Full-Cab A18.1/B355 Lifts — An Alternative to LU/LA Elevators

How to differentiate between lifts and elevators in North America and choose between a traditional or LU/LA elevator, stairlift, IPL or VPL

by Graham Kawulka

As the population of North America ages, accessibility has become a common topic in the design of buildings — both private residences and public/commercial spaces. A key element of accessibility typically revolves around the use of some form of elevating device to transition from one level of a building to another as part of creating a barrier-free path. Guidelines such as the Americans with Disabilities Act are often used to inform best practices for these types of accessibility designs in combination with specific codes applicable to different equipment options to accomplish the intent.

Learning Objectives

After reading this article, you should have learned:

- The main difference between a lift and an elevator in North American terms
- The difference between a LU/LA elevator and a lift
- The benefits and limitations of a lift versus a LU/LA elevator
- The main codes that apply to lifts and elevators
- The stretcher access limitations for both LU/LA elevators and lifts
- The differences between the Canadian and U.S. codes

While traditional passenger elevators are well known to the public, there are other types of elevating devices, such as stairlifts, inclined platform lifts (IPLs) and vertical platform lifts (VPLs), that are more applicable to accessibility and barrier-free path design. These types of devices are used where the elevation change is greater than that for which a ramp product would make sense and before the travel distance, loads or duty cycle would require stepping up to a full passenger elevator.

A ramp, for example, is often a good solution for travel distances under 24 in. and where the number of people needing accessibility is quite high, but once the travel distance gets above that height, the requirement of 12 in. of length for each inch of rise can become tougher to accommodate and quite expensive. VPLs and other elevating devices then tend to become more economical and can save considerable floor space. While stairlifts can be used in numerous circumstances, their use in commercial buildings is limited, as they cannot typically accommodate a person with a wheelchair. VPLs and IPLs are more typical in commercial spaces to accommodate people with mobility challenges across the entire spectrum of need.

This article intends to look at a specific type of VPL that is less well known and could help reduce costs for accessibility in buildings that are not private residences. This type of lift configuration still preserves a high-quality aesthetic that would be beyond what a typical VPL installation provides.

In some parts of the world (such as Europe), a "lift" and an "elevator" are the same thing. In Canada and the U.S., a lift (or, more specifically, a VPL for accessibility) is defined by different codes than elevators. The codes that apply to lifts in Canada and the U.S. are CSA B355 and ASME A18.1, respectively. Elevators in North America have a harmonized code, the *ASME A17.1/CSA B44 Safety Code for Elevators and Escalators*, which applies to both countries.

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The main defining difference between a VPL and an elevator is the type of operation. Specifically, an elevator is automatic, and a lift is operated by constant-pressure controls. Automatic operation is what most people are familiar with when it comes to elevating devices — you simply press the button, and the device moves to the desired landing or level automatically while you wait (or, as is more likely today, while you check your email or text messages on your phone). Constant pressure, on the other hand, requires that the user/operator presses and holds the control button continuously until the carriage arrives at the desired landing, where the door or gate will then become unlocked and allow a passenger to enter the carriage area.

In addition to the difference in controls, VPLs are more limited in travel, weight capacity and platform size than a passenger elevator due to the codes that apply to it. The history involved in deciding the amount of travel and sizes acceptable are not always clear, but, from the perspective of your author, the VPLs were specifically for single users or a user plus attendant. The carriages, with commensurate weight ratings, were then set up to match those requirements. The travel limitations were also considered with respect to single-user operation and, thus, additional travel to multiple stories is not considered logical for this type of equipment, as more than one passenger would be unlikely to utilize the lift at a time. A need for multiple-person mobility would, then, make a passenger elevator a more logical choice for the application.

There is a special classification of automatic elevator, outlined in A17.1/B44 Section 5.2, that can be used for commercial purposes, called a limited-use, limited-application (LU/LA) elevator. This elevator type is more limited (as the name implies) than a typical passenger elevator in size, weight capacity and travel. Sometimes, this type of elevating device is preferable, as it has the automatic controls that might be more commonly understood by the public. It may also allow for voice activation where a lift would not have that ability.

