

Regulations and tests in the Italian lift history [from its origins to the present time]

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Elevatori Magazine, Milano, Italy.

ABSTRACT

Lifts in Italy have been subject to a safety testing system since 1927, when lifts were still considered a luxury. Since that date, jurisprudence and technical safety standards have been in constant evolution imposed by institutional changes technological progress. The only constant element is that the testing and supervision procedures have always been a prerogative of Public Bodies. Following the enforcement of the European Directive institutional reforms are being carried out, representing a traumatic change to Italy's traditions. This paper looks at the history of testing, supervision and use of lifts in Italy and concludes with the reforms being carried out.

Biographical Notes

Carlo Distaso received his school education in Urbino, attended high school in Rimini and graduated in mechanical engineering in Rome. His career started as a teacher at a professional institute, where he was promoted to deputy headmaster. He then was successful in gaining a post at ENPI's Milan office. ENPI is the former Italian national body for safety at work. For some 21 years Eng Distaso has been Editor in Chief at Elevatori. Recently he founded the Technical Control Institute, which handles consultancy and the testing of lifts.

Editors note:

The poor quality of this paper is owing to its receipt being by fax and not as CRC. No Abstract or Biographical Notes were included. These have been added.

The origins

If you ask to an Italian lift man, with a little passion for history, when do the first installed Italian lifts do go back, he won't hesitate and will surely answer Archimedes from Syracuse (336 BC). If this lift man is also an engineer he would continue mentioning Marcus Vitruvius Pollio, who in 26 BC, under the rule of emperor Caesar Octavianus Augustus, described the lifting machines used to take gladiators and beasts from the Colosseum basement to the arena level. Moreover if this lift man, engineer and founder of history, comes from Southern Italy, he would be proud to say that in the mid of the past century, in Naples royal palace there was a lift to transport Their Royal Majesties Francis II Bourbon and Sofia Asburgo Lorena.

For sure it was a human-powered lift. A luxury good reserved to few privileged people. But there is something good in privileges. As time goes by the number of privileged grows. This is why during the first decade of this century in Palazzo Montecitorio (the Italian Senate) on the lift door there was a sign saying "Members of Parliament only".

The first regulations

In 1927 in Italy there were a little more than 1,000 lifts in service. They were enough to convince the Minister of Public Works of the necessity to make His Majesty Vittorio Emanuele III Savoia, King of Italy for the grace of God and will of the Nation, promulgate the Royal Decree no. 1404, 23 June 1927. We do not know if something serious occurred to convince the Minister of Public Works that it was necessary a decree to protect users' safety. In fact we don't have any statistics of the accidents occurred in that period. We can only work them out from the decree first paragraphs. Paragraphs 2 and 3 state that the car must move inside an its own space; no admittance is allowed apart from personnel; and it must provide that no one could insert in it his head or part of his body. Then we understand that most of the lethal accident might have occurred because of the fact that there were no barriers to stop people to get close to the lift moving parts (i.e. car or counterweight).

Unfortunately, paragraph 3 safety requirements were not able to prevent that the bottom of the hoists were filled by porter's beheaded heads, trying to clean the safety devices even on from the inside. Beheaded, while leaning in the hoistway, by the car moving downward. The paradox is that although these accidents continued to occur, the successive regulations continued to consider sufficient defences 1.7 metres high. Then in 1963, as we will see later, the height was taken to 3,5 metres but only for those points less than 30 cm far from lift moving parts, and leaving the rest unchanged.

Even with this serious gap, the Royal Decree was an important step in lift safety regulations' history. It was a small decree: only a law paragraph and 21 regulations paragraphs. Nevertheless these 21 paragraphs do clearly underline the main risks involved in the use of a lift. These regulations introduced the use of electromechanical locking devices for the landing doors; safety electric contacts for the car doors; overspeed governors, safety gears in case of car downward overspeed; electric circuit insulation, connection of the metal masses to the ground to avoid electrical risks; 30 mm limits for the car and floor skirt to avoid shear effects; ropes safety coefficient, now limited at 8; ratio of the diameter of the friction pulley and the external thread of ropes for which a minimum limit was fixed even at 800. From some of these regulations it is possible to guess that the standard maker wanted to suggest some rules that at the time were not that clear, but as time passed, and experience grew, were more precisely defined and described.

