-1 and 81-2 were discussed thoroughly during the public enquiry in 1994-5 and a lot of common comments could be agreed on. They got more emphasis as they came from four different countries and most of them were accepted. In the end of 1995 the changes needed in EN 81-1/2 because of the lift directive were discussed.

Denmark was very strongly against the electrical anti-creep system as it may fail because of

- failure in the power system
- failure in the pump motor
- failure in the pump itself
- failure in the control system
- lack of oil in the tank

For this reason Denmark was in 1995 of the opinion that it continues to request a pawl device in hydraulic lifts. It could only be replaced by the electrical anti-creep system if there are special control points for

- power and pump system
- oil level in the tank
- installation (hose/pipe)

In 1996 one major lift manufacturer (Kone?) had complained about this to the EU Commission. The other Nordic countries were not willing to support Denmark. According to the last information Denmark has given up this requirement.

In 1996 the Swedish Health and Safety Authority had proposed that the requirements for stop switches preventing the starting and for emergency stop switches should be defined differently. It should be defined whether the stop switches required in machine room, pit and top of car should be stop switches or emergency stop switches. Mr Larsen proposed that CEN TC10/WG1/AH4 should make a risk assessment for this case. Finland, Denmark and Norway thought that the definition of stop switches in prEN 81-1/2 is acceptable because the same switch can fulfill in practice both requirements.

In 1996 overload devices were discussed. No Scandinavian country has so far general rules for overload contacts. There is, however, some experience that mechanical contacts are not very reliable. In a forthcoming meeting will be discussed what kind of electronic overload devices are available.

In 1996 Denmark and Sweden wanted to have a separate annex for A-deviations in EN 81-1 and -2. It is not enough that they were only mentioned in the Preface because it may be changed in the revision after 5 years.

In 1997 Denmark made clear that it wants to have the A deviations mentioned as a separate list in the EN 81-1. The text in the foreword clause 0.2.2 is not sufficient. Without the list they will not accept the standard. Sweden wants also the list but could accept 0.2.2 as a compromise.

In 1998 it was stated that CEN TC 10 has decided that the WG 1 should make rules for machineroomless lifts. Following locations for the machinery should be included:

- in the upper part of hoistway
- in the pit
- on top the car
- below the car
- on the side of the car

In the same year the documents ISO DIS 4190-5 (Control devices) and draft prEN 81-61 were shortly discussed. Finland and Norway had accepted the ISO DIS 4190-5 with comments but Sweden had given a negative vote. The WG 7 has not finalized the draft prEN 81-61 (later EN 81-70) yet but it includes now also the minimum car and door dimensions as well as a requirement for stopping accuracy (+ 10 mm).

EN 81-1 and -2 were approved in the final vote and published by CEN in the autumn of 1998. The Swedish and Finnish translations were ready for printing. In the Swedish translation the machine room dimensions have been given according to the Swedish legislation and the dimensions given in the original EN are in a foot note.

In 1999 WG 1 had continued to discuss about the machineroomless lifts, the latest document was N 419. It has been discussed mainly about electric lifts but Sweden has proposed that also the hydraulic lifts should be taken into account. It should also be noted that the screw lifts (prEN 81-5), guided chain lifts (prEN 81-6) and rack and pinion lifts (prEN 81-7) are basically machineroomless lifts. These draft standards have just been sent out for CEN enquiry. The working environment for machineroomless lifts is now being created for many decades to come.

The discussion about machineroomless lifts was continued in the October 1999 meeting of INSTA. On October 20 in the end of the first day a machineroomless lift of Otis in Stockholm was visited. Next morning the discussion was continued. Two experts of ergonomy from the Swedish Health and Safety authority were also present. Mr Østby told about a Thyssen machineroomless lift he had been inspecting in Denmark together with the Danish inspectors. The controller is in the hoistway on the uppermost floor level. There is a movable platform which is turned down with an electric motor and provides the standing level in front of the controller. The platform is about 0,5 m above the landing level and there is a horizontal distance of 220 mm from the hoistway threshold to the platform. Below the platform there is a gap where things can fall into the hoistway. The machinery is accessible only from the car roof and it is partly above the car. The general opinion of Mr Østby was that the safety of passengers is OK but the safety of mechanics is not on the same level as in EN 81-1.