A typical VPL, for commercial applications, has guardrails on the platform that are 42 in. high, rather than a full-height carriage that is required for elevator applications. A LU/LA elevator is no exception and has a full-height-carriage requirement. The code for VPLs does not, however, limit the guardrail height. So, a complete, full-height carriage could be attached to the platform. With a full-height carriage, a user could certainly be excused for thinking a VPL looks identical to an elevator.

Differences between a Full-Height-Carriage VPL and LU/LA Elevator

Some of the main differences between a full-height-carriage VPL and LU/LA elevator are as follows:

- Floor area: LU/LA elevators' floor area is limited to 18 sq. ft. by code. In the U.S., a VPL is also limited to 18 sq. ft., but in Canada, the code allows VPLs to have as much as 21 sq. ft. of floor space.
- Drive types: virtually any drive type can be attached to a VPL or LU/LA elevator, and the options available on the market are extensive. They range from simple screw-type devices to hydraulic, and even machine-room-less (MRL) traction devices.
- Weight capacity: weight capacity for LU/LA devices is typically 1400 lb., whereas the capacity for a lift is 1400 and 1050 lb. for Canada and the U.S., respectively, unless a variance is obtained.
- Travel speed: LU/LA elevators are limited to 0.15 mps (A17.1 Section 5.2.1.16.4) by code, whereas VPLs can be equipped to operate at up to 0.25 mps for Canada (B355 Section 4.3) and 0.15 mps for the U.S. (A18.1 Section 2.7.1).
- Travel distance: LU/LA elevators are limited to 25 ft. of travel in both Canada and the U.S. VPLs are limited to 23 ft. (B355 Section 4.2.1) and 14 ft. (A18.1 Section 2.7.1) in Canada and the U.S., respectively. Depending on the type of device, many jurisdictions in the U.S. will grant variances for full-height-carriage VPLs up to 25 ft.
- Stretcher access/use: depending on the building, there may still be a requirement from local authorities for the elevating and accessibility equipment to be deemed "stretcher ready."

To elaborate on the latter point, A17.1/B44 Section 3.5.4.1(1) of ASME 17.1/CSA B44 states that a stretcher, with a patient in the prone position, is 2,010 mm (79 in.) X 610 mm (24 in.) in size. According to B355, the maximum platform area on an accessibility lift is 21 sq. ft. (3,024 sq. in.). Similarly, the limit on platform area in the U.S., under A18.1, is 18 sq. ft. (2,592 sq. in.).

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Doing the math, both platforms can theoretically handle a stretcher if they are built with a long, skinny platform. Whether a product can be arranged this way and still meet the rest of the testing, stress and code requirements is outside the scope of this article and will vary from product to product, as well as manufacturer to manufacturer. Under both rules, the platform gets quite skinny, and, in the case of the Canadian code, an 80-in.-long platform would then have a maximum width of 37.8 in. If 24 in. of that is taken up by the stretcher, there would be only 13.8 in. left for an attendant. This is even further reduced in the U.S., where the platform width would only be 32.4 in. In both cases, this is quite limited, and a likely scenario is that the stretcher would travel on its own without an attendant. While this is possible, it may present safety risks about which a paramedic or ambulance service could be concerned. At least one elevator authority has tried to provide guidance on this issue. A document on its perspective is part of this month's Online Extras at www.elevatorworld.com.

Each local authority may have a different perspective, and, ultimately, your author suggests working with the local building-permit office to determine if stretcher-ready service is required. Also, work with a local elevator-company branch to get its interpretation on what is acceptable and apply for permits in advance of any construction so there are no surprises.

Depending on the product, pit depth can be significantly reduced for a VPL with a full carriage. There are products on the market that will allow a full carriage on a VPL with no pit and only a small threshold ramp on the exterior of a shaft. This can be a significant advantage for retrofit applications, in which an existing

foundation is already in place and digging a pit is problematic but accessibility is needed.

As noted earlier in this article, the operation on a VPL is constant pressure, whereas an elevator is automatic. Constant-pressure operation can be confusing to users more familiar with typical elevator equipment, and this is one of the main reasons some developers and owners consider LU/LA or passenger elevators instead of VPLs. However, VPLs are typically equipped with signage to explain constant pressure usage, and, since they are primarily for accessibility, many of their users are familiar with their operation.

