



▾ WHITE PAPER ON: AECO CERTIFICATION

ASME A17.7/CSA B44.7 Continues to Gather Momentum as Benefits Accrue to All Parties Involved

A sharp-tongued Nobel laureate once said, “Progress is impossible without change, and those who cannot change their minds cannot change anything.” We suspect that George Bernard Shaw, son of a grain merchant and familiar with elevators on all sorts of levels, would be quite pleased at the arc being described by the Performance-Based Safety Code for Elevators and Escalators: ASME A17.7/CSA B44.7 (A17.7)—a standard born of the need to accommodate progress, and one that is beginning to change minds in Authorities Having Jurisdiction (AHJs: United States) and Regulatory Authorities (RAs: Canada) across North America.

Before the introduction of A17.7 in 2007, it was very difficult to introduce new technologies and innovations that did not comply with the letter of the prescriptive ASME A17.1 or CSA B44 Elevator and Escalator Safety Codes. Under ASME A17.1/CSA B44 (A17.1), there is no uniform process for validating the compliance of new technologies with the safety requirements, making their adoption difficult, inefficient, and very expensive. The unintended effect of the code was to impede progress in the industry. (A17.1 did have provisions for “equivalent safety” in its preface and Section 1.2, but it was up to the manufacturer and the AHJ or RA to determine if this had been met. With over 130 AHJs and RAs in North America today, an “equivalent safety” approval would have to be addressed by many, if not all, of these bodies by a process of submitting variances—an expensive and time-consuming process on an individual basis; a financially crushing proposition when considered on a continental scale.)

The problem the industry faced was not an uncommon one: by their nature, new technologies and innovative approaches do not always or often fit for compliance into prescriptive codes that never anticipated their existence. While attempts were made to write new code rules in performance-based language, it was not enough to solve the problem.

What to do?

In Europe, a document called The Lift Directive specified a process that allowed for innovation and functional safety to coexist. This directive stated that a manufacturer must either meet the prescriptive requirements of the EN 81-1 or EN 82-2 safety codes or submit the design and supporting risk assessment, test data, etc., to an independent “notified body” for approval. When approval is achieved, a certificate is issued and the product would be accepted throughout the European Union.

In North America, ASME and CSA adopted a similar strategy. In 2007, they introduced the ASME A17.7/CSA B44.7 Performance-Based Safety Code for Elevators and Escalators. This new code defined the Global Essential Safety Requirements (GESRs) and processes necessary to ensure that these requirements are met. Now, if a manufacturer introduces an innovative product or process that does not meet the prescriptive requirements of A17.1, it can be evaluated to the requirements of A17.1 through the performance-based code A17.7. This process requires that an independent, accredited elevator/escalator certification organization (AECO) evaluate the product to ensure that it meets the requirements of the performance-based code to offer “equivalent safety” to A17.7.



A Rigorous Certification Process

Certification of subsystems, components, or functions is the procedure whereby an ANSI-accredited AECO certifies that a representative sample of a subsystem, component, or function of an elevator system will permit the elevator system to satisfy the relevant requirements of A17.7, provided that the subsystem, component, or function is correctly fitted to the elevator system as specified in the manufacturer's Code Compliance Document (CCD).

Certification of an elevator system is the procedure whereby an AECO certifies that an elevator system satisfies the requirements of A17.7.

A product certification review is initiated by the submittal, by the manufacturer or the manufacturer's representative, of a completed application (appropriate program application form and all the information required, such as test data, photographs, schematics, attachments, exhibits, etc.) to the AECO and signed by a duly authorized representative of the manufacturer.

The application demands the following be provided by the manufacturer:

- Name and address of applicant and/or authorized representative
- The corporate entity, name, address, and legal status
- Written declaration that:
 - The same application has not been submitted to another AECO.
 - Or the reasons it is being submitted to another AECO.
- Technical documentation
- The Code Compliance document
- A general description of the system, subsystem, etc., its intended use and limits of use
- A list of A17.1 requirements used to meet A17.7 and/or how "equivalent safety" is achieved
- Global essential safety requirements (GESRs) considered in the risk assessment
- The risk assessment report and team members compiling the report
- Design and manufacturing drawings and diagrams

- Procedures for acceptance inspection
- Procedures for tests, periodic inspections, maintenance and repair: Maintenance Control Program (MCP)

The evaluation process is an iterative one, with each step after the initial meeting and review being assessed for completeness.