The safety of mechanics is in many cases based on special instructions to be followed. However, if the service company is changed, it may happen that the new company does not get these instructions at all. In any case the service cost will increase with the time. The ergonomic points of view have so far been forgotten in the machineroomless lifts.

On January 26, 2000 in the end of the first day a machineroomless lift of Schindler (Smart) was visited in Helsinki. Next morning the discussion was continued. The lift has a normal geared machine with vertical shaft in the upper part of the well. The controller is quite small and situated on the door front in the uppermost floor. The frequency converter is in the well. The cantilever car is self supporting. During maintenance of the machine the car should be locked on place with a separate rod which is quite difficult to install. One could think that the mechanics are not using it.

The interpretation requests for lifts and escalators were discussed in several meetings. In many cases a common answer could be found.

Lifs in existing buildings

In 1996 the proposal of CEN TC10/WG1/WT3 (N 337) was discussed. Sweden had sent their comments to the secretary of WG1. The meeting had following general comments:

- the document has been written in bad English, the language errors should be corrected
- the numbering of clauses should be the same as in EN 81-1.
- the safety philosophy used means that we get different safety levels for new lifts in existing and new buildings. This is against the principle used e.g. in the Swedish standard SS 2097-4. However, all countries were willing to accept N 337 because the total safety in a building with a lift is anyway better than the safety without a lift due to the big amount of accidents in staircases.

In the next meeting it was discussed again whether we can accept two different safety levels (new and existing buildings). Also the definition of existing building should not be in the

standard but in the national legislation. Automatic stops to limit the travel are not sufficient. Also manual stops are needed for psychological reasons.

The draft prEN 81-11 had come to the 6 month enquiry in 1998. Denmark informed that they are against this standard because they don't accept two different safety levels. The other Nordic countries could accept this standard with some comments. However, Sweden does not accept the wording "equivalent safety" used in the Foreword. It should be appropriate or sufficient safety. In general the English language should be checked one more time.

As for prEN 81-11 the unanimous opinion of the meeting in 2000 was
- no new enquiry is needed, the final vote should be taken as soon as possible
- a member country can only allow or forbid the "other means" according to LD
- Annex I clause 2.2. The technical solution shall be approved by a notified body.

The situation according to the clause 2.2 of Annex I of LD in the Nordic countries was discussed again in 2005 (low overhead and pit).
- DK: Arbejdtilsynet gives dispensation case by case if normal distances are considered impossible
- NO: Authorities give the permission case by case and NB must accept the solution
- SE: Basic permission has been given in the legislation and the local building inspection should accept that dimensions acc. to EN 81-1/2 are not possible. NB must accept the solution.
- FI: The permission for existing buildings has been given in the legislation. Lift company and the customer decide whether dimensions acc. to EN 81-1/2 are impossible to reach with reasonable costs. NB must accept the solution.

Maintenance instructions - TC 10/WG 5

In 1996 Mr. Larsen was of the opinion that CEN TC 10 does not sufficiently take into account the Articles 100 and 118 A in the Treaty of Rome. One example is the WG 5 which has taken the owner's obligations into the draft standard. In fact they cannot be in the standard they should be in the law.

The draft of WG 5 - Maintenance instructions - was discussed again in 1997. Denmark and Sweden were of the opinion that the draft standard goes beyond the mandate of the WG. It cannot give requirements to service companies and to lift owners because it is based on Art 100a of the Treaty. At least the word 'service company' should be replaced by 'service person'. Anyway the standard will come to conflict with national rules concerning the maintenance of lifts. A 4 page promemoria on comments to the draft was distributed by Sweden. The general feeling was that all authorities in the Nordic countries will be against the draft standard.

The draft standard prEN 13015 had come to the 6 months enquiry in 1997. The first reaction of the authorities in all Scandinavian countries has been negative. The working group has gone beyond their mandate. The obligations of lift companies and lift owners cannot be prescribed in a standard which refers to a directive according to Art. 100a of the Treaty of Rome. The standard is going to overlap national regulations in all Scandinavian countries. In some cases it requires more, in other cases less than the national regulations. Denmark, Sweden and Norway are going to vote 'no with comments'. Finland has not decided yet.