Another main difference between elevators and VPL applications is shaft/door arrangement. Due to how the safety code has been arranged for VPLs, the shaft construction and door arrangement are required to be "flush" on the interior. This arrangement avoids issues with shear hazards and eliminates the ability for persons, objects or pets to remain in place on a landing threshold behind the door but not fully onboard the carriage before the door safety device is engaged and allows operation of the lift. This arrangement reduces the cost profile for the equipment and installation on a VPL when compared to a LU/LA elevator.

Overhead clearance is the distance between the finished floor at the top landing and the ceiling inside the shaft. For a LU/LA elevator, the overhead clearance is typically a minimum of 134 in., whereas a VPL has no specific overhead clearance and is simply limited to practical human height restrictions and machine size. There are numerous products on the market that can provide as little as 92 in. of overhead clearance. This can be a significant point for design consideration/product selection, depending on the project and building arrangement. Building modification or retrofit projects often raise the profile of the overhead clearance of concern more frequently, but even new building construction can be challenged by the overhead clearance required by a LU/LA or passenger elevator.

One of the main issues clients, owners and architects have with VPLs is the appearance. The devices often look less refined and more utility based than a LU/LA or passenger elevator. In many applications, the code will require accessibility, and the travel requirement between levels is excessive for a ramp of some kind, though the building is also intended to look more polished. A full-height-carriage VPL with a full hoistway will give the accessibility device the same appearance as a LU/LA elevator and, in many cases, other finishes, such as glass and stainless steel, can be employed to match up with other modern design aesthetics.

Figure 1: A full-height-carriage lift; photos courtesy of Uppercut Elevators and Lifts

Depending on its exact configuration, a full-height-carriage VPL will have 30-50% less equipment and installation expense than a LU/LA device. For some projects, this can be substantial amounts of savings and mean the difference between a building with accessibility that preserves the architectural appeal and one that simply meets the code.

Initial inspections are required on all commercial elevating product installations across the U.S. and Canada. Once an initial inspection has been passed, VPLs and LU/LA elevators are typically inspected annually, so the type of equipment selected does not affect initial costs. Once in operation, LU/LA elevators typically require preventative-maintenance inspections four times per year; for VPL elevators, such inspections are typically once per year. Depending on the provider of the service and maintenance, this can be a substantial operating-cost difference.

Practical Example of a Full-Height-Carriage Lift

An example of a full-height-carriage lift can be seen in Figure 1. This particular application is located in Calgary, Canada, and has the following specifications:

- Applicable code: B355-2009
- Number of stops: three
- Travel: 295 in.
- Weight capacity: 800 lb.
- Carriage platform size: 48 in. X 63 in. (21 sq. ft.)
- Drive system: MRL counterweight geared traction with 1.5-hp motor
- Stretcher ready: no

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- Doorway safety device: flush doors
- Manufacturer: RAM Elevators and Lifts

Although this unit's travel of 295 in. is larger than would be allowed in the U.S. under A18.1, it does comply with B355, which allows up to 23 ft. of travel.

Andrew Smith of Uppercut Elevators said of the lift:

> *"The client for this application was really looking to save on the capital costs but wanted an accessibility device that had a 'wow' factor that would not detract from the appeal of the building. The use of a commercial traction lift from RAM fit the bill perfectly, and as you can see, the enclosure/hoistway built by the finishing carpenters really makes the whole thing stand out."*

The interior on this vertical platform lift has a full-height carriage. It is likely that those not skilled in the trade might think this is an elevator. However, a few key indicators (such as the wheelchair-accessible signage on the landings) show that it is, indeed, a lift for accessibility. Another indicator is the installation's unusual door type. The low-effort, bifold doors have a zero swing radius. This style of door is not unlike that of a home closet, yet still used on an accessibility lift in a commercial setting. Unlike a typical swing door, these doors avoid an extended turn-around-and-approach radius area at the landing for wheelchairs by having a low swing radius. In this application, the building had plenty of space, but in tighter locations, this type of door can replace a typical sliding door, the type of which is often seen on a passenger or LU/LA elevator.