First the CCD is reviewed. Is it complete? If no, back to the manufacturer with specific requests for more information; if yes, on to the review of GESRs and safety parameters.

Are those complete and accurate, or do they need additions and revisions? Only when complete will the manufacturer submit a detailed risk analysis for review.

The AECO reviews the risk assessment and develops a GAP analysis, comparing actual to desired performance. Where are we? Where do we want to be? The iterative process is worked to address the gaps in the risk assessment, and often hundreds of items are identified for review and resolution at this point.

The risk assessment is probably the most unique part of the AECO certification program. There is really no standard that tells how to test a portion of an elevator system, other than the risk assessment process. The risk assessment itself defines, through its identification of risk, what things need to be tested. And those tests are mitigations for risks. The AECO's responsibility is to witness the test and make sure it has been defined and executed correctly. The AECO assures the manufacturer's due diligence.

Once the risk assessment is deemed complete and accurate, a detailed review of test results and data ensues. When this is complete, often after additional tests and analysis are done, a detailed review of installation procedures and the MCP are done. When these are found to be complete and accurate, the AECO will issue a draft report for review with the manufacturer. At this point the question is asked: *Is the product in compliance with A17.1/A17.7?*

If yes, first a final report and then a certificate of compliance are issued. If no, lists of non-compliance are issued, along with additional GESRs, Risk Assessment scenarios, or other test required. Once these are completed, the manufacturer may retry for certification.



Win-Win-Win

The introduction of A17.7 and AECO certification programs benefits manufacturers, governmental bodies, and individuals. They all win via the performance-based code.

Manufacturers

Foremost for manufacturers, AECO certification programs drive down costs in the approval process by enabling installation for products meeting the “equivalent safety” of the prescriptive code. One submission fee to the AECO versus time and cost to submit variances in each AHJ can result in dramatic savings. For example, a major manufacturer estimated its introduction of a new component cost them \$3.5M in getting variances approved over the universe of AHJs and RAs. The certification of that part through an AECO program will reduce the cost somewhere in the range of 95%.

While AECO certification does not have anything approaching universal approval among AHJs and RAs, its impact is growing, and even those not recognizing AECO certification per se are attributing positive weight to what one state called “an amazingly detailed process.”

Also saving costs and improving market share is faster time to market through the process. As the number of AHJs and RAs adopting A17.7 increases, this benefit will increase proportionally.

Manufacturers also benefit from greater and faster utilization of new technologies. This offers manufacturers the ability to better realize the market advantages of these new technologies (e.g., lower cost, greater performance, reduced energy consumption, improved utilization of space) for competitive advantage.

AHJs, RAs, and Governmental Bodies

A17.7 provides AHJs and RAs a harmonized process to assess and enforce safety requirements on new and emerging technologies. While this has existed, albeit rather clumsily and inefficiently, in the form of variances, AECO certification provides regulatory bodies a rigorous and detailed process that assures professional and independent assessment of new products before they are asked to grant final approval. Thus their burden is shared, and shared with experts. While final approval of systems remains in their hands, they now have more and better information upon which to base their decisions.

The use of global essential safety requirements in the A17.7 process provides AHJs and RAs another tool by which to identify safety objectives, but one that provides manufacturers greater flexibility in meeting those objectives. The burden of compliance remains with the manufacturer, but the new process provides AHJs and RAs with greater detail by which to ensure and enhance safety.

Finally, as environmental concerns rise in the pantheon of issues governmental bodies are concerned with, the ability to better incorporate new technologies will make new installations more sustainable, less demanding of energy, and less expensive for individuals and institutions alike.

Individuals

The adoption of A17.7 improves safety when new technologies are introduced. The formal process by which products are evaluated to performance-based codes by AECOs provides a consistent means of ensuring that products are safe, and greater peace of mind for those using those products.

The speed, capacity, and overall efficiency of elevators are often limited by prescriptive codes that limit designers and engineers to use specified materials, controls, and drives. By accommodating new technologies, A17.7 will empower manufacturers to use stronger, lighter materials, computerized controls, and new drive designs to move elevators faster, smoother, and more efficiently.