Fire doors (EN 81-58)

The 6 months enquiry time has been finished in the end of 1997. Finland has voted "yes" with comments mostly given by the Fire laboratory of the State technical research center. Sweden has voted "no" following the opinion of Boverket, the lift authority. Boverket thinks that lift doors should be tested in the same way as normal fire doors and they consider the gas tracer test as unreliable. Voting results of Norway and Denmark were not known.

In 1999 it was stated that the comments for prEN 81-8 have been handled and the standard will come for final voting in the spring. Germany has proposed as the maximum time for flaming 15 min instead of 10 seconds! A major problem is that the acceptance criteria are different in different countries. Sweden and Finland continue to require EI doors. However, it seems that the definition of I (insulation) will be different than before. The temperature limits outside the furnace would be:

	average	max.
Previous classification A	280° C	330° C
New classification EI	140° C	180° C

This would make all existing A 60 doors useless. EI 60 doors should have a thicker insulation.

In 2005 there was (again) a discussion concerning fire doors for lifts. TC 10 and TC 127 have agreed on that EN 81-58 is an acceptable test method for lift doors but tests according to EN 1634-1 (building doors) will also be accepted. However, EN 81-58 is still not accepted in some countries, e.g. in Denmark. Also the required fire classes are different in each country. If there is a hoistway with walls in fire class EI 60 the landing door should be (according to the meeting participants):

- NO: E 90 (old F 90)
- FI: EI 30 (E30 may be accepted if distance to burning material > 2 m)
- DK: Rules are unclear, written rules different from practice
- SE: EI 60? Building rules quite complicated, see BFS 2002:19, clause S:676

EN 115 - escalators

In 1996 CEN TC 10 had proposed to eliminate the restrictions in point 5.1.5.8 concerning the centrally positioned hand rails. Sweden, Denmark and Norway are against this proposal because they think that it would reduce the safety. Moreover, they think that there cannot be sufficient experience on this matter because the standard was accepted only a few years ago. Finland will support the proposal. Similar escalators were used in Finland before the EN 115 came valid and no accidents have occurred due to the hand rail.

In 1999 WG2 was starting to update EN 115. For that a risk analysis should be made for each clause. British Rail does not accept cast steps for escalators and has its own test methods.

ISO standards

The standard ISO DIS 4190-1 was studied in 1997 in order to find common comments for the Nordic countries. Most comments were of editorial nature. Sweden is totally against the standard, mainly because of too large dimensions in general and especially for the machine rooms.

The standards ISO 9386-1 and 2 have been approved in the final vote in 1999 and will soon be published. However, they don't include all the ESR's of the Machinery directive and need some changes in order to be published as EN-standards.

TC 178/WG4 has continued the work for global safety code. Mr. Gibson has made in 1999 a biomechanical study of emergency stop (incl. running on safety gear and buffer)

Notified Bodies and NB-L

In Sweden the notified body SAQ had certified in1996 a vertical platform for disabled without any limitation for lifting height. The base for the certification is the Swedish national standard for 'Lågfartshissar'. In this way there is a high risk that, due to economic reasons, ordinary lifts are replaced by platforms. Then the safety level remains much lower. No car doors are required, there are no type approved safety gears and door locks and no protective space is needed below or above the platform. Only Sweden allows the 9 m rise, Finland, Norway and Denmark would like to limit the rise to 4 m but cannot forbid type approved lifting platforms.

In 1997 SAQ of Sweden has given type approval for a Norwegian vertical platform lift for handicapped, called TKS-A1. However, the final product does not conform to the approval. SAQ has given remark about this to the manufacturer. The door locking device was not accepted by the Norwegian lift inspection. In Norway the device must be equipped with EEC type examined locks. It is also very strange that the device has linked chains as suspension chains. Normally this kind of chain has only been accepted as compensating chain. Denmark will not allow the use of this device even though it is CE marked. If somebody tries to install it in Denmark, Arbejdtilsynet will forbid it and inform the EU Commission. It was told that Thyssen is now selling this device in several countries.