Meanwhile it appeared an important matter. As regulations were produced and had the strength of law, then it was necessary to think of how make them be respected.

The controls

We have to recognise that from some point of view our ancestors had clearer ideas than us. In fact the 1927 regulation stated that the lift maintenance had to be carried out by a qualified company. This meant that the company had to demonstrate to be able to carry out its duty. But this is not all. Our ancestors thought that it was necessary to test lift installations before they were put into service; to test once a year. Moreover, the one carrying out all these operations had to be an independent company and not the constructor.

Our ancestors believed in an infallible, unbreakable and immutable life rule: the lack of controls will inevitably lead to transgression. What is a law worth of if nobody controls it is respected ?

Paragraph 18 of the 1927 regulation states that tests and annual inspections had to be carried out by personnel with a degree in engineering, depending from the Ministry of Public Works which had the possibility to delegate the tests on lift, not owned by the state, to ANPI (Italian National Association for Accident Prevention). At that time ANPI was a private body, created and managed by the association of industrialists. So 68 year in advance of 1995 we can see the same principle required by the European Directive 95/16/CE: a private body under the control of a public body (Ministry of Public Works) in charge for tests and annual inspections to lift installations.

This is not all. Before putting a lift into service, the Prefect - the State representative in each Italian Province - had to issue a licence. He was able to give the licence only after the favourable opinion of the ANPI tester engineer. The licence was effective for one year that it had to be renewed again after the ANPI's engineer's periodical test.

Before the testing operations were carried out the owner of the building in which the lift was going to be installed, had to send to the Prefect a complete technical documentation: design draws; the installation description; the constructor's name; the rated load and speed; the description of all the adopted safety measures. Then the Prefect could assign a matriculation number and give ANPI the service record on which the tester engineers marked the installation characteristics, the safety devices test results and his favourable opinion. When testing operations were concluded the service record was given again to the Prefect who signed the annexed licence form. Then the service record and the licence were given back to the owner who had to keep it in a place easily reachable by the tester engineer during his periodical inspection the next year. In the same record were recorded the results of all the successive six-month maintenance operations and annual tests.

The first updating of the law

Seven years after the first regulation there was the first updating of the law. In fact, on May 3rd 1934 was issued the Royal Decree no. 906. From its first paragraphs it is clear that concerning about people who get too close to the movable parts inside the hoistway are grown. Paragraph 3 says that: "Personnel only can enter the hoistway". Nevertheless no further safety measures were taken and the 1.7 metres high has remained unchanged continuing to behead porter's heads.

Something about ropes was added: they had to be of the flexible type and the pulley diameter/rope diameter rate had to be not less than 40.

This last Decree takes into account that architects already started to design panoramic lifts. Therefore it gives the possibility to install infrangible glass walls with a minimum resistance rate fixed by the Superior Council for Public Works.

Again it was stated that the building owner had to entrust a "surely" expert company for the maintenance (then it seems that the law makers had some doubt on some companies). Among the maintenance company duties there was to carry out, every six months, serious inspections on ropes integrity (the ever solved eternal problem), the functionality of the safety devices, and to substitute the deteriorated or broken parts.

ANPI, now turned into ENPI - National Body for Accident Prevention), was still in charge for the tests and was still owned by the industrialists association which had turned into the Italian Industry General Fascist Confederation. Again ANPI worked under the control and vigilance of the Ministry of Public Works. The licences and their annual renewal were still a Prefect competence.

In 1942, while not encouraging news were arriving from the war front, Law 1415 was published. The law classified lifting devices into five different categories, indicated with five alphabet letters. Letters A and B indicated those properly considered as lifts; the first ones for persons transport and the second one for persons and goods. Categories C and D indicated hoists with accessible or not accessible car for persons. Category E was used for the Paternoster lifts. As far as I know, only 8 Paternoster lifts were installed in Milan and they were demolished by the end of the Eighties. Again it was the Prefect to let the license and its renewal. Law 1415 stated that maintenance personnel had to pass the technical examination of an apposite commission before being allowed to carry out their work. Only if the examination was passed then the Prefect would let the maintenance licence. From this comes that the building owner was forced only to use licensed personnel or companies with licensed personnel.

