The 1935 Code of Practice for the Installation of Lifts and Escalators

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Abstract. The 1935 *Code of Practice for the Installation of Lifts and Escalators* was written by the Lifts and Escalators Installation Panel of the Building Industries National Council. The thirteen-member panel included representatives from the lift industry, insurance industry, trade unions, the Royal Institution of Chartered Surveyors, and the Royal Institute of British Architects. Prior to 1935 there was no British national code or national legislation, beyond the *Factory and Workshop Act*, which governed lift and escalator installation. Thus, the panel looked outside Britain for precedents and they reported that they examined "all existing Codes … in force on the Continent of Europe, in America and in several British Dominions" [1]. The new Code was described as offering "safety and protection to all users" while also ensuring that it "would not encroach upon design and unnecessarily or impede engineering progress" [1]. The authors' collective goal was to develop a system of "coordinated safety regulations having reasonable flexibility" that "would avoid the difficulties inherent in official or departmental control *per se*, and would at the same time meet all reasonable demands for safety" [1]. This, perhaps contradictory, goal was achieved in a mere 35 pages of text and one illustration. This paper will examine the membership of the Lifts and Escalators Installation Panel, the Code's contents, and its American and European precedents.

1 INTRODUCTION

The history of lift and escalator codes remains a relatively unexplored topic in the history of vertical transportation. Although references to this history are often found in the introductions to new or revised editions of existing codes, these typically consist of a brief outline of the full, and often complex, story of the code's origins and authors. Writers charged with revising an existing code must, out of necessity, understand the rationale and reasoning that produced the earlier edition. This activity often represents a pragmatic rather than a historical understanding of the prior work. However, the decision to write a *first* lift code speaks to a particular moment in time. The subsequent changes that occur in following editions constitute evidence of changes in technology, use patterns, and the culture of vertical transportation. The publication of the *Code of Practice for the Installation of Lifts and Escalators* in 1935 marked a unique moment in time for Great Britain, as this represented the first attempt to write a British national code. At the same point in time, it was also produced within the context of a brief, but none-the-less well established, international history of lift codes and regulations. Beginning in the early 1900s lift codes and installation guidelines had been or were being developed in the United States, Germany, Italy, France, Finland, Belgium, and The Netherlands. Thus, the authors of the first British code had history on their side, with the established precedent of the need for a national code, and they also had recent history as a guide in the presence of existing codes, which they utilized to determine the proper content and tenor of *their* new national code.

2 THE LIFTS AND ESCALATORS INSTALLATION PANEL

In September 1931 the Advisory Committee on Building Acts and Byelaws of the Building Industries National Council established the Lifts and Escalators Installation Panel (Table 1), which was charged with reviewing existing legislation concerning lift and escalator installation.

Table 1. Lifts and Escalators Installation Panel.

Member	Representing
Leonard Stewart Atkinson, A.M.I.E.E.[1]	Co-opted member
Rendell Davies, M.I H.V.E.[2]	W. MacIntyre, Consulting Engineers
Murray Easton, F.R.I.B.A.	The Royal Institute of British Architects
Alfred Harold Edwards	Redpath, Brown, Ltd.
David W. Rolfe Green[1]	Waygood-Otis, Ltd.
Matthew T. Greenwell	Electrical Trades Union
Edward Charles Harris, F.S.I.[3]	The Chartered Surveyor's Institution
Ernest Matthew Medway[1]	J. & E. Hall, Ltd.
W.W. Pattinson[1]	Insurance Companies
Edwin Charles Stevens, M.I.M.E.[1]	Institution of Mechanical Engineers
John William Stevens[1]	The Express Lift Company
William Wellesley Weaver[1]	Waygood-Otis, Ltd.
[1]Member of the Code Drafting Subcommittee	
[2]Chair, Code Drafting Subcommittee	
[3]Chair, Lifts and Escalators Installation Panel	