Sören Juhlin reported on the 3rd meeting of NB-L in June 1998 and distributed the minutes. Some interesting points:

- old EEC type examination certificates cannot be used after July 1, 1999 but they may be modified to EC certificates by the Notified Body without new tests
- a working group comprising representatives of Industry and NB-L is making requirements for the final acceptance of lifts according to annex VI of the Directive using the FEM document as a basis.
- an ad hoc group has been establish to change information concerning pipe rupture valve tests
- it is not clear yet how wide the variation of parameters of a model lift could be. The Industry and Notified Bodies have different opinions

Bengt Ivarsson (SAQ) reported about the last NB-L meeting in 1999. There were no minutes of the meeting available but the main items discussed were the definition of model lifts and the common check list for the final inspection made by notified bodies. In Sweden there are already five notified bodies but only SAQ has attended the meetings of NB-L. In Finland there is so far one notified body. In Denmark there are no notified bodies and in Norway there is one.

The Swedes were worried about increasing competition between the inspection bodies which might result to decreasing safety level with short inspection times. There are at least six notified bodies in Sweden inspecting new lifts. Inspections of modernized lifts and periodic inspections of existing lifts are made by bodies authorized by Swedac. Most of them are also notified bodies.

In 2000 Vesa Haakana of Fimtekno referred the last NB-L meeting. There are so far 89 notified bodies, 11 of them from the Nordic countries. In the meeting a draft for "NB-L Recommendations of use" had been distributed. It was not clear what the status of these recommendations will be.

In 2004 25 NB's were present in the meeting, 3 from Sweden, 2 from Finland one from Norway. The implementation of EN 81-80 in different countries was discussed. It was also discussed about the transition period of new or updated harmonized standards. 6 months were proposed.

Nordic standards

One target of INSTA/M Lifts was to create Nordic standards. The first item discussed was the discard of lift ropes. In Finland a standard for discard of lift ropes (SFS 5620) had been published in 1990. This standard was translated into Swedish and studied in the meetings in 1994. It was accepted by all countries. The Nordic standard for discard of lift ropes was published in 1995 under the number of INSTA 730 in Finland, Sweden and Norway.

Sweden had published in 1994 modernization standards SS 2097-4 and -5. Denmark and Norway were interested to establish a Nordic standard for modernization based on the Swedish standards. Finland was not so eager. If a standard is made it should be more a recommendation than a binding rule. The question had been discussed in several meetings based already on the draft standards published in 1990 but no Nordic project was started. The way of presentation used in the Swedish standards was not generally accepted. However, in 1995 Denmark drew up rules for changes in existing lifts. They have been sent to EU for notification and will probably be published in 1996.

In 1995 it was decided to draw up a Nordic standard for discard of chains based on the existing Finnish standard SFS 5614 which had been published also in Swedish. However, Sweden (mainly Stockholm Underground) wanted to have more exact rules for discard of escalator step chains and wanted to put a working group to make these rules. Unfortunately they could not finance this group. The chairman asked the countries to study the possibilities for financing before the next meeting.

In a meeting in 1997 the Swedes stated that the Finnish standard which has been proposed to be approved as an INSTA standard does not sufficiently take into to account the problems which may occur in high rise escalators like those installed in the Underground of Stockholm. They have asked for money to the working group from other countries. So far Sweden has promised SEK 30000,- and Norway SEK 15000,-. Finland and Denmark were not interested. However, it is not sure any more whether Mr. **Ronald Petterson** from Stockholm Underground is still willing to act as convenor of the working group.

Finland proposed a simple addition to the standard which includes measuring the distance between the steps on both sides and if the difference will exceed 4 mm the step chain should be discarded even though the distance between the steps would nowhere exceed 6 mm. This could be used if the working group cannot be established.

In 1998 it the discard of lift and escalator chains was discussed again.
Sweden is still interested in this work but so far no members to the working group had been found. The manufacturers are apparently not interested to give information like

- expected life time of chain
- measurable criteria for the discard of chains

- whether only one part of the chain may be changed

The work could be based on the Finnish standard SFS 5614 by adding requirements for escalators
- distance between steps
- distance between step axles
- differences in the lengthening of the step chain on different sides
- possibilities to adjust the tension of the chain

In 1998 Sweden informed that Mr. Ronald Petterson will collect a working group and make a work plan to the next meeting. The work will be financed by Sweden and Norway.