After the storm

When in 1945 the war was over, Italy was a complete disaster. The country divided into two parts - Southern Italy in favour of monarchy and the North in favour of the republic - in May was unified by the provisional Parri Government. King Vittorio Emanuele III, who first escaped to Bari and then to Salerno, since a year had announced to have left public life and had nominated his son Umberto, Prince of Piemonte as Lieutenant. Umberto II will later become king in May 1946, one month before Italy turned to be a republic.

In this new climate of brotherhood, the Italian Government found the time to take care of lifts and in October 1945 was published the Lieutenant Decree 31 August 1945 no.600 (in less than one year Umberto signed 600 decrees !).

What is extraordinary in this decree is that it was made of three law paragraphs and 90 regulation clauses prepared by the National Council for Research. This act is the first serious, complex and articulated document that manage the lift safety matter on the basis of deep scientific and technologic knowledge: it sounds strange in a period in which it was more logic that the Government had something more important to think at.

The new standard introduced free safety spaces for the maintenance personnel at the top and at the bottom of the hoistway. Ropes mechanical characteristics were defined more precisely. The calculation to verify ropes stability and the specific pressure were introduced. The intervention terms of the overspeed governor were introduced. Precise indications for emergency manoeuvres and put out of service were given. More precise standards for electric circuits, safety glasses, power tension and ground wires were issued. But the most important thing is that the maintenance personnel responsibilities were clearly defined: they had the duty to substitute ruined parts as soon as possible and to give a written communication to the owner. Unfortunately the minimum height for safety defences remained 1.7, with obvious consequences easy to imagine; and moreover the eternal problem of ropes substitution was not solved.

ENPI was still in charge for the tests though it was not anymore owned by the General Fascist Confederation - closed for obvious reasons - and turned to be a into a non-profit corporation. Together with many other bodies ENPI entered the state-controlled bodies system: financed by the National Institute for Accident at Work Assistance; controlled by the Ministry of Public Works, together with the Ministry of Industry and the Ministry of Justice. In other words the ENPI costs were sustained by the State.

The Prefect remained competent for licences and licences renewal

The reconstruction

At the beginning of the Fifties just in Milan there were more than 3,000 lifts under the ruins. Old lift men told me they used to dig under the debris to reach those lifts and to obtain some material: they were able to obtain a complete lift using the remains of three.

In Italy we are used to say that necessity is mother of invention. From this necessity born a generation of highly specialised and professional lift people. People able to build a lift with just four tools. At that time many buildings, which needed a lift, were erected in place of the debris made by the war. A singular detail: all the Milan's debris were in an area and have formed a big hill that today is a public park named Monte Stella (Mount Star). In that period many small and medium lift firms were established, and some later become big ones. No specialised lift component producer did exist at the time so all these firms were forced to produce every single part of their installation apart from ropes: gears, control panels, and in some cases, even guide rails. In the same period inside ENPI born a class of highly specialised lift engineers. They took in great consideration the accident prevention matter together with technological progress. Soon they were able to find out all the lacks of the old Lieutenant Decree. It were they that realised the exigency to create new regulations to keep the pace with the new safety needs and technologies. For first they understood that they job was a very special one and that a new generation of lift engineers was necessary to carry out tests and periodical inspections. At this aim they created updating and training courses for ENPI's employees. Every year the various ENPI periferical offices gave the competent Prefect the list of the engineers enabled to carry out tests. Then a complete updated national list was compiled by the Ministry for Public Works.

After all this effervescence and under the Presidency of MP Segni, the Decree of The President of the Republic 29 May 1963 no. 1497 was published. This had the great merit of reducing accident on lifts to very rare episodes, most of them due to imprudence or their misuse. This merit must be shared with the new lift engineers educated by the old lift engineers on the basis of this new regulation.

This decree has the merit of having eliminated the accidents depending on the insufficient height of the safety defences. Furthermore it defined new parameters, even though in an incomplete way, on which basis it was possible to decide to substitute, or not, ropes.