The membership of the Lifts and Escalators Installation Panel represented an intriguing cross section of the lift industry and engineering profession. The Panel chair, Edward C. Harris (1883-1966), was a quantity surveyor who apparently had no direct connection with the lift industry. However, he had founded EC Harris in 1911, one of the first multi-industry consultancy firms, and thus he had a broad perspective on the building industry. Other non-industry members included Matthew T. Greenwell (representing the Electrical Trades Union), Murray Easton (representing the Royal Institute of British Architects), Alfred Harold Edwards (a structural engineer with Redpath, Brown, Ltd.), W.W. Pattinson (representing the insurance industry) and Rendell Davies (1891-1941) (a consulting engineer with W. MacIntyre). Of this group, only Pattinson and Davies were selected by Edwards to serve on the Code Drafting Subcommittee.

Harris selected Davies to chair the drafting subcommittee. Davies was a member of the Institution of Heating and Ventilating Engineers, worked as a consulting engineer in London, and was associated with the British Standards Institution. He was also one of the youngest members of the subcommittee, which, as will be seen, represented two distinct generations. The three other members of the younger generation were Leonard Stewart Atkinson, William Wellesley Weaver (1890-1947) and John William Stevens (1887-1954). Atkinson had been co-opted to the committee from the Institute of Electrical Engineers. He had joined Waygood-Otis as an apprentice in 1914 and by the early 1930s he had advanced to the position of Assistant Chief Engineer. Weaver had joined Waygood-Otis as an apprentice in 1907 and was appointed managing director in 1933. Following his military service in Word War I Weaver had traveled extensively on behalf of the company, working for one year in India, two years in Australia, and one year in New York. Stevens had begun his career in 1900 as an office boy in the firm of Easton, Anderson and Goolden, the successors to Easton & Anderson (who built the Mersey Railway Elevator System). In 1904 he joined the newly founded Easton Lift Co., Ltd. who, in partnership with the General Electric Company, Ltd., founded the Express Lift Co. in 1917. Stevens served as managing director of Express Lift from 1923 to 1936.

The older generation was represented by Ernest Matthew Medway (1875-1955), Edwin Charles Stevens (1869-1952) and David W. Rolfe Green (1871-1942). These members also represented three of Britain's oldest lift firms. Medway was the son of Matthew Thomas Medway (1850-1915), who founded the Medway Safety Lift Co. in 1878. In 1926 J. & E. Hall, Ltd. acquired a controlling interest in Medway and by 1935 the older firm had been fully assimilated into J. & E. Hall and the name Medway was no longer used. Stevens (no relation to John William Stevens) was the son of John Sanders Stevens who, with Archibald Smith, had founded Archibald Smith & Stevens in 1880. The company became Smith, Major and Stevens, Ltd. in 1909, at which time its manufacturing plant was moved to Northampton. By 1922 Edwin Stevens was serving as Chairman and in 1930 the company was amalgamated by the Express Lift Co. Green was the son of William R. Green (1838-1910), who had joined R. Waygood & Co. in the early 1860s (Waygood was his Uncle). David Green began his career as a Chartered Accountant and he joined Waygood in 1886 as an assistant to company co-founder Herbert C. Walker (1852-1939). In 1933 Green was elected Chairman of Waygood-Otis.

Thus, the subcommittee members brought approximately 200 years of experience in the lift industry to their assigned task. They also had experience working in six different lift companies of various sizes: the Easton Lift Co., the Medway Safety Lift Co., Smith, Major and Stevens, J. & E. Hall, the Express Lift Co., and Waygood-Otis. However, in 1931, Waygood-Otis clearly dominated the subcommittee's membership. Therefore a critical question, given the bifurcated nature of the firm: Waygood-Otis or, as seen through another lens, British-American, concerns the significance of the role that Otis and/or the American lift code played in writing the first British lift and escalator code.

3 PRECEDENTS

The Panel was charged with the review of "such legislation as affected the installation of lifts and escalators in buildings and to report on the need for revision thereof and the form such revision should take" [1]. However, they quickly shifted their focus beyond the revision of existing legislation and, as they reported in 1935, their "enquiry was devoted to formulating a code of lift and escalator practice" [1]. A key part of this investigation was the examination of "all existing Codes and Glossaries available, including those in force on the Continent of Europe, in America and in several British Dominions" [1]. The Panel also "examined the publications of the British Standards Institution" [1].