As Figure 1 shows, this type of device can be much more architecturally attractive than a typical commercial VPL and blended to the style of the building by providing custom shaft constructions. Doug Roberts of Roberts Lifts explained:

> *"While this type of full-carriage VPL may not be well known in the industry, we have been using it very successfully in the Vancouver market for more than 10 years to help save clients money, while still accomplishing an elegant accessibility project."*

Summary

The key defining difference between a lift and an elevator is constant pressure operation versus automatic operation. The different codes that apply are B355 and A18.1 for lifts and A17.1/B44 for elevators. Lift limitations for both Canada and the U.S., by code, vary due to the lack of a harmonized code for lifts. The key differences between the two codes are platform area: 18 and 21 sq. ft. for the U.S. and Canada, respectively, as well as the limitation of 14 ft. of travel in the U.S., whereas in Canada, the travel can be up to 23 ft.

There are additional control-related differences between the codes, but any reputable manufacturer familiar with commercial lift codes will typically have already incorporated those aspects. As noted above, stretcher-ready accessibility devices can be accomplished. However, in reality, many jurisdictions will likely require a full passenger elevator for stretcher access. The use of a full-height-carriage lift product should always be discussed with the local AHJ before proceeding, but this will usually not be an issue of technical compliance and often a lack of familiarity.

While LU/LA elevators are an excellent alternative to full passenger elevators, the floor area is also limited. Lifts are actually allowed to have the same or larger floor area, but, in most cases, they have limited architectural aesthetics, as they are often considered more for function. In addition, pit depth on a LU/LA elevator, although shallower than that for a commercial passenger elevator, is still significant. There are, however, products on the market that can combine the aesthetics of a full-cab elevator with the function of a lift. This combination is typically less expensive than a LU/LA, can have more floor space and reduced pit depth, or even be put on grade. This arrangement, in some buildings, could offer a more attractive option for accessibility at a fraction of the cost of a LU/LA elevator if the client is willing to work with constant-pressure operation in its building.

Graham Kawulka is a professional engineer and partner at RAM Elevators and Lifts. He applies his technical background in manufactured equipment with experience in R&D, product development, sales, marketing, and profit-and-loss roles in Canada, the U.S., Europe and Asia as the head of Commercial Operations in the elevating device field. Kawulka graduated from the University of Alberta in Canada.

Learning-Reinforcement Questions

Use the below learning-reinforcement questions to study for the Continuing Education Assessment Exam available online at www.elevatorbooks.com or on p. 119 of this issue.

- How/which are the different codes that apply to lifts and elevators in North America?
- How are lift codes for Canada and the U.S. different?
- How does the application of lifts affect their acceptable uses?
- At what point do lifts or elevators become better solutions than ramps for accessibility?
- What are the advantages and disadvantages of using lifts over elevators, or vice versa?

ELEVATOR WORLD Continuing Education Assessment Examination Questions

Read the article **"Full-Cab A18.1/B355 Lifts — An Alternative to LU/LA Elevators"** (p. 51) and study the learning-reinforcement questions at the end of the article.

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1. How much travel is a VPL allowed to have in the U.S.?
   a. Whatever the AHJ will allow.
   b. Whatever the AHJ will allow, up to 14 ft.
   c. 12 ft.
   d. 23 ft.

2. What travel is a VPL allowed to have in Canada?
   a. Whatever the AHJ will allow.
   b. 12 ft.
   c. 14 ft.
   d. Whatever the AHJ will allow, up to 23 ft.

3. How many square feet can a VPL carriage have in the U.S.?
   a. 18.
   b. 21.
   c. 12.
   d. 25.

4. How many square feet can a VPL carriage have in Canada?
   a. 18.
   b. 21.
   c. 12.
   d. 25.

5. How many square feet can a LU/LA carriage have in North America?
   a. 18.
   b. 21.
   c. 12.
   d. 25.

6. Which code applies to VPLs in Canada?
   a. A18.1.
   b. B355.
   c. B44.
   d. A17.1.

7. Which code applies to VPLs in the U.S.?
   a. A18.1.
   b. B355.
   c. B44.
   d. A17.1

8. What is the main defining difference between a VPL and an elevator in Canada and the U.S.?
   a. Limited travel.
   b. Limited platform/carriage size.
   c. Limited weight capacity.
   d. A lift requires constant pressure controls.

9. Which section of A17.1/B44 applies to VPLs?
   a. Section 3.
   b. Section 5.2.
   c. Section 6.
   d. None of the above.

10. Which section of A17.1/B44 applies to LU/LA elevators?
    a. Section 3.
    b. Section 5.2.
    c. Section 6.
    d. None of the above.

ELEVATOR WORLD Continuing Education Reporting Form

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