As decided in the last meeting Mr. Ronald Petterson had made a draft for project plan and mapped possible members for the working groups. The work will be started as soon as a sufficient amount of members has agreed to participate.

In the spring of 1999 the work had still not started because the working group had not been collected by IKH. Now IKH promised to start collecting before end of August.

In 2000 the working group had been collected and Ronald Pettersson had been named as convenor. As agreed earlier the project will be financed by the Sweden and Norway. It was agreed to ask for additional financing from Helsinki Underground. The Finnish standard SFS 5614 can be taken as a basis but the requirements for discard of escalator step chains must be revised.

In the end the working group did not start at all. The lift companies were apparently not interested. The only interested part was Stockholm Underground.

Recording of accidents

Lift accidents were one of the most important items to be discussed in each meeting.
However, it was difficult to find a way how to record the accidents. In 1996 it was decided again to draw up a common lift accident statistics for the Nordic countries.

In 1997 a common form was agreed on to be used when reporting the lift accidents to IKH Sweden who will then keep the Nordic statistics. Each country has to decide who will send the accident reports to IKH. It was discussed in what extent the accident descriptions can be made public. So far the descriptions did not show the name of the victim nor the manufacturer of the lift. This practice will be continued when IKH is collecting information from Nordic countries. It was stated that also TÜV and EEA are collecting accident information.

It was decided to add in the Nordic accident registration form also the information on type of equipment, identification of the defect part and identification of the part causing the accident. The code system of Boverket (Sweden) will be used for this. IKH will study if an electronic data file for lift accidents could be created. Unfortunately IKH was closed down in 1999 and it was never able to start the recording of accidents.

In 2004 a new internet based recording system for lift accidents was planned and the Nordic Council was asked for financing. However, no money was received and up to the end of 2005 no new solution had been found.

Accident statistics

In addition to accident descriptions annual accident statistics were regularly handled in the meetings. Here are some examples:

In Denmark a statistics on serious lift accidents in 1990 - 1996 had been drawn up. There had been 20 accidents. One of them was fatal.

In Sweden 37 lift accidents occurred in 1995.

- 12 accidents to lift erection mechanics causing 367 sick days
- 8 accidents to service mechanics causing 97 sick days
- 17 accidents to users causing 154 sick days.

Denmark distributed a report of lift accidents in Denmark in the years 1990 - 1997. There were 28 reported lift accidents of which 14 occurred because the lift had no car door. In 1997 already five accidents had happened, all of them in cars without doors. There was a lot of material damage but only small injuries to the passengers.

In Finland 30 lift accidents have been registered in 1997. Most of them had only minor consequences. 14 accidents have occurred due to the missing car doors.

Sweden presented a statistics on lift accidents in 1996. It included only accidents to people at work. In total 48 accidents, including one fatal, had been recorded causing 1143 days of lost working time. 13 accidents occurred to lift mechanics, 11 of them at service or repair work.

Sweden also presented a statistics on accidents to lift passengers (not work accidents) in 1997. 18 incidents or accidents had been recorded, only five of them causing bodily injuries.

In 1996 in Norway there were 1 fatal accident, 1 serious injury for a person and 6 almost accidents.

In Finland 30 lift accidents have been registered in 1997. Most of them had only minor consequences. 14 accidents have occurred due to the missing car doors.

Denmark had sent a statistics of lift accidents in 1998. The list included 14 accidents, seven of them causing passenger injuries. Five of the accidents were caused by missing car doors.

Finland distributed a summary of lift accidents in Finland in the year 2000. It included 11 accidents. There was one fatal accidents in a lift without car doors. There were five more accidents in lifts without car door. In three of them bones were broken, other were minor. Two accidents occurred in escalators and one in a platform for handicapped, the latter having only material damage.

Denmark distributed a statistics about accidents in cars without doors. Installing of car doors begun in Denmark in 1997. Since then the number of accidents has been reduced as follows:

1997 11 accidents, one of them fatal
1998 4 accidents, one of them fatal
1999 2 accidents, no fatal
2000 1 accident, no fatal

Examples on accident reports

The handling of accident reports has been a very informative and instructive part in the INSTA/M meetings. The analyzing of the causes of the accidents has helped to understand the reasons behind the safety rules and standards and the importance to follow them. The following examples have been shortened from the original reports.