Unfortunately, no record or list has been found of the resources examined by the subcommittee. The only English code precedent was the *Factory and Workshop Act*: first drafted in 1901 and amended on a regular basis. However, this limited set of regulations primarily concerned goods or freight lifts and only addressed lifts in industrial settings. Other possible resources included *The Protection of Hoists*, Safety Pamphlet No. 2 (H.M. Stationery Office, London: 1919: third edition 1924) and *British Standards Specification for Round-Strand Steel Wire Ropes for Lifts and Hoists*, No. 329 (British Standards Institution: 1928).

Possible European precedents identified thus far include guidelines and regulations drafted in Germany, Italy, and France. A chronological list of these works (Table 2) reveals that Germany and Italy produced some of the earliest regulations and that most of documents addressed both the installation and operation of lifts. The only precedent from the British Dominions discovered thus far is the South Australian *Lifts Regulation Act* of 1908 (*An Act to Regulate the Use of Passenger and Other Lifts*). This *Act* primarily concerned lift inspections and contained no technical specifications (its only operational statute was to set a minimum age of 18 for all lift operators). The American code precedent was the 1931 edition of the *American Standard Safety Code for Elevators, Dumbwaiters and Escalators*.

Table 2. European Lift Guidelines/Regulations 1908-1927

Ausführungsanweisung zur Polizeiverordnung, betreffend die Einrichtung und den Betrieb von Aufzügen (Fahrstühlen)	Germany	1908
Gli elevatori industriali considerati nei riguardi della sicurezza del loro esercizio	Italy	*1911*
Polizeiverordnung betreffend die Einrichtung und den Betrieb von Aufzügen (Fahrstühlen) nebst Ausführungsanweisung	Germany	1913
Unfallverhütung am Fahrstuhlbetriebe	Germany	1917
Ascenseurs et Monte-charges. Dispositifs de Sécurité	France	1926
Ausführungsanweisung. Polizeiverordnung über die Einrichtung und den Betrieb von Aufzügen	Germany	1926
Regio decreto crica l'implianto e l'esercizio degli ascensori per transporto in servizio privato di persone e di cose accompagnate da persone	Italy	1927
Bestimmungen über Einrichtung und Betrieb der Aufzüge	Germany	1927

4 ORGANIZATION

The Code Drafting Subcommittee spent approximately four years working on their assigned task, which was completed in 1935. The *Code of Practice for the Installation of Lifts and Escalators* featured a *Forward* by Sydney Tatchell (1877-1965) F.R.I.B.A. and President of the Building Industries National Council, a *Preface* by Edward C. Harris, a brief table of contents, the code, and a detailed index. The code was divided into three sections: a glossary that defined 94 terms, the *Code of Practice for Lift Installation* with 24 regulations, and the *Code of Practice for Escalator Installation* with 11 regulations (Table 3). Many of the lift and escalator regulations were divided

Table 3. 1935 Lift and Escalator Code Sections.

Code of Practice for Lift Installation		**Code of Practice for Escalator Installation**	
Regulation	*Title*	*Regulation*	*Title*
1	Lift Well	1	Trusses and Girders
2	Lift Enclosures	2	Chains
3	Lift Pits	3	Track Arrangements
4	Top and Bottom Clearances	4	Angle of Inclination
5	Suspension Ropes	5	Width of Escalators
6	Guides	6	Capacity and Loading
7	Lift Cars	7	Balustrade
8	Inspections Maintenance and Insurance	8	Treads and Landing
9	Locking Devices for Landing Gates, Doors and Shutters	9	Application of Power
10	Motor Rooms and Overhead Structures	10	Safety Devices
11	Overhead Pulleys	11	Machine Room Lights and Access
12	Emergency Safety Devices		
13	Safety Gear Tests		
14	Slack Cable Switch		
15	Counterweights		
16	Lift Machines		
17	Sheaves, Drums		
18	Shafts		
19	Operation and Control		
20	Capacity and Loading		
21	Buffers		
22	Electric Wiring		
23	Terminal Limit Switches		
24	Ultimate or Final Limit Switches		