This not only means greater speed, but greater comfort as well, as new technologies are applied to enhance aesthetics, functionality, and personal user experience.

Why UL Is the Logical Choice for Those Considering AECO Certification

Even before the performance-based code concept was conceived or articulated by the industry, UL was already participating in the ASME A17.1 technical committees on the North American level, as well as the ISO TC 178 committee on the international level—putting it on the frontline in terms of exploring how risk management was going to be handled relative to safety issues in the industry. So the company was a logical participant as the A17.7 code developed in North America.



UL is the world's most recognized independent product safety organization. It has been testing products and writing standards for safety for more than a century. The company's impeccable record of independence and objectivity in the application of safety principles is an asset to a process where the AECO and manufacturer work closely in establishing the merit of "equivalent safety" for A17.1. This should serve to help allay any concerns AHJs or RAs might have regarding the working relationship with the manufacturer.

Further, UL is driving the AECOs toward collaboration to ensure consistency across the industry. This is something the AHJ community should find helpful.

As an ANSI accredited AECO, UL provides the following services:

- Assessment of elevator and escalator systems, subsystems, components, and functions for conformance with A17.7/B44.7 to establish equivalent safety to the requirements of A17.1/B44
- Post-release surveillance of the manufacture of certified designs of systems, subsystems, components, and functions to establish that they continue to meet requirements of A17.7 throughout the product life cycle

UL's AECO evaluation teams are composed of members from different disciplines and experiences; in this composition, the evaluation team mirrors the risk assessment teams of manufacturers, who are strongly encouraged by the standard to have a multidisciplinary team produce the risk assessment. AECO evaluation teams must always have a program manager, a licensed, registered professional engineer (P.E.), well-defined risk assessment methods, and a minimum of three members.

Risk assessment defines what tests are required, and typically includes functional testing at the design phase, type testing, and engineering testing. Testing may be conducted at UL test facilities (requiring ISO/IEC 17020), a third party test facility (requiring ISO/IEC 17025), or at a manufacturer's design test center (requiring ISO/IEC 17021/Guide 62).

UL's test capabilities include:

- EMI/RFI susceptibility/emissions
- High voltage/high current
- Shock and vibration

- High pressure gasses/fluids
- Energy efficiency
- Combustibility and flammability
- Electrical shock and fire safety
- And much more
- Current UL tests for the elevator/escalator industry include:
 - A17.5/B44.1 for electrical safety
 - 2.26.4.4 of A17.1: EMI susceptibility
 - Type tests (8.3 of A17.1), including:
 - Car and hoistway door interlocks and contacts
 - Oil buffers
 - Entrance fire test
 - Brakes
 - Hydraulic valves
 - And more

The company has over 62 testing laboratories worldwide, in Asia/Pacific, Europe, Latin America, and North America. "UL stands by their certification, as much as if not more than other AECOs," says industry analyst Julian Shull. "So if someone has problems or there are questions that arise when a UL certificate has been submitted to an AHJ or RA, UL will be there to support the certificate or provide additional support as needed."

The company also has a very strong electric safety program for elevator products, certified in accordance with ASME A17.5. This is something that not all nationally recognized test labs can do, and points to another advantage UL provides: unparalleled one-stop service for safety.

Consolidating product testing and certification at one global organization creates significant efficiencies that can deliver greater return on compliance investment. This holds true for A17.7.



Progress Indeed

A specific example of how UL's AECO program is enabling the progress that Shaw understood as necessary to drive society forward is the work the company is currently doing with wind tower elevators.

As environmental issues continue to move to the fore, and as wind energy continues to emerge as a green alternative to energy needs, jurisdictions must deal with supporting technologies, one of which is elevators that allow wind towers to be assembled, installed, and serviced.

These are special types of elevators that have unique characteristics, and neither existing elevator codes nor wind tower standards address wind tower elevators.

So the best solution has been to use the AECO program and A17.7 to address the unique attributes of wind tower elevators and make sure that "equivalent safety" to traditional special use elevators is established for these wind tower applications.

By doing so, change is enabled — and progress as well.

For more information on UL's AECO program, contact Kevin Connelly at UL at 631.546.2691 or go to the web at www.ul.com/aeco.