(1990) A 5 years old boy was killed in a lift without car doors when he tried to come out from a car trapped between floors through the broken window of a landing door. Five more accidents were registered due to cars without doors.

(1995) In Sweden one mechanic got his fingers crushed between escalator steps and comb. He was testing the individually moving comb teeth pushing them with a screw driver when the screw driver went under the teeth and the step pulled the screw driver and the fingers under the comb. The escalator was stopped with stop button. The stopping distance was longer than allowed in EN115. The escalator was an old type by Schlieren.

(1995) In Oslo a worker was killed in a lift without car doors. He was crushed between the open hoistway wall and a waste container he was transporting in the lift.

(1996) This spring a similar fatal accident has occurred also in Sweden.

(1996) From Sweden one incident was reported where the lift was running with open landing door but no accident occurred. It was a Schlieren lift where a double coil relay has been used to control the opening of the door. One coil has been connected before the door contact and the other coil after the door contact. There was a short circuit between the coils.

(1996) In April 1996 a fatal accident occurred in Hamar Norway. This lift was a panoramic lift having a 2,5 m high hoistway enclosure of glass on the lowest landing. There had been water in the pit and a heater blower had been brought into the pit for drying. One of the glass panels of the hoistway enclosure had been taken away for easier access to the pit. One employee of the lift owner was told to take the lift into use again. He went to the 1,3 m deep pit through the opening in the glass enclosure not using any ladder and pulled the emergency stop button in the pit into running position. The main switch had not been switched off and consequently the lift started to run downwards. A colleague warned him and he tried to come out of the pit through the opening in the enclosure. However, there was not time enough and he was crushed between the car and the pit wall.

(1996) Many of the user accidents are caused by stumbling due to bad stopping accuracy. It is not understandable that prEN 81-1 does not include any rule for the stopping accuracy in new lifts but EU Commission is recommending + 10 mm accuracy for existing lifts. prEN 81-1 should be changed before the final vote. In one of the accidents due bad stopping accuracy a wheel chair overturned and the passenger died.

(1996) In Sweden four accidents have occurred where passenger was pushed against the car rear wall by a waste container which got stuck at the hoistway wall in a car without doors. One of them was fatal. A similar accident occurred in September in Finland resulting to six broken ribs.

(1996) In Norway there was one stumbling accident where a passenger broke his hand because the car light was off and the emergency light was so dim that he did not see the threshold between car and landing.

(1997) A fatal accident occurred in Finland in December where a passenger was pushed against the rear car wall by a waste container which got stuck at the hoistway wall in a car without doors. In Sweden one painter working on top the car got his leg injured because the lift mechanic had made a provisional and illegal wiring to drive the car which had no inspection switch.

(1997) an accident occurred in a 4500 kg goods passengers lift having large double swing doors. On one door the locking angle which together with the lock bolt keeps the door locked had broken and the door could be opened even though the car was not behind it. Because of this one person had fallen down to the pit. Fortunately the injuries were not very serious. This type of lock was used in the Swedish Nykroppa doors between the years 1984-1991.

(1997) In Sweden an "almost accident" had occurred where the lift ran with open doors because metal chips had got into door contact.

(1997) In Sweden one accident was reported where the lift stopped between landings and opened the automatic car door. There was a 25 cm gap from car sill to hoistway wall and a 2 year old boy, who for some reason was alone in the car, fell through this gap to the pit.

(1997) There was one incident in Sweden where an escalator was running with one step missing. It had fallen into the lower end of the escalator. The escalator was a Schlieren escalator from the beginning of 1960's and it had no detection for missing steps.

(1997) In Norway some minor accidents had happened. In one case a hydraulic lift went with full speed to the upper buffer. Even though it was the hydraulic buffer of Deve with 25 mm stroke the suspended ceiling in the car fell down on a passenger who, however, was not injured.

(1997) In Finland there was again one accident where a waste paper container had fastened at the hoistway wall of a lift without car doors. The incident was quite new and more accurate information was not yet available.

