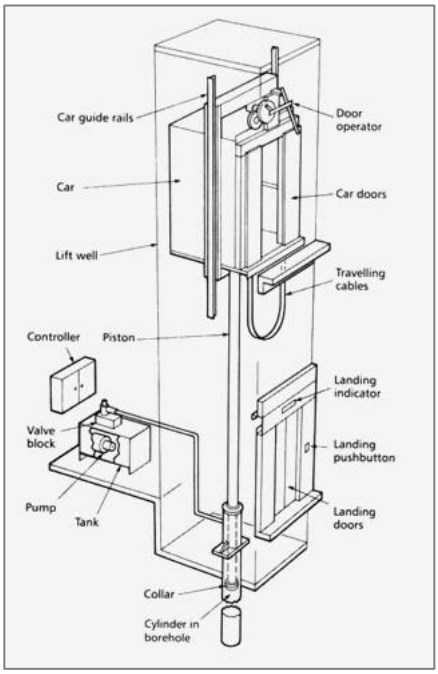
Elevator Interior Design:
The Critical Elements



Around the world, 325 million passengers ride on elevators every day. In only three days, that amount is equivalent to the entire population on Earth. It is an enormous number of opportunities for a company and its brand. Elevators give passengers their first and last impression of a building, which impacts perceptions.

Will your elevator's interior portray what the building owner intends to communicate for the company and brand? How about in the long-term? Or will high traffic quickly lead to sending the wrong message leading to a bad impression? A damaged elevator interior with scuffs, scratches, dents, discoloration, or broken parts can communicate abuse and neglect.

It raised a different perspective on the critical importance of focusing on durability and longevity when selecting your materials for an elevator interior. It's about maintaining that 'new car look' as long as possible to make a great first impression.

Material durability is more than a product lasting until the end of a warranty. It's about products made of materials that will keep their new look and feel long-term. Therefore, impact resistance is a feature to look for which will deter damage like scuffs, scratches, cracks, and gouges.

Another feature to look for is moisture resistance, which can prevent damage from moisture like humidity that can cause mold and mildew to grow. All affect a passenger's experience that influences the development of favorable or unfavorable perceptions toward a company and its brand.

No material is 100% immune to damage and can stay unaffected over the long term. But to what level a material loses its new look and feel, and how quickly can be estimated by looking deeper at the product. It takes looking at each material's makeup, manufacturing process, and past performance. Plus, evaluating every part of an elevator's interior, including ceilings, walls, floor, etc.

Building code compliant materials for elevator interiors are made of metal, wood, laminates, glass, and stone. Each has its own uniqueness, benefits, and drawbacks to consider. The following provides some insights for you to consider when selecting materials.

- **Metals**

Stainless Steel is the most popular choice for metal finishes compared to the alternatives like aluminum, copper, or bronze. It is especially the case with facility management, who love how great stainless-steel feels and looks once finished. However, metals naturally degrade over time and will require proper cleaning to maintain luster and a look of quality.

Textured steel is lower in weight than ordinary steel and can reduce it by up to 40%. The lighter weight has less density which brings operating costs down. At the same time, plain steel interiors can look very industrial, more like a freight car or inside a refrigerator.

The benefits of using metals include:

  - Stainless steel panels of the appropriate grade can be easily molded and shaped into surfaces without protruding edges that could cause injuries.
  - After buffing and polishing, stainless steel will have a look of luster and quality.
  - Textured metal is very resistant to impact, reducing the number of scratches, scrapes, and gouges from heavy traffic.
  - Metal will not burn

A few cons to consider are:

  - Metal is more expensive to install and restore/refinish.
  - Stainless steel smudges when it is touched.
  - Daily, plus monthly, or quarterly maintenance is needed, like buffing and polishing with special products to keep the luster.