into sections and subsections, which resulted in a total of 182 individual rules or recommendations. The code also included two tables and one illustration. The tables addressed the minimum top and bottom clearances for cars and counterweights and the maximum stopping distances allowed for cars equipped with Gradual Wedge Clamp (G.W.C.) and Flexible Guide Clamp (F.G.C.) safeties. The illustration was a schematic section of a typical electric lift installation with the lift operating in a stairwell (Figure 1).

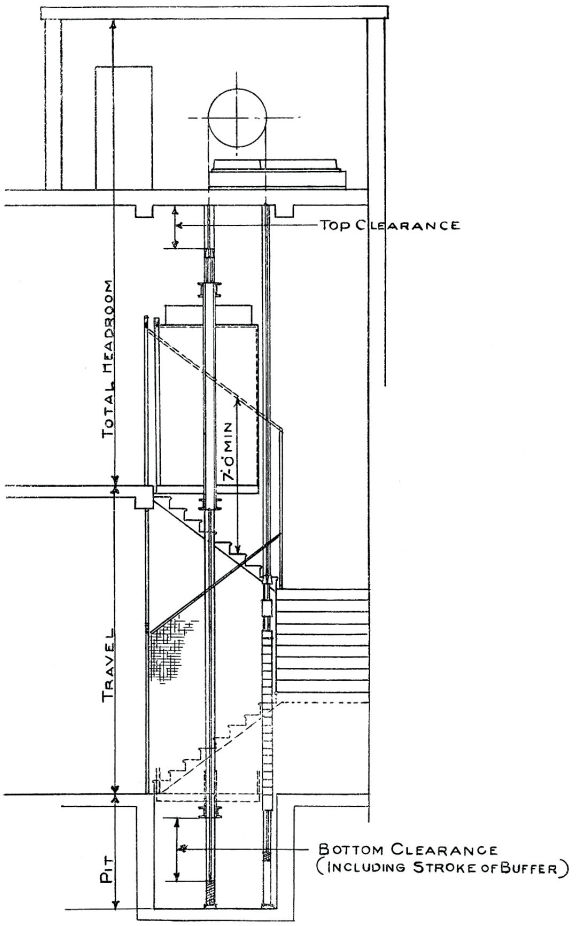

Figure 1. Typical Lift Installation, *Code of Practice for the Installation of Lifts and Escalators* (1935).

5 ANALYSIS

A comparative analysis of the *Code of Practice for the Installation of Lifts and Escalators* reveals that the primary source for the new code was the *American Standard Safety Code for Elevators, Dumbwaiters and Escalators* of 1931. A mapping of the codes' contents reveals that 22 of the 24 lift regulations and all 11 of the escalator regulations had counterparts in the American code (Tables 4 & 5). A detailed analysis found that 89 of the 157 lift-regulation sections and subsections and 24 of the 25 escalator-regulation sections and subsections had American code counterparts. Finally, the British code included 94 terms in its glossary and the American code defined 84 terms. It is of interest to note that only 25 common terms appeared in these glossaries. However, while many of the British lift regulations had American precedents, in many cases there were also key differences.