(1998) Denmark informed about 4 lift accidents since July 1997. Three of them were due to missing car doors and one due to a bad stopping accuracy. In November 1997 there was a fatal accident. It occurred in a nursing school where a student nurse was wearing her arm in a bandage with one sleeve empty. The empty sleeve had fastened between the door and door frame when the swing door at the landing was closed and the lift started down. The student remained hanging on the sleeve and her head hit the car roof. The lift had stopped for some reason before the next landing. Then it started again and the sleeve was torn and the student fell on the car floor where she was found dead in the first floor.

(1998) Sweden informed about 2 accidents. In December there had been an accident when transporting a waste paper container in a lift without car doors. The container caught the hoistway wall and pushed to the chest of the person standing behind the container in the car. The person was injured on the face and the chest. In the second case no one was hurt but the lift was running with open doors because due to an electric fault the brake was opened without a running command.

(1998) Two accidents were reported from Finland. One fatal accident has occurred with a lifting platform for handicapped. The upper landing door could be opened even though the platform was on lower landing. A person in wheel chair went backwards to the lift and fell

down into the hoistway. The lift was built by a little company who did not know anything about safety rules or Machinery Directive and CE-marking.

(1998) In Helsinki there was an accident where a 2,5 year old boy fell into the pit but was not hurt. He apparently remained between closed landing door and collapsible car gate in a lift which had been built in 1933. When the lift started upwards from the lowest landing he was standing on the car sill outside the gate and fell down through the side opening when the car started to move.

(1998) In Sweden has an accident occurred with a Skylift where two people died. The platform of the Skylift collided with the upgoing car of a building hoist located outside a building. The platform was overturned and the three men on it fell down about 25 m. One of them survived. Similar accident has occurred in Denmark earlier in this year but inside a building where a Skylift platform collided with the car of a permanently installed panoramic lift.

(1999) Two accidents with doorless cars had occurred in Finland. The arm of a girl was injured between the car sill and hoistway wall. The other case was a "near miss" were a refrigerator was transported in a small car and a student girl was sitting on it. The refrigerator was wedged between hoistway front wall and car back wall but the girl was not injured.

(1999) In Norway a five years old boy had been riding on the handrail of an escalator and fallen down on another escalator. In many cases the building authorities require an extra balustrade outside the escalator if it is possible to fall down more than 3 m. The normal escalator balustrade is considered to be too low.

(1999) In Sweden one accident has occurred where a person fell 3,5 m into the hoistway because the lift was running even though the door was not locked. The lock had an EEC type examination certificate.

(1999) In Finland one incident was known where a large piece of furniture was transported in a lift without car doors. Its lower edge was caught by the front wall and it was pressed against the back wall of the car so that the back wall was loosened. Fortunately the person in the car was standing close to the side wall and was not hurt.

(1999) In Norway two girls (8 and 5 years) were trapped in a car with automatic doors about 1,7 m above a floor. They managed to open the car door and also the hoistway door. Then they tried to jump to the floor. The elder girl succeeded but the younger girl fell 12 m into the hoistway. Surprisingly she survived. The car had a toe guard with a height of 790 mm.

(2000) In Norway one accident has occurred where a mechanic got electric shock from an inspection trap of a dumbwaiter. The trap door was not grounded and it became live due to an insulation fault on a wire. The mechanic survived but got burns. The voltage of the safety chain was 220 V. It was stated in the discussion that there may also be a lot of automatic doors which are not properly grounded. The protection for electric shock could be done only with a GFCI in the safety chain. Special risks for leaking current exist in maritime climate.

(2000) In Finland a fatal accident occurred in May in a lift without car doors. A repair man was transporting welding equipment in a cart in the lift. He was probably pushing the landing door open with the cart. Before the door contact opened the car started downwards by a hall call and the cart was jammed to the front wall and the shaft of the cart crushed the chest of the man.

(2000) An almost accident occurred in a platform for disabled in Finland. A cleaner put a floor polishing machine weighing ca. 30 kg on the platform and sent it to the lower floor. When she went downstairs and looked onto the platform the polishing machine was not there. Fortunately, she did not enter the platform because suddenly the machine fell down onto the platform. The shaft of the machine had got fastened on the balustrade of the upper floor and the machine remained hanging there until the shaft suddenly came loose.