- **Wood**

The first elevator can be traced back to 236 BC and was built of wood. Today hardwoods (ash, maple, mahogany, oak, teak) and softwoods (Douglas fir, pine, cedar, spruce, redwood) are still commonly used for building elevators interiors. It is frequently in the form of engineered and manufactured wood sheets.

Examples are Plywood, Industrial Particle Boards (IPB), and Medium Density Fiberboards (MDF), which are all made of wood fiber. Plywood is manufactured from thin layers or ‘plies’ of wood. The layers are bonded together with an adhesive into a sheet. Most manufacturers use an ‘interior’ adhesive which is urea-formaldehyde. It is not designed to withstand moisture. Water exposure can cause the softwood layers to warp or de-laminate.

There is also an ‘exterior” adhesive called phenol-formaldehyde resin. It became the standard bonding agent for ‘Marine’ plywood when it was invented back in the 1930s. It remains the standard adhesive for Marine plywood, made of higher-grade wood like Pine, Douglas, Spruce, and Redwood.

The phenol-formaldehyde resin adds to the plywood strength and resistance to long-term moisture exposure. It can tolerate a fair amount of moisture over a short period of time. The sheets can be dried out and will maintain their strength and finish.

The pros and cons include:

PRO	CON
• Wood is renewable – it can be repurposed and refinished	• Wood paneling does not tend to stand up as well as other materials with continual use and abuse
• There is more versatility with wood because it can be used in a variety of applications	• Insects like termites, carpenter ants, and post beetles can damage wood and affect both its appearance and strength
• Manufactured woods like Marine plywood are water-resistant and can tolerate some moisture without losing their look and feel	• Wood can warp, shrink, twist, or swell over time from prolonged exposure to humidity and temperature

- **Laminates**

When someone bring up the topic of laminates, people often first think about kitchen counters. But laminates are also used in elevator interiors, especially for renovations. People chose the material because of its versatility, impact resistance, low maintenance requirements, and limitless designs. Wood is used in some laminates, but most are made of other materials including plastic and glass.

A commonly used type is Polyurethane Reactive Laminate (PRL). PRL is a finished panel where thin sheet materials are bonded to both sides of a substrate using PUR adhesive. Laminates are manufactured using either a high- or low-pressure. The type of pressure used adds different characteristics that influence its durability. High-pressure manufactured laminates have more strength, stability, and sound insulation than low pressure. They are also very resistant to heat and impact. Plus, they will expand or contract in response to humidity.

Therefore, buying quality high pressure manufactured laminate is important to gain long term durability. PRL and other laminates are commonly used in elevator interior walls, base, canopy, suspended ceilings, doors, and handrails.

The pros and cons include:

PRO	CON
• High-pressure products are impact and heat resistant; will expand and contract with temperatures	• Low pressure manufactured laminates can warp from humidity and they are not easy to repair

• Durable for up to 15 years & low maintenance required	• Not always visually appealing – i.e., the appearance of wood, it doesn't look as genuine
• Cost-conscious choice - can cost $3-$7 per square foot, including installation	• Wood can warp, shrink, twist, or swell over time from prolonged exposure to humidity and temperature

- **Glass**

Glass is another material that is often used in elevators interiors. It is selected because of being extremely lightweight, scratch- and damage-resistant, and needs minimal maintenance. Plus, a large variety of laminated or painted patterns, color choices, and texture options. Building codes specify the requirement of using 'tempered glass' for lining walls and ceilings of elevator cars.

Tempered glass meets the following standards:

- The glass is bonded to a nonpolymeric coating, sheeting or film backing having a physical integrity to hold the fragments when the glass breaks.
- The glass is not subjected to further treatment such as sandblasting; etching; heat treatment or painting that could alter the original properties of the glass.
- The glass is tested to the acceptance criteria for laminated glass as specified for Class A in accordance with ANSI Z97.1 or Category II in accordance with CPSC 16 CFR Part 1201.