The American code's influence included the use of identical text in the new British code, the use of slightly modified text, and the substantial rewriting of parallel sections intended to reflect local building and industry practices. Examples of the literal influence of the American code include technical guidelines, illustrated by the British regulation *Suspension Ropes 5d* and American *Rule*

Table 4. Lift Code Comparison

1935 British Code		1931 American Code	
1	Lift Well	Rule 100	Fire-Resistant Hoistway Enclosures
2	Lift Enclosures	Rule 101	Non-Fire-Resistant Hoistway Enclosures
3	Lift Pits	Rule 103	Pits, Overtravel and Clearances
4	Top and Bottom Clearances	Rule 103	Pits, Overtravel and Clearances
5	Suspension Ropes	Rule 230	Cables
6	Guides	Rule 200	Guide Rails
7	Lift Cars	Rule 210	Car Construction
8	Inspections Maintenance and Insurance	Rule 701	Inspection
9	Locking Devices for Landing Gates, Doors & Shutters	Rule 121	Door Interlock
10	Motor Rooms and Overhead Structures	Rule 104	Hoistway Windows, Penthouses and Machine Rooms
11	Overhead Pulleys		
12	Emergency Safety Devices	Rule 215	Car and Counterweight Safeties and Speed Governors
13	Safety Gear Tests	Rule 216	Car and Counterweight Safety Test
14	Slack Cable Switch	Rule 215	Car and Counterweight Safeties and Speed Governors
15	Counterweights	Rule 202	Counterweights
16	Lift Machines	Rule 220	Machines and Machinery
17	Sheaves, Drums	Rule 220	Machines and Machinery
18	Shafts		
19	Operation and Control	Rule 223	Operation and Control
20	Capacity and Loading	Rule 218	Contract-load Test
21	Buffers	Rule 201	Car and Counterweight Buffers
22	Electric Wiring	Rule 108	Pipes and Wiring
23	Terminal Limit Switches	Rule 222	Terminal Stopping and Limit Devices
24	Ultimate or Final Limit Switches	Rule 222	Terminal Stopping and Limit Devices

Table 5. Escalator Code Comparison

1935 British Code		1931 American Code	
1	Trusses and Girders	Rule 604	Strength of Trusses or Girders
2	Chains	Rule 611	Application of Power
3	Track Arrangements	Rule 605	Track Arrangement
4	Angle of Inclination	Rule 600	Angle of inclination
5	Width of Escalators	Rule 601	Width of Escalators
6	Capacity and Loading	Rule 606	Capacity and Loading
7	Balustrade	Rule 602	Balustrading
8	Treads and Landing	Rule 603	Treads and Landings
9	Application of Power	Rule 611	Application of Power
10	Safety Devices	Rule 612	Safeties
11	Machine Room Lights and Access	Rule 613	Machine Room Lights and Access

230g Cables, both of which read as follows: "No car or counterweight cable shall be repaired or lengthened by splicing" [1, 2]. Another essentially literal example reflects differences in attitudes toward appropriate emergency lift use between the 20th and 21st centuries. The American *Rule 100a Fire-Resistant Hoistway Enclosures* included the following:

> Note: Experience has demonstrated the value of the elevator as a life-saving device in case of fire. A simple form of fire-resistant construction (cement plaster on metal lath) will usually resist a fire for a greater length of time than the elevator can be used as an exit from a burning building. Fire- resistant hoistways are therefore recommended for all elevators. [1]

This was translated into the British code as follows:

> Lift wells, together with the whole of the contained equipment, apparatus, etc., shall be rendered fire resisting to the greatest possible extent. Note. Experience in the

> U.S.A. has demonstrated the value of the lift as a life saving device in case of fire. A simple fire resisting construction will usually resist a fire for a greater length of time than the lift can be used as a means of escape, and for this reason the above recommendation is made. [2]

In the majority of cases the British code retained the essence of the American precedent, which was often expressed in a simplified and edited manner. The following example illustrates this strategy:

> *Rule 210i Car Construction*: When car-leveling devices are used the car platform shall be provided with a substantial vertical face flush with its outer edge, extending a sufficient distance below the car floor so that there shall be no horizontal opening into the hoistway while the car is within the landing zone and the hoistway door is wholly or partially open. [2]

> *Lift Cars 7h*: Where car leveling devices are used, aprons shall be fitted to the car floor to ensure that no space is permitted between the threshold and the landing whilst the car is being leveled to a floor. [1]

Although there was a higher degree of synchronicity between the two escalator code sections, a similar editing process also occurred:

> *Rule 602a Balustrading*: Escalators shall be provided on each side with "solid balustrading." On the escalator side the "balustrading" shall be smooth, without depressed or raised paneling or molding. Glass panels in "balustrading" are prohibited. There shall be no abrupt changes in the width between the "balustrading" on the two sides of the escalator. Should any change in the width be necessary, the change shall be not more than eight (8) percent of the greatest width. In changing from the greater to the smaller width the change in the direction of the "balustrading" shall be not more than fifteen (15) degrees from the line of the escalator travel. [2]

> *Balustrading 7a*: Escalators shall be provided on each side with solid balustrading. On the escalator side the balustrading shall be smooth, without depressed or raised panelling or moulding. Glass panels should not be used in balustrading. [1]

However, the British code was not simply a well-edited version of its American precedent (with 35 versus 173 pages): it included sections and information not found in the earlier code and reflected critical differences in lift culture. The maximum speed referenced in the British code was 800 feet per minute, while the American code referenced speeds up to 1,600 feet per minute. The British code also included a section titled "Shafts" that referred to shafts that held sheaves and pulleys:

> *Shafts 18*: (a) Any shaft carrying a sheave or pulley and fitted between dead eyes or other housing must be stepped, i.e., reduced in diameter, at or near the point of entry at each end. (b) Any shaft where stepped, i.e. reduced in diameter, must be turned to a reasonable radius at the point of reduction in diameter.

It is unknown why the drafting subcommittee felt it was necessary to include such a detailed recommendation on this particular aspect of lift technology.

The issue of lift inspection was also treated very differently in the two codes. The American code stated that: "Responsibility for the care, operation, and maintenance should be definitely fixed by statute or ordinance. Where not so fixed, it is recommended that leases for buildings specify such responsibility as between owner and lessee" [2]. The British code stated that: "Every□ power driven lift, before being put into service, should be covered by insurance, such insurance cover to include for and incorporate regular inspections at least three times per annum by a representative of

the insurance office" [1]. The suggested preferred inspection protocol was further defined as follows:

> *Rule 701 Inspection*: The following is the schedule of inspections recommended: Hoistway doors, car gates, interlocks, contacts, control apparatus, controller, automatic stop, limit stops, car and counterweight cables, "safeties," guide rails, buffers, elevator machines, and the lighting of the car and of the machine room, in passenger and freight-elevator installations, shall be thoroughly inspected at least quarterly. [2]
>
> *Inspection, Maintenance and Insurance 8c*: At least once in every three years the safety gear and governor switch, if fitted, should be subjected to a running test under maximum load and speed conditions, and a certificate issued on the result of each test. Such certificate in its most effective form would be signed by the insurance engineer supervising the test. [1]

The references to insurance companies and insurance engineers speaks to the drafting committee's hope that the insurance industry would play a primary role in code enforcement: "having regard to the very deep material interest of the insurance offices in lift and escalator installation, the code of lifts and escalator practice might, with advantage, be operated under their aegis" [1].

6 CONCLUSION

The goal of the Lifts and Escalators Installation Panel was to write a code whose implementation would avoid the problems encountered in other countries: "It is felt … that wherever control of the mechanical equipment of buildings is vested solely in official bodies or departments, such control must of necessity tend to become rigid and to retard progress" [1]. The Panel also recognized that codes "of this nature must be subject to review from time to time, as by evolution both materials and machinery are improved and requirements change" [1]. They therefore recommended that "a tribunal" be established "to observe the effect of the Code in operation and to suggest such interim amendments as may prove necessary" [1]. The speed of change in the lift industry was such that the effort to revise the 1935 code began in 1940/41 and the second edition, titled the *Code of Practice for Electric Passenger and Goods Lifts and Escalators*, was published in May 1943.

REFERENCES

[1] Building Industries National Council, *Code of Practice for the Installation of Lifts and Escalators*, London (1935).

[2] American Standards Association, *American Standard Safety Code for Elevators, Dumbwaiters and Escalators*, New York (1931).

BIOGRAPHICAL DETAILS

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