(2004) In Oslo an accident had occurred with large material damage. A lift with a drum machine on below side had been modernized in the 1980's and a new drum machine had been installed on the old bed. However, the new machine had been fastened only with 4 bolts instead of the 6 used before and the outer bearing with 2 bolts instead of the 4 used before. The bolts had been tightened against the inclined edge of a U profile which caused bending stress on the bolts. In the 1990's power operated car doors had been added which increased the car weight. Probably last year one of the fastening bolts had broken. This year all bolts broke and the lift machine was thrown upwards by the ropes, the drum was broken, the ropes fell from the pulleys and the balancing weight fell to the pit. The car was in the lowest floor but the falling balancing weight remained in the guides and the car was not damaged. The cause of this accident is insufficient planning of the modernization and may be missing skills of the mechanics. However, the risks have been noted neither in inspections nor in maintenance.

(2005) In Norway a machine sheave shaft with three bearings had broken and the car with three passengers fell several meters but was stopped by safety gears. The machine was at the side of hoistway and the ropes jumped out of the sheave. Consequently also the counterweight fell down but was suddenly stopped by one of the ropes which was jammed somewhere. The sudden stop made the counterweight to break in pieces which fell down to the pit. Fortunately, the passengers were not injured. To prevent this kind of accidents the shafts with three bearings should periodically be checked with ultra sound measurements.

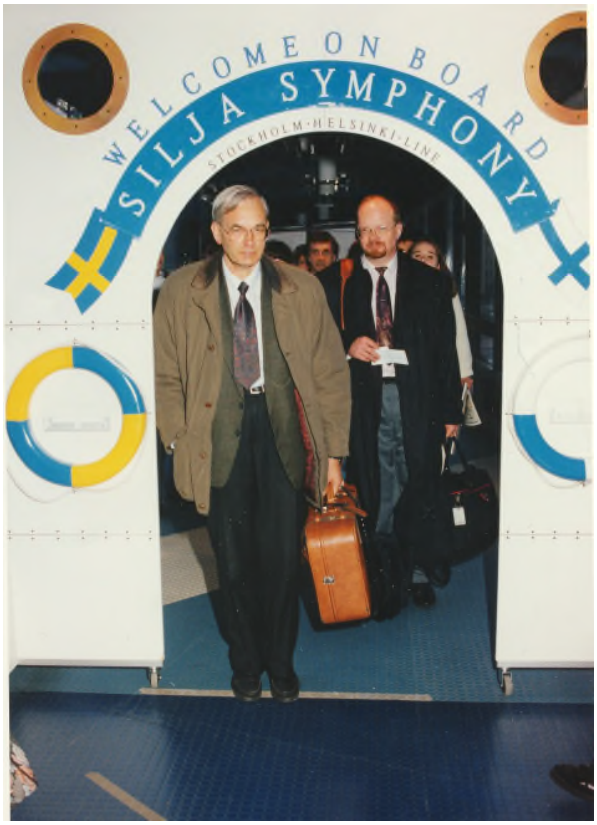
(2005) In Sweden one person has been killed in a car without doors when an oil barrel was caught by the front wall and the person standing behind the barrel was crushed against the car wall. There had also been a stumbling accident where the leg of the passenger was broken. One person had got electric shock from the gate contact of an old lift. He had closed the gate with keys in his hand and the keys touched the contact having a voltage of 230 V. The hand was injured.

(2005) In Denmark a fatal accident had happened at a stair lift transporting wheel chair. A man drove with an electric wheel chair too fast on the platform and fell over the platform. He was strangled between the wheel chair and the protective barrier. Also in Denmark there was an accident where a little boy got electric shock from a door contact. In this case the control voltage had been increased in modernisation from 24 V to 230 V but the door contact had not been changed (a 16 mm hole).

(2005) In Finland there has been one case where the mechanical brake remained open when the lift had stopped by electric braking. Consequently the car started to move up with accelerating speed. The passenger jumped out of the car before the doors were closed. The counterweight hit the oil buffer with overspeed but there was no material damage.

INSTA M/Lifts meets in Stockholm in 1990

Back towards camera chairman Roar Østby, from the right Matti Kaakinen and Rune Granberg, at the end of the table Ruben Karnfält, from the left Ilkka Mäntyvaara and Bertel Blomster.



The Finnish delegation returning from a meeting in Stockholm in 1993.