The pros and cons include:

PRO	CON
• Glass panels let sunlight pass through into the elevator cab reducing the need for electricity	• Glass is thought of as a Residential elevator material and not Commercial
• Glass provides the people on board with an optimal 360° view and feel of the building	• Glass must be frequently cleaned
• Glass adds space to an elevator, offering greater comfort and convenience	• Glass can be expensive

Another building code-compliant material for elevator interiors is stone. It is less frequently used, but it is non-combustible, strong, and durable. It also creates a unique appearance.

Another Consideration, Building Codes

Another critical area of consideration is building codes. The materials you select must comply with all code requirements for elevators. The main national codes come from the International Building Codes® (IBC) and the American Society of Mechanical Engineers (ASME). There are also federal, state, and city building codes that apply.

For example, there are building codes from the American Disabilities Act that specify requirements, including those listed below. Many of these requirements are standard across all types of elevators—but certain systems can have requirements unique to their technology.

- Elevator must be easily accessible in a public space
- Doors must remain fully open for at least three seconds
- Call buttons are a minimum of 0.75 inches in diameter
- Button heights must be centered 42 inches from the floor
- Car must be at least 51 inches deep and at least 68 inches wide
- Door width must be at least 36 inches
- Braille must be below or next to floor numbers on the control panel
- Automatic verbal announcement of stop or non-verbal audible signal of passed floors and stops must be used
- Two-way communication must be available in elevator cabs that deaf/blind users can use
- Emergency controls must be grouped at the bottom of the elevator control panel and have their centerlines no less than 35 inches above the finish floor

Code requirements are care separated into categories, including fire resistance (for shafts, machine spaces, and elevator lobbies), hoistway ventilation, accessibility, foreign equipment restrictions, HVACs, plumbing, fire suppression, emergency firefighter operations, fire alarm, and electrical. Some of the ASME elevator codes are below.

- ASME A17.1 - As a code, is intended to provide safety of life and limb and promote public welfare. It covers elevators, escalators, moving walks, dumbwaiters, material lifts, and related equipment and their associated parts, rooms, spaces, and hoistways.
- ASME A17.1- The code is broken up into specific parts to ease compliance. Besides those detailing general requirements, each part covers specific equipment—electric elevators, hydraulic elevators, elevators with other driving machines, special application elevators, escalators and moving walks, and dumbwaiters and material lifts. This document details a range of interests but is succinct enough to be adopted by regulatory bodies.
- IBC 2021 Chapter 30 Elevators & Conveying Systems – Chapter 30 at www.codes.iccsafe.org covers the design, construction, installation, alteration, and repair of elevators, conveying systems, and their components. It includes the provisions that regulate vertical and horizontal transportation and materials handling systems installed in buildings. The chapter also provides several elements that protect occupants and assist emergency responders during fires.

Keep in mind that you may think the material is code complaint because it is listed, but that does not give you the green light to use it. For example, if a laminate panel, adhesive, and substrate are all Fire Rated, that does not mean they meet building code compliance requirements. It just means the product conforms to the code. Some materials must still be inspected, tested, and certified.

The Bottom Line

The bottom line is that when it comes to elevator interiors, the materials you select have a significant impact on the outcome in the future. The decisions made will put into place factors that will affect the experiences of many, many people. Those experiences will create impressions that turn into perceptions about a company and brand. Favorable perceptions contribute to successfully building a strong company and brand positioned for growth.

Putting it all into motion requires digging a little deeper in finding, scrutinizing, selecting, and recommending each material for an elevator interior. It means asking and answering a few simple questions to evaluate each material considered. They are:

- *Will this material contribute to fulfilling the project and customer needs?*
- *Will this material contribute to the goals my customer is trying to meet?*
- *Will this choice fulfill all the building code requirements?*

If you have NO answer, it's time to go back through the process and find something else. If the choice is not compliant with building codes, you will not pass inspection. If you fail inspection, the project will be delayed while you make corrections. That will move project completion further into the future. It's an outcome than often does not bring a favorable response or winning outcome.