The only defect it was the same of all the Italian standards. The regulation, made of 88 paragraphs, was part of a law, made of 5 paragraphs. This means that to change even a single phrase of the regulation, it was necessary to restart the whole law making procedure which is so long that when the document is ready for the publication it is already old. Then it is necessary to start all again.

To solve the problem it was devised a stratagem. In the law was inserted a paragraph which gave the CNR - National Council for Research - the power to express opinions on the questions asked by the interested organisations. The opinion is considered the authentic interpretation of the regulation statements. Every time there was a problem regarding the meaning of a certain statement the CNR was asked to give an explanation which was considered conclusive and definitive. This means that the CNR was silently given a kind of infallibility. With this system every time the market introduced a technologic innovation not included in the DPR 1497 paragraphs, the CNR expressed an opinion able to introduce new statement specifically dedicated to the new product. Until 1997 the CNR has expressed over 600 opinions. The most interesting case is the opinion no. 128, 4 October 1966. On it, in 1979 the Ministry of Public Works based its decree 1635 specifically dedicated to hydraulic lifts.

The age of reforms

When ENPI reached the top of its prestige both on the national and the international side the wind of reforms started to blow. A stormy wind which blew away many institutions including ENPI, which - God knows why - was considered useless. This silently started in 1977 when the Decree of the President of the Republic 24 July 1977 no. 616 on public functions decentralisation was published. It seemed to be an innocuous law made to transfer some functions from the central bodies to the peripheral ones. In the lift sector they meant that the release and the renewal of the licences competence passed from Prefects to the mayors of the single cities.

The process was just the starting of a deeper reform that in 1979 lead to Law 833 creating the National Health Service. For three years, until 1982, ENPI was managed by an extraordinary commissary and then was divided in two separate bodies. The project examination and testing become competence of the new-born ISPESEL (Superior Institute for Prevention and Safety at Work), directly depending from the Ministry of Health. The other new body, USL (Local Health Unit) depending from the city Health Assessor and under the mayor supervision, was competent for the periodical and extraordinary inspections. What have lifts to do with the health service is a question that has no answer. From that reform things started to work as follows:

- a) the building owner in which the lift is installed sends the mayor all the technical documents regarding the installation (design draws, calculations, electric scheme, hydraulic scheme, etc.) together with the request for the licence;
- b) the mayor sends ISPESEL all the technical documents to carry out its procedures;
- c) ISPESEL registers the document, assign a matriculation number and examines them;
- d) if the exam is passed, then ISPESEL lets a favourable report allowing the installation of the lift and sends a copy of it to the mayor together with the immatriculation document in three copies.
- e) the mayor let the installation licence, records it in the immatriculation document last page and re-posts it to ISPESEL;
- f) the building owner, once holding the licence, orders the lift company to install the lift;
- g) as installation works are concluded the owner asks the mayor for the exercise licence;
- h) the mayor communicates ISPESEL the request;
- i) ISPESEL tests the lift;
- j) if the test is passed ISPESEL writes on the lift document all the installation's data, the testing results, lets a favourable report for the exercise licence and sends all to the mayor;
- k) the mayor lets the exercise licence, reported in the immatriculation document's last page. Keeps a copy of the document, sends a copy to the owner and another copy to USL;
- l) in a year, before exercise licence expiration, USL carries out an inspection;
- m) if the inspection is passed, USL lets a favourable report to keep the installation operating, gives a copy to the owner and sends another copy to the mayor;
- n) the mayor, on the basis of the USL favourable report, renew the exercise licence for another year.

16 years after this revolutionary reform, the result is that the Milan ISPESEL periferical offices 10 year in late in respect of the market exigencies. In the city there are 65,000 lifts and ISPESEL is able to carry out only 12,000 periodical inspections per year. Moreover it might happens too the inspection engineers having completely different ideas from the ISPESEL test engineer. But this is another story.

Modern times

The quiet descending from public bodies was generating anxiety. They periodically announced reforms that punctually never happened. Meanwhile the lift companies were forced to operate between the private law and the moderate severity of public bodies. Then it arrived Europe. The effect was like a large rock thrown in the frogs' pond. A voice had been preaching in the desert for at least 15 year but nobody had ears to hear and eyes to see. When in September 1995 was published the European Directive 95/16/CE, someone said it was just an European standard, meaning in Italy the situation was much different. Three year have past since that date and finally we have the Italian Law 128/98, receiving 163 European directives, among which the 95/16. Then Suddenly Italy was awoken. That day a lot of Italian excellent professional, which distinguished themselves in various prestigious activities, were stroke with lightning on the road to Damascus: they suddenly felt expert lift men. All this enthusiastic ferment is born from the idea that the lift matter is solved by self-certification and that the word "deregulation" means to work with self-made rules. In Italy this is synonymous of working without rules.

Nevertheless we have to recognise that the 95/16 text generates some misunderstanding, as if we reduce it to lowest terms, what it says is that nobody can produce lifts that might endanger people's safety and health. If this is the only meaning of the Directive then I would say that the European Commission efforts were not worth. To convince me that danger machines must not be produced is enough "the moral sense inside of me and the starry sky above me" (as Immanuel Kant used to say). Moreover, whereas the moral sense is not sufficient there is always the penal code. The Lift Directive just relies on the penal code. In fact as it allows a lift company to test its own installations, automatically defers the control at when an accident might occur. But this is not all. The faculty the Directive allows sounds like an invitation to buyers to feel sufficiently protected by the seller's good faith. But what buyers have to know is that things works as follows:

- ⇒ the company installs the lift;
- ⇒ then it sends a tester chosen among its employees;
- ⇒ the tester founds (just as an hypothesis) some defects;
- ⇒ the tester reports that his employer has not worked properly;
- ⇒ the employer immediately repairs the defects at its own expenses;
- ⇒ the tester then checks again if everything is all right;
- ⇒ the owner is now happy that the lift is now imperfect conditions;
- ⇒ in the end the employer awards his employee for the job done.

There is another aspect in the Directive not convincing us, old Italian lift men, with a long experience inside ENPI. It does not mention the importance of maintenance and periodical inspections. Experience has taught us that even when a lift has been build the best components on the market, if maintenance is not carried out, it soon turns into a dangerous installation: when periodical inspections are not carried out it follows that maintenance also is not carried out.

There is another fundamental aspect we do not have to underestimate. Lifts involve the knowledge of many different subjects: mechanics, electrotechnics, oleodinamics and structures static. Therefore to become lift tester it is necessary to follow specific training courses and to have a long severe practical experience starting from the designing of every single component till the lift installation in the yard. Many engineers think they achieve technical knowledge through reading regulations. It is true the exact contrary. You have to start from the lift technical knowledge to understand a regulation. The Directive does not mention anything about the professional profile of the engineer which should carry out the tests on lifts.

For these reasons, and others which is not the place here to mention, it easy to forecast that, at least during the first period we will have a frightening Babel. Everyone will use its own language deriving from its personal experience but resulting absolutely and completely incomprehensible to others. Then it is possible this confused period will be over. What we do not know is how long it will last and how many damages will it cause. Nevertheless I think there is something we can do to limit the confusion and to shorten the time for clarification.

- 1) First of all we all have to agree on the necessity, or not, to have tests on lifts. If we think it is not necessary, it is useless to spend time and energy to produce standards. It will be sufficient to recall everybody that the Penal Code forbids to build dangerous machines and that transgressors will be severely punished in case their installations caused an accident.
- 2) On the other hand if we think that it is necessary to have tests on lifts, before it is put into service, then we must understand that tests must be carried out by a third part, equidistant from the supplier and the buyer. It is not reasonable to think that the constructor would test his own products. No code world-wide allows the one undergoing tests to be the same carrying out tests.
- 3) Notified bodies enabled to carry out tests must have at their inside a structure able to give its own personnel proper education and continue updating. It must be defined, as much precisely possible, the professional profile of the engineer enabled to carry out tests. The same profile must be valid for all the notified bodies.
- 4) Every single country must watch over the activity of the independent notified bodies and on the professional and deontological aspects.
- 5) None of the notified bodies must be state owned. If not we find ourselves in the situation of a Country authorising itself, notifying itself, watching over itself, and entrusted with retiring its own authorisation in case of he is unfulfilling.

This is my opinion and I am ready to listen at any observation from any